





AN

+ ILLUSTRATED + WEEKLY + MAGAZINE +

FOR THE

ARCHITECT, ENGINEER, ARCHÆOLOGIST, CONSTRUCTOR,  
SANITARY REFORMER, AND ART-LOVER.

CONDUCTED BY

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FELLOW OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

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"Every man's proper mansion-house, and home, being the theater of his hospitality, the seat of self-fraiture, the comfortablest part of his own life, the noblest of his sonne's inheritance, a kinde of private princedom, nay, to the possessors thereof, an epitome of the whole world, may well deserve, by these attributes, according to the degree of the master, to be decently and delightfully adorned."

"Architecture can want no commendation, where there are noble men, or noble mindes."—SIR HENRY WOTTON.

"Our English word TO BUILD is the Anglo-Saxon Bylban, to confirm, to establish, to make firm and sure and fast, to consolidate, to strengthen; and is applicable to all other things as well as to dwelling-places."—DIVERSIONS OF PURLEY.

"Always be ready to speak your mind, and a base man will avoid you."—WILLIAM BLAKE.

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LEFT COMPARTMENT: HISTORY AND PHILOSOPHY.





THE B. B. B. JULY 4, 1917

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#### The Imperial Institute Competition.



HE six designs submitted in the limited competition for the Imperial Institute have been on view to the public this week in the Vestibule of the late Indian and Colonial Exhibition. The building, as our

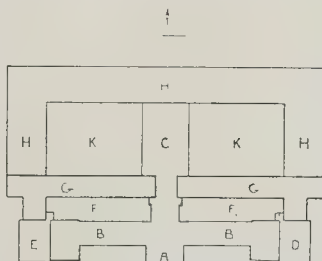
readers are probably aware, is to stand on a site within what were the Horticultural Gardens, on a line axial with the centre of the Albert Hall, the principal front facing southwards towards the back of the Natural History Museum. It seems, to begin with, a mistake to face the front of one great building towards the back of another,—at least, it is unfortunate, but perhaps could not well be avoided on this site.

We have always maintained that the site was a mistake for the purposes and meaning of the building, and that, failing sufficient subscriptions, public money should have been voted for doing the thing in a grand manner on a site near the great Palace of the Imperial Legislature; and that on such an occasion cost ought to be no element in the matter, or at least no obstacle. The exhibition of the designs does not tend to modify our conviction. Nearly all the competitors are obviously hampered by the attempt to do something big without enough money to do it. Two of the finest designs are too costly for the circumstances; the only one which is a typically monumental design is obviously impossible for the money. The selected design is a good one as far as plan is concerned, and the design is picturesque and rich in effect, but it is not a design rising to the occasion of a building of such great significance and importance.

The principal requirements appear to have been a grand reception-hall, a library, a

conference-room, various rooms for secretaries and committees, permanent museum galleries, and capability of future extension. It is obvious in such a case that the reception-hall and the State entrance form necessarily the centre of the whole, the nucleus around which the other departments should be grouped.

The design submitted by Mr. Colcutt, a perspective of which we give in the present number, has the merit of providing a sufficient and complete building on plan for the present, with a very convenient and easily managed provision for large extension. How this is generally arranged will be seen by the small block-plan appended, the blocks marked as future per-



Block Plan of Imperial Institute.

#### REFERENCES.

- A. Principal Entrance.
- B. Main Building.
- C. Reception Room.
- D. Library and Entrance.
- E. Conference-room and Entrance.
- F. Quadrangles.
- G. Permanent Galleries.
- H. Future Permanent Galleries.
- K. Occasional Exhibits.

manent galleries extending along the north front, with returns on the east and west sides to join the system of permanent galleries proposed to be first built. The large spaces marked K on the block plan, which will then become enclosed quadrangles or gardens, will be available for temporary exhibitions, but this

whole space, as well as that occupied by the future extension of the galleries, is at present left entirely out of the building scheme; and it is no doubt this well-managed economy of building for the present which has done a good deal towards recommending the selection of this plan, the funds available so far being obviously insufficient for the production of a monumental building of a high class to cover the whole site. Generally speaking, the plan (which we are unable to give in detail this week) is simple, practical, and effective in arrangement. The principal entrance leads up a broad and lofty flight of steps, first through a square vestibule chamber forming the base of the tower, thence to the cortile of the principal staircase, then through a large octagonal ante-room top-lighted, and thence to the grand reception-room, with an apse at the upper end. The front vestibule, under the tower, opens right and left on to what may be called the administration blocks (marked B on block plan), with long corridors giving access to the secretary's rooms, committee-room, &c. (facing towards the quadrangles F); and leading on the west to the door of the general conference-room and on the east to that of the library. There is thus a capability of a very fine vista straight from the principal entrance to the apse of the reception-room, and another east and west, across the first vestibule, along the whole of the administration blocks. A similar east and west vista is obtainable along the permanent galleries and through the openings in the inner octagon vestibule. The general entrances for the public to the galleries are in the basement of the conference-room and library at each end, through the arcades shown in the perspective.

The design is, as will be seen from the lithograph, an exceedingly graceful and rich composition, in the style of modified Renaissance which Mr. Colcutt's architectural muse (architects may surely have their Muses as well as poets) has in general inspired him with.



As far as the main body of the building goes, it is a very pleasing piece of architecture. The tower we hardly think is so happy; it is rather too bare to assort well with the richness of the rest of the design, and seems, at any rate, to demand a more richly-treated upper story and lantern to be worthy of its position. Our conclusion as to the design generally, however, is that, charming as it is in itself, it is not of the stately and monumental character which we should associate with a national building second only in importance to the Houses of Parliament, if second to that. This can, perhaps, hardly be charged, entirely at least, against the architect. The funds for a building such as the occasion demanded have not been promised. Mr. Colcutt has evidently been influenced by considerations of economy; and we cannot say how far he might have risen to the occasion had he not had this stumbling-block of economy before his eyes.

We have described the design in the title to the plate, as accepted "subject to modification," in accordance with the decisive official expressions which have been communicated to us, that the Committee of the Imperial Institute do not bind themselves to erect that design, and that it may be subject to considerable modification. It was decided, however, to accept it as, at all events, the basis of the building to be erected; a decision, by the way, which its architect first learned from a letter from the editor of this journal, some days before it was made public, though, as the information came to us informally and in conversation, we did not feel at liberty to make public use of it.

Having described first the accepted design, we will take the others in the order of hanging. That by Dr. Rowand Anderson certainly does not serve to explain the reputation which its author enjoys in the northern portion of this kingdom, and Scotland may be said, in fact, to be out of the running altogether. The plan is scattered and wanting in arrangement and concentration, and the design is simply a piece of commonplace, not meriting higher praise than that of being "neat and appropriate"; the author has failed to realise the importance of the occasion, and has produced a design which only suggests the idea of a large training college.

Mr. Blomfield's plan consists of two great quadrangles divided by a large central block running north and south; the central portion of this contains the reception-hall; the State entrance is, as in all the plans, in the middle of the south side, and gives access to a large octagonal entrance-hall 70 ft. diameter, leading through a small vestibule to the reception-hall beyond. The octagon hall is square externally, and the angle spaces internally are occupied by deep arches, niches, or recesses, with columns and galleries crossing the openings in a rather artificial manner; but the effect of this octagon hall with its deep recesses, lighted from a dome and lantern above, would undoubtedly be very fine internally, and be a worthy entrance on State occasions. Externally the octagon dome with a solid basement, a large triple arcaded opening on each face, and a rich cornice and gallery below the base of the dome, is a very fine feature; but the effect of this central feature of the south front is sadly marred by the arrangement of the roofs of the adjoining blocks of building north and south so as to stop short of the base of the dome, and leave a gap on each side of it. Had the lower portion of the central feature, comprising the grand entrance porch, been enlarged in scale and carried higher, this defect would have been avoided, which goes far to spoil an otherwise fine design. The main blocks of building are in two nearly equal stories, with a low rusticated basement under them, and a rather too lofty roof over them, which seems to depress the whole structure more or less. In the plan the more public entrance to the galleries is on the north side, where there is a staircase and large coloured vestibule behind it, which seems of very little use either for architectural effect or practical convenience, access being had to it only by narrow doors and side corridors; it is cut off architecturally from everything, and is a most singular piece of

planning; and the front blocks on the south side are curiously irregular in planning for a building of this type; as we heard it remarked, it is "house-planning," not public-building planning. The galleries for exhibition are on the north, east, and west sides, and the spaces enclosed utilised for occasional exhibitions. This part of the plan is suitable enough practically, but there is no internal effect or vista anywhere except in the entrance-hall and reception-hall. The author can claim credit for considering, however, one point, which several other competitors have entirely neglected, the desirability of doing something with the north front, towards the Albert Hall, instead of leaving it a mere back elevation. It is adequately treated in a Romanesque style with dark and light bands, the main features crowned by *frontons* (a convenient word which we will take the liberty of adopting from the French), with open arches, in which statues are placed standing free; a pretty architectural effect, though not the best way to show a statue, certainly. The pencil detail elevations of part of the south front show very graceful and pleasing work. The main perspective view, also in pencil, is ineffective and flat in execution, and seems to have been hurried.

The design by Mr. Aston Webb and Mr. Ingress Bell shows a most elaborate set of drawings, and is certainly in every respect one of the most notable of the designs. The general style of the design is evidently intended to assimilate to that of the Natural History Museum, so as to produce a certain architectural unity on the site. The buildings are disposed in two great parallel lines running east and west, with crossing blocks at either end, projecting north and south beyond the line of the main blocks, so as to give force and projection to the angle and structure. On the south elevation these side blocks project about 60 ft. in front of the main line of building, and rise into angle pavilions, while the centre shows another projecting block considerably higher. In front of this centre pavilion is left an open space up to the boundary of the site (the other portion of the ground in front being enclosed as ornamental gardens), and in the centre of this space stands a monumental tower, entirely free, having a highly-decorated lower story, with a niche on each face, that on the south face being occupied by a statue of the Queen. This separate tower is a fine idea, and the tower is very well treated architecturally, but it may be questioned whether it is large enough in scale for the occasion; it looks so in the perspective view where it is placed in the foreground, but in the section it hardly seems sufficient to assert itself and dominate the building. In the plan, as in Mr. Colcutt's plan, the north and parts of the east and west galleries are planned for future addition. The style adopted is a Romanesque Gothic much on the same type as that of the Natural History Museum. The principal entrance is through a deeply-recessed arcade into an arcaded and vaulted vestibule, across which is reached the reception-hall, placed in the centre block running north and south. The great galleries run right and left from the vestibule, and the authors appear to have boldly left the whole open to the vestibule so that the whole of this part of the building can be seen through from end to end; there is an arcaded court running up through two stories on either side of the vestibule, then the long gallery, then another arcaded court; the whole would make a beautiful interior effect. The library is at the back of the reception-hall, on the north front, and reached by corridors on either side of the reception-hall. A large detail drawing of part of the centre pavilion (south side) shows exceedingly rich and effective work, apparently intended for terracotta execution: a frieze of figures runs along the top in the central part, and is stopped by the projections at the ends of this pavilion. It may be a question whether the decorative details of windows and arches are not a trifle large in scale as compared with the scale of the human figure. The whole effect, however, would have been very rich and grandiose; also rather costly, which has perhaps militated against the design. Sufficient attention has

been paid to the north front. The tower is treated in a very original manner, the buttresses at an angle of 45 deg. in the lower portion, rising first from the square ground-line with no very great projection, but developed inwards in the upper stage by the setting back of the wall face, and finally resulting in a kind of arcaded angle buttress connecting the octagon lantern with the substructure; the development of octagon out of square is thus managed in a manner at once playful and solid-looking. The square pavilions terminating the wings have a very solid appearance also, though they are perhaps a little squat in proportion, and the towers and octagonal turrets at the re-entering angles are exceedingly well placed. The whole design is very well considered, and has the unity of conception so essential in the architectural treatment of a large public building.

Honour to Ireland: for the design by Mr. T. N. Deane, who represents the sister kingdom in the competition, is the most distinctly monumental and imposing of the whole set, both in regard to plan and design. It is a very costly design, so much so as probably to put it out of court on that ground alone; but it is a very fine conception. It is Classic in style; the plan shows a grand flight of steps up to a columned portico, which gives access through a small vestibule into a large central hall, worked into an octagon with niches at the angles; the library is beyond, and corridors opening east and west lead to an assembly-hall westward and a conference-hall eastward; the wings curve outward, southward, in semicircular porticos, leaving open areas between the back of the corridors and conference-hall and assembly-hall, and leading to further corridors giving access to minor rooms. Unfortunately this part of the plan, however symmetrical and striking it may look on paper, is very inconvenient and impractical in arrangement, and would prove a very inconvenient working building; and the colonnaded aisles at each side of the assembly-hall with doors at each end would, unless the doors are kept locked, become practically passages. The assembly-hall, to seat 1,000 persons, is, we suppose, practically intended to be the reception-hall, for there is no apartment marked as reception-hall; but if so, this is a mistake, as the reception-hall ought to be, in its position and approaches, the grand central feature of the building, whereas the approach to it in this case is a side one, balanced by the approach to the less important apartment assigned to the conference-room. Behind the main building is the most distinctive feature of the plan, in which it differs from every other one, viz., an immense amphitheatre (so-called), a vast longitudinal apartment with each angle curved into a semicircle, with special external entrances on the axis of the semicircle, and also internal entrances (not sufficiently large) from the corridors of the main block. All this, however, is shown in outline only on the plan, and, therefore, we presume, is only intended as a future extension. The design contains no special novelty of detail; it is a Palladian type of architecture, with a rusticated basement story and a large order of unfluted Corinthian columns running through the stories above. But the grouping as seen in the perspective view, with the long horizontal lines of surbase and cornice, the curve of the arcaded corridors, the smaller angle pavilions with their eight octagonal cupolas and the large dome in the centre, forms an exceedingly grandiose composition on what are certainly very old-fashioned lines of architectural design; a composition which might no doubt be improved and diversified in detail, but which could not fail to command admiration as a whole. The principal floor, we may observe, is lifted to the level of the lofty surbase, up to which the great flight of entrance steps leads: the steps are flanked by an immense podium on each side, supporting a colossal statue. The conference-hall and assembly-halls rise as square masses behind, and assist in telling the story of the internal plan. The dome is constructed on the same principle as that of St. Paul's (unfortunately, for, with all reverence for Wren, it is a false



principle); there is an inner masonry dome and an outer timber one, but the place of the cone is taken by a high curved dome, a small segment of a large circle, which carries the lantern. The latter might be improved in design; it is heavy and ungraceful, and in the interior the author has repeated the mistake of Wren in hanging inwards the pilaster order in the drum of the dome. He has also indulged liberally in the use of the conventional vase (of portentous size in this case) for balustrade finials. In short, the design includes many of the long-recognised weaknesses and mistakes of Classic design of the type adopted; but while its faults are those of the type of architecture employed, its merits are those of the present designer, who might have done a still finer thing had he given a little loose to his fancy and invention in detail, instead of following recognised, but by no means faultless, precedents. The plan would require remodelling in many of its points, for practical reasons; but as a design, and independently of the question of cost, it is certainly the grandest and most stately and monumental in general conception.

Mr. Jackson's design is shown in a most beautiful set of drawings, and contains, as every one would expect, a great deal of architectural beauty and refinement. The plan, however, is certainly a mistake for a building of this class. The entrance, from a *porticochère* into a vestibule under the central tower, is in itself a narrow and rather poor one, and is further completely marred, as a matter of interior architectural effect, by its total want of centralisation and climax; the inner door of the vestibule leads up to a blank wall on the other side of a passage; the visitor has to turn to the left and then to the right again to enter a hall or crush-room of by no means imposing proportions; the whole design of the front block is "house-planning" again, and not very good house-planning; a crowd of rooms with very small areas for light burrowed into them. This may be called a picturesque arrangement of plan, but ever since great buildings for state purposes have existed the world has thought that spaciousness and symmetrical arrangement are necessary conditions of dignity and monumental character; and the world is likely to go on thinking so. The museum galleries in the plan are placed as narrower blocks along the east, west, and north sides of the site, enclosing a quadrangle, and an extension wing is indicated on the east and west sides. The design is, in the main, a very pleasing one. It is Elizabethan in general character; the ground-story has an arcade of semicircular arches with windows under them; above are long mullioned windows running through two stories, with decorative panels along the centre dividing the stories; and the elevation finishes with dormers of the Caius College gateway type. The building is of brick with stone dressings. The tower, nearly 300 ft. high, is a fine and picturesque one in general outline, and rising rapidly as it rises through its successive stages, and developing into open arcades in the upper portion; the general outline and composition reminding one of a North-German Hôtel de Ville type of tower, though the details are very different, and some of them very objectionable. The large double curls of stone stuck on the top of some of the turrets and connecting them with the tower are (whatever precedent may be quoted for them) pieces of huge gimcrack, in the worst taste, and it is quite a pity that a design in general marked by good taste and refinement should have been disfigured by them.

The exhibition of the designs seems to have excited very little interest among the general public, as far as we noticed; the majority of the few people visiting them were apparently architects, who, of course, had a special interest in them. Of other visitors there were very few, as far as we had any opportunity of observing. The public will fight for seats to see the ceremony of laying the foundation-stone, as they will for any other chance of assisting at a ceremony in which royalty is concerned; but what is to be erected over it is a matter they are apparently quite indifferent about.

## THE PROPYLEA AT ATHENS.

BY W. WATKISS LLOYD.

**T**HE progress of the excavation of the surface of the Acropolis at Athens, which has brought to light such a store of examples of the Archaic style of Attic sculpture, has not been without results of peculiar interest to architects; it has laid bare, quite unexpectedly, the complete ground-plan of what appears to have been originally the principal temple of the tutelary goddess of the city. The site of this is so close to the Erechtheum as to be encroached upon by the Caryatid portico; it appears to have been the temple which was destroyed by the Persians. It was with great judgment that a new position,—that of the present Parthenon,—was adopted for the restored chief temple on somewhat higher ground, at a greater distance from the entrance to the Acropolis, and of more favourable presentation and conspicuousness.

At the present time, when so much is planned and in progress around us for opening out and widening the approaches to our national buildings of ancient date, and others that are in contemplation, it may be worth while to draw attention to some principles of grouping and relative proportion which commended themselves to the genius of the architects of the city "of the violet crown."

In designing the Propylea of the Athenian Acropolis the architect was, above all things, governed by loyal regard to its becoming relation and subordination to the Parthenon.

It was required by the proprieties of the case, and by the proximity of the two structures both in the same style of architecture, that this important entrance to the Acropolis should support and not have the air of competing with the Parthenon, and be so arranged as to favour the best aspect of the Temple, both from special distance and presentation.

This last condition was accommodated by the distance of their respective east and west porticoes, being exactly equal to the length of the Parthenon on flank; and then by the parallel axis of the Propylea being placed so far to the north that the produced diagonal of the plan of the Parthenon from S.E. to N.W. strikes exactly the centre of its east portico.

In consequence the Parthenon was presented to one entering the Acropolis at the favourable angular aspect, a front and flank coming into view together and in agreeable perspective, the flank colonnade not excessively foreshortened.

The approach not only up to but through the Propylea was an ascent, and the Parthenon is again upon a higher level. That the platform below its lowest step is exactly on a level with the cornice of the Propylea cannot be a mere coincidence, but proves that the adjustment of relative level was also determined after consideration and on a principle.

That the porticoes of the Propylea are hexastyle was sufficient so far to subordinate them to the octastyle temple; but it was also of importance in promotion of the same object that greater lightness should be given by more open spacing, and then by an inferior scale for the columns.

The determination of this scale was all-important; only by a certain dignified approach to the massiveness of the Parthenon columns could those of the secondary structure harmonise with them; the problem for the architect was, therefore, to decide on a relative proportion which should avoid competition on the one hand and meanness or meagreness on the other.

The lower diameter of the Parthenon column is 6·245 ft., and that of the large Doric order of the Propylea 5·11 ft.

Compared directly these are as 9 : 11 (11 : 9 :: 6·245 : 5·109.—Cf. measured 5·110). The areas of circles are to each other as the squares of diameters; and these columns consequently are proportioned to each other by area of plan, as 2 : 3 (81 : 121);  $9^2$  (= 81) :  $11^2$  (= 121). Such is the simple relation of the masses, whether or not so determined.

The foregoing determination of an appropriate diameter for the column relatively to

that of the Parthenon gives at once a general limit for the height of the column, and even for its spacing. It is in accordance with the adopted principle of greater openness of spacing that the column is loftier relatively to the horizontal complement; that is to the joint heights of the entablature and steps; and that the metope is broader relatively to the triglyph than in the Parthenon; there is, in fact, a general widening out of intervals,—of voids relatively to solids.

It would probably be a mistake to attempt to discover which of these adjustments was decided first and determined others; the ultimate design may be assumed to have been the result of many trials of modes of conciliating advantageous relations, and chosen at last, it may be, as the best out of several, each with considerable pretensions.

There is more to be hoped from tracing the harmony which the artist did achieve and rested in than in presuming to set forth how he first arrived at it, or how he must have been guided to it, though even of this we may have an occasional glimpse.

A conspicuous peculiarity of the composition is the central ditriglyph spacing of the two porticoes, which was adopted to admit of the equivalent of a carriageway.

The triglyphs are proportioned in breadth to the metopes as 9 : 14; to compare with 9 : 12 (= 3 : 4) in Parthenon.

Thus the central columniation or extent from axis to axis of the two central columns would embrace on the entablature three metopes and three triglyphs,—two whole and two halves,— $9 \times 3$  (= 27) +  $14 \times 3$  (42) = 69.

The adjacent columniation would answer to two metopes and two triglyphs,—

$$9 \times 2 = 18 + 14 \times 2 (28) = 46;$$

$$\text{and } 46 : 69 :: 2 : 3.$$

The central columniation, in the terms of this comparison, is to the adjacent as 3 : 2. The completion of the architrave at either end comprises two metopes and two and a half triglyphs, = together  $14 \times 4 = 56 + 5 \times 9$  (= 45) = 101 ÷ 2 = 50½, apart from possible modifications of the triglyphs and metopes by the angles.

We find therefore that, in effect, the stylobate is divided into three equal parts, of which the central part is assigned to two columns, and the single broad intercolumn, and each of the others to two columns and two ordinary intercolumns, except that the one by the angle is contracted by the angle column being moved inwards towards the centre and from the central line of the triglyph above, to accommodate the normal termination of the entablature. This is the ordinary well-known Doric adjustment, due to the circumstance that, had the axis of the angle column been allowed, as in the case of the other columns, to plumb with the centre of the triglyph above, it must have weakened the composition by projecting idly beyond the end of the architrave.

The distribution so far is compatible with any variety of heights and spacings of the column.

The height given to the column of the eastern portico equals 5½ diameters. (In the Parthenon this height comes out curiously near to 1·6th of the mean diameter of the angle column. Here it compares, however, with 5½ the ordinary diameter, 34·347 as 34·253,—thus with a reduction of 0·094.

This gives to each triplet group of columns exactly the same height as its breadth on plan; it brings them, in fact, into a square. They are so spaced that the intercolumn on the right and left of the centre is proportioned to the diameter of the column, as 4 : 3.

The central intercolumn is to the diameter of column as 7 : 2.

The abacus of the column is exactly 1·13th of 70 attic feet, a dimension of which we shall presently recognise the importance here in relation to a leading dimension on plan.

$$70 : 938 = 13 = 5 \cdot 456 \text{ (measured } 5 \cdot 466).$$

The abacus of the Parthenon west front, with which it comes most directly into comparison, averages, according to Penrose, 6·578; this compares with the above very closely as 6 : 5.

$$6 \cdot 578 \div 6 = 1 \cdot 096 \times 5 = 5 \cdot 480.$$



The eastern portico has only one step, which thus represents a mere stylobate; its height is included in the rectangular proportion of the front, that is, the proportion of height to breadth, but not in the rectilinear or proportionate division of heights, which appears in most cases to be the most important comparison.

In the Parthenon, the height of the architrave is rather less than the upper diameter of the column; here it agrees very closely; it is exceeded by the frieze, as usual, by a fraction.

The horizontal cornice, which in the Parthenon is proportioned to the frieze as 4 : 9, is here as 3 : 8.

With this addition of the cornice, the height of the entablature comes out proportioned to the central wide columniation as 1 : 2.

The addition of the pediment with its cornice completes the façade, and a total height, which compared with the breadth of the stylobate gives a rectangular proportion of 11 : 16. This is one of the series having a difference between the terms of 5, which is employed in regulating all the proportions of the Parthenon.

The joint height of the pediment and entablature,—that is, the horizontal complement less the stylobate,—compares with the height of the column in the simple superparticular ratio, 2 : 3.

The western elevation repeats the eastern with the differences first that the column is made loftier to the extent of the thickness of the abacus,—or what is nearly the same, that of the eastern stylobate; and then that the stylobate is augmented and consists of four steps.

The additional height thus conferred brings out a ratio of full height to breadth of front as 3 : 4,—the ratio which is so much in favour for hexastyle compositions; it also accommodates a proportion between the joint height of column and entablature, and the breadth of front, as 6 : 11, another ratio of the Parthenon series.

A like comparison holds good in the Parthenon, where the proportion is with marvellous exactness 4 : 9.

9 : 4 :: 101 341 measured breadth : 45 0426, differing from measured height 45 046 by 0 0034,—Penrose's dimensions.

The eastern symmetry between the height of the column and the spacing on plan is of course lost by the change of the former.

The comparison of height of column with the full complement,—that is, joint height of pediment, entablature, and steps,—brings out here, not as usual in many examples of fine Greek architecture, a simple super-particular ratio, but 7 : 9 very exactly.

To obtain a super-particular ratio, we must arbitrarily leave out of account one step, as on the east front; the satisfactory ratio will then emerge of 3 : 4 (4 : 3 :: 28 960 : 21 72).

It may be noted that, whether by unregarded or regarded coincidences, the same proportion 4 : 9 exists between stylobate and entablature, and entablature + stylobate and the height of the column. This is probably one of the coincidences which are certain to occur when combinations of very simple terms are dealt with.

The caution cannot be too strongly insisted on that no numerical relations are to be taken account of unless the parts they apply to come into comparison significantly and naturally.

The architect seems to have worked in the small Doric order of the wings by the general proportion of the larger order of 7 : 10, though the lower diameters of the columns as given compare somewhat more and indeed very exactly as 11 : 16.

Supposing the ratio 7 : 10 to be applied to these diameters, the sectional areas would then approximate to the simple ratio 1 : 2 ( $7^2 : 10^2 :: 49 : 100$ ).

This proportion would require for the smaller column diameter 3 577 as against 3 516 measured.

The full height assigned to the western front only exceeds that of the line of cornice of the Parthenon above the pavement by (51 592 - 51 104) = 0 488.

We now proceed to consideration of the plan, which, there can be no doubt, was not

settled independently, but taken into consideration concurrently with the considerations of propriety which applied to the elevation.

The general structure may be described as consisting of a central hall, divided by a cross-wall and portals from a hexastyle portico on the east, and entered from the west through another stately Doric portico, beyond which two smaller porticos as advanced wings are at right angles to, and so embrace, a number of steps which lead up to the entrance. Both steps and porticos and hall are traversed by a broad road, which leads through the structure by the ditriglyphal inter-columniation to the interior of the Acropolis.

The axis of the building, taken from the edge of the step of the eastern portico to the line connecting the ante of the small advanced western porticos is obtainable from the engravings of Mr. Penrose's book, as 101 248. The fact is not observed there, but we cannot doubt that the basis of this measurement was the same hecatempedon, or 100 Attic feet (101 341), which measures the breadth of the Parthenon.

One half of this dimension is given to the central hall and west portico; the other half is equally divided between the eastern portico, and the steps advanced westward and flanked by the subordinate porticos. The two central ionic columns of the hall lie in consequence on the central transverse axis of the general composition on plan.

Upon this scheme 50 670 would be assignable to the central hall.

The measured dimension from the edge of the western stylobate to the cross wall is as near to this as 49 977.

This leaves 27 322 for the cross wall with the five portals and the eastern portico, which is in excess.

These joint dimensions (27 322 + 49 977 = 77 299) exceed the theoretical 3-4ths of the hecatempedon by 1 300, at the expense of the 1-4th assignable to the western extension, which, in fact, is given as (20 815 + 3 134 =) 23 949.

It will be seen that this anomaly is not to be escaped by any distribution of the width of the cross wall between the eastern portico plan and that of the central hall. I do not doubt that it was deliberately admitted for the advantage of some proportions of the interior of the building.

The hall and the eastern portico are on different levels, and this would render precise exactness of proportion less necessary, to say nothing of the uncertain distribution between the two of the thickness of the cross wall.

The breadth of the platform to which the steps of the advanced flanks immediately descend is given as 70 603. This is so near to 70 attic feet (70 939) that I do not doubt that this dimension was so regulated to have the proportion of 7 : 10 to the main axis of the structure.

The width of the carriage-road is limited by the wide central intercolumn; it occupies very nearly 1-5th of the width of the central hall, and this is proportioned to the side avenues, as 1 : 2.

The proper area of the central hall may be considered as limited by the line of the cross wall eastward, and westward by the plumb of the abacus of the west portico. This would give 49 977 - 5 466 = 44 511 to compare with the measured breadth, and bringing out very accurately the simple proportion 3 : 4.

4 : 3 :: 59 527 : 44 643 to compare with 44 511 as deduced.

The height of this hall was necessarily determined, apart from subordinate accommodations in treatment of the marble ceiling, by that of the order of the west portico, and this height would, of necessity, control the magnitude and proportions of the ionic columns.

This height is 36 786, or very slightly exceeding the height to the summit of the external frieze, as taken to the under side of the marble beams that carry the lacunaria.

This dimension would require to be increased by as much as 0 414 (= 37 20 to accommodate moderately simple proportions to the length and breadth of the hall.

Height.	Breadth.	Length.	
37 20	44 641	59 527	5 : 6 : 8
	3 : 4		3 : 4
5	6		5 : 8
	5 : 8		

It does not appear, however, how such an increment of height can be justified.

The height at command for the ionic columns, after allowance for the architrave, is 33 989; from which is derived their lower diameter of 1-10th,—3 387.

The design was for three ionic columns on either side of the carriageway, upon the space from the western portico columns to the cross wall, viz., 44 685.

Deduct from this the sum of three diameters :—

$$44 685 - (3 387 \times 3) = 10 161 = 34 524$$

This remainder is divisible among the four intercolumns :—

$34 524 \div 4 = 8 567$ , which agrees with the measured to a fraction. Columniation :—11 954; diameter, 3 387 = 8 567.

This apportionment accommodates a proportion of diameter of column to intercolumn nearly as 2 : 5.

5 : 2 :: 8 567 : 3 427 (Cf. 3 387 measured, err. 0 04).

The intercolumn also compares with the transverse intercolumn very closely as 3 : 5.

The space given to the Pinacotheca and its portico north and south compares with the full breadth of the interval between the flank porticos now very nearly as 2 : 3.

$$78 627 \div 3 = 26 225 \times 2 = 52 450. \text{ Cf.}$$

51 771 measured.

## THE LAW OF LIGHT AND AIR IN INDIA.

HOSE who advocate the abolition in this country of the easement of light, and who urge that a man should be allowed to build without regard to interference with his neighbour's light, will not find their task more easy when it is understood that the principles of the English law have been found acceptable in British India. It would have been possible there to do away with this particular easement altogether, or to modify the principles of English law. But, on the contrary, those who have been responsible for the promulgation of the law in India have practically accepted all the principles of the English Prescription Act, as well as most of the judicial decisions which in England have gradually raised up a substantial mass of judge-made law upon the basis or in connexion with the statutory enactment. In 1877 the Indian Limitation Act (No. XV. of 1877) was passed, which extended to the whole of British India, and the easement of light and air was dealt with in section 26. It is of sufficient interest to be quoted at length, and it runs (so far as it concerns light and air) thus, "When the access and use of light or air to or from any building have been peaceably enjoyed therewith as an easement, and *as of right*, without interruption, and for twenty years. . . .

The right to such access and use of light or air . . . shall be absolute and indefeasible.

Each of the said periods of twenty years shall be taken to be a period ending within two years next before the institution of the suit wherein the clause to which such period relates is contested.

*Explanation.*—Nothing is an interruption within the meaning of this section, unless where there is an actual discontinuance of the possession or enjoyment by reason of an obstruction by the act of some person other than the claimant, and unless such obstruction is submitted to or acquiesced in for one year after the claimant has notice thereof, and of the person making or authorising the same to be made."

This Act was followed by "The Indian Easement Act, 1882," which, however, only applies to the territory of Madras and to the Central Provinces and Coorg, the rest of British India being still governed by the Act of 1877. The easements of light and air are governed by



Section 15, which is the same as Section 26 of the Act of 1877 except that the words in that section which we have printed in italics are absent from the later Act.

The first and most important particular in which the law of British India in regard to the easement of light differs from that of England is in the value which is given to the word "air." In the English Prescription Act it does not appear at all, and, as has been more than once pointed out from the Bench, the common sequence in this country "the easement of light and air" is erroneous because English law really does not regard the easement of air at all. But in India it is different, and the easement of air is regarded as of equal value with the easement of light. In the recent case of *Nandkishor Balgovan v. Bhagubhai Pranalabhdas* (8 Indian Law Reports, Bombay Series, p. 95), Mr. Justice West said,—"The access of air is in this country of hardly less importance than that of light. It must be taken as a matter of common knowledge that a material interference with it is injurious, not only to the comfort but to the health of the inmates of the house thus affected." Upon this principle an obstruction of the air to an aperture gives ground for a successful application to a Court of Law, whereas in this country the mere obstruction of the access of air is not an actionable wrong. But, in British India the familiar phrase obstruction of light and air is quite accurate, and thus the law is so far as it hinders building is more severe in India than it is in England.

On the other hand, in this country, as is well known, there may be a break in the prescriptive period, so that an enjoyment of fifteen years, with a break for five, and then a further enjoyment of the easement for five years more makes up the prescriptive period of twenty years. But in India the law is different, and "the interruption of the unity is not merely to suspend the process of acquisition while it lasts, but to destroy altogether the effect of the previous user by breaking the continuity of the enjoyment as an easement and as of right" (Mitra's "Law of Limitation and Prescription," p. 418). On this point, therefore, the law of British India is more favourable to the owner of the servient than of the dominant tenement, and would seem also to be more in accordance with sound legal principle and with practical reason.

Again, in both the Act of 1877 and the Act of 1882 are inserted the word "peaceably," the enjoyment of the easement must be peaceable. Here, again, the law of British India is more favourable to the owner of the servient than of the dominant tenement, and has, in fact, placed him in a far better position than he is in this country. For, says Mr. Mitra in a passage which expresses the law with great clearness and accuracy, "enjoyment by force or violence, enjoyment during strife or contention of any kind, enjoyment continually disputed and interrupted (even when such interruption is not acquiesced in for one year) is not of right or peaceable. Repeated interruptions, in fact, though too short to operate as 'an interruption' within the meaning of the Acts, are good evidences to show that the user all through was 'contentious.'" It is, therefore, obvious that in India the owner of the servient tenement has two remedies open to him to prevent the acquisition of this easement; he can, if possible, obstruct the light for a year, and if submitted to this will defeat the acquisition, or he can interrupt the user from time to time, and do such acts as prevent the enjoyment of the light or air from being peaceable.


Again, in the Act of 1877, though not in that of 1882, the words "as of right" appear. These words are hardly suitable in regard to such an easement as that of light and air, because the whole basis of a prescriptive right is the fact of unobstructed user. For this reason these words were not inserted in the later Act, and in the former their effect is slight, for if the open enjoyment of the easement is not actually obstructed, "and it is not had in such wise as to involve the admission of an obstructive right in the owner of the adjacent heritage, the easement is en-

joyed as of right within the meaning of Act XV. of 1877." In other words, the phrase "as of right" is little more than mere surplusage. To turn to another point, in the English Prescription Act the prescriptive period must be one "next before some action or suit" wherein the right to the easement is brought in question. But in India the prescriptive period must be attached, so to say, to the particular suit or action in which the matter is being discussed.

A more interesting and less technical point is, however, the explanation of the meaning of the term "substantial damage," which is always in this country a matter of so much uncertainty. Explanation II. to section 33 of the Act of 1882, is as follows:—"When the easement disturbed is a right to the free passage of light passing to the openings in a house, no damage is substantial within the meaning of this section, unless it falls within the first explanation (i.e., materially diminishes the value of the easement), or interferes materially with the physical comfort of the plaintiff, or prevent him from carrying on his accustomed business in the dominant heritage as beneficially as he had done previously to instituting the suit." Explanation III., which refers to the right to air, is silent as to the prevention of carrying on business, and after the clause as to the physical comfort of the plaintiff, the following words are added: "though it is not injurious to his health." These explanations of "substantial damage" seem to make Indian law on this subject clearer and more understandable than the law of England. This is not surprising. Those who drafted the Easement Act of 1882 had the advantage of the various English decisions, and were thus enabled to make the law clearer than it can be when it is elucidated in a piece-meal fashion by judicial decisions as it is in this country.

Having regard to the great importance of the law of light in England, the form and the substance of the same law in British India may enable those desirous of improving this law here to do so, if not in a drastic, yet in a sensible, manner. If a legislative term for substantial damage were to be created in England, there can be very little doubt that it would tend to decrease litigation, and put the law of this easement on a sounder footing. Indeed, the whole of the Indian Easement Act affords valuable lessons, and shows the possibility of placing the law of easements in this country in the form of a code. We cannot but think that the Institute of Architects would do good service to the whole community if they could create and carry through Parliament a code of the law of light. As is well known, it is to the Bankers' Institute that the country is indebted for the code of the law of bills of exchange, which is based on that originally published as a private work by Judge Chalmers, who subsequently drafted the Bill for the Bankers' Institute. With their multifarious and pressing political duties it is impossible to expect that any Government will take active steps to codify branches of the law. In India codification is at once a tradition and a duty of the legal member of the Governor-General's Council. In this country it must be done by public and influential bodies, and one of the advantages of the two Acts to which we have referred is that, in addition to making the law in India clear on some points and improving it on others, they are to some extent a precedent for a code of the law of light and air and other easements in this country.

#### NOTES.

HE Westminster (Parliament-street, &c.) Improvement Bill has passed the second reading in the House of Commons. This Bill is of an important character, and might, we think, have received a little more attentive consideration by the House. It provides for the widening of Parliament-street on the west side, between Charles-street and Parliament-square, the widening of Charles-street between Parliament-street and Delahay-street, and the widening of Delahay-street. A new street is pro-

posed to be formed between Charles-street and Great George-street opposite the northern end of Little George-street, and another new street on the site of Little George-street between Great George-street and Broad Sanctuary. King-street, Gardiner's-lane, Boar's Head-yard, and the roads on the north and west sides of Westminster Sessions House will be absorbed, and portions of these roads utilised as building sites. A portion of the enclosure in the rear of Canning's statue, on the west side of Parliament-square, is included within the limit of land to be acquired upon the deposited plans. It is much to be regretted that an undertaking of this kind should be allowed to be carried out by private enterprise. The improvement is one of a metropolitan character, and should be undertaken only by a public body armed with power to carry it to a successful termination. It was stated in the House of Commons that the work would not be left in the hands of a joint-stock company, but would be carried out by the same persons who had effected the improvements on the Cadogan-square estate. This appears to be a distinction without a difference, the point being that the work will not be carried out by a responsible public body. The evil results of handing over a public improvement to a private company were exemplified in the case of Victoria-street, Westminster, which was for many years a miserable failure, and is not wholly completed to this day.

**A**NOTHER important public improvement, the continuation of the Mall into Charing-cross, appears to have been resolved upon in the hole-and-corner manner in which all our important public works are usually determined. Mr. Plunket announced on Tuesday last that the Mall would be prolonged, and would be made of the width of 75 ft. in connexion with the New Admiralty and War Office site, but he declined to give any pledge with regard to the open spaces about the buildings. The Mall must be at least 130 ft. wide, and to call a street 75 ft. wide an extension of the Mall is ridiculous.

**WE** have already commented on the unsatisfactory and inartistic character of the new coinage, on which point there seem to be no two opinions among those who have any right to an opinion. The answer of the Chancellor of the Exchequer to a question on the subject last week was amusing. He replied, with an air of injured virtue, that if the reverses of the coins had been condemned it was probably in ignorance of the fact that they were reproductions of the best of our old designs. The right hon. gentleman was so satisfied with this reply that he repeated it twice, not appearing to see that it was simply a begging of the whole question. He is correct in saying that the Gothic details on the old florin are not very good: they are not, but the coin has the merit of being designed with an eye for decorative effect, which the new florin is not, and to repeat that it is an old design reproduced is no kind of defence for the design; it is bad and ineffective, whether old or new.

**ON** Tuesday the second reading of the "Metropolitan Open Spaces Acts Extension Bill" was passed in the House of Lords. This is a measure to promote and facilitate, in urban and rural sanitary districts, the acquisition of land for permanent open spaces, as has been done in regard to many disused churchyards and other spaces in London. The Bill will enable Corporations to appropriate their land for open spaces, to sell or give land to urban authorities to be used for the enjoyment of the public, &c. It is gratifying to find that a salutary movement of such comparatively recent growth is thus making its way, and its advantages becoming generally recognised.

**F**OR nearly ten years past the stones of Temple Bar have lain in sorry neglect in an enclosure next northwards of Farringdon Market. The lead from the roof was melted into medals, and the windows are destroyed.



On Thursday, June 23rd, the Court of Common Council carried, by a majority of forty-two, a report of their City Lands Committee recommending that the stones be presented to Sir Henry Bruce Meux, Bart. Sir Henry undertakes to defray all charges of their transport, and of re-erecting the materials at the entrance to his seat, Theobald's Park, near to Cheshunt, in Hertfordshire. The latter cost is estimated to amount to 1,700*l*. So that the rumour to which we alluded in last week's issue (p. 931), that Temple Bar was about to be re-erected in a gentleman's park not fifty miles from the City, is confirmed, notwithstanding that the *City Press* denounced it as a *canard*. An amendment was moved that the matter should be referred back; but this did not meet with much favour, and the report of the Committee was adopted by a majority of 80 to 38. One member observed that it would be impossible to re-erect the gate, as the majority of the stones had been carted away, and had been macadamised in London and elsewhere, and another member remarked that it was absurd to class Temple Bar with Westminster Abbey,—the Abbey being a thoroughly ancient structure, while the Bar was only 200 years old. Whatever is done with the stones, it may safely be predicted that the gate, when re-erected, will retain very little interest as a building or an antiquarian relic.

MR. PLUNKET'S explanation in the House of Commons in reply to a question by Mr. Howarth as to the treatment of the ancient Coronation Chair at Westminster during the Jubilee celebration on Friday week was eminently lame and unsatisfactory. The allegation, which was first made by Mr. Frederic Harrison at the annual meeting of the Society for the Protection of Ancient Buildings on June 9th, was that "the historic chair of five centuries and a half, the fetish of the English monarchy, the chair famous in Shakespeare and in our literature, has been delivered over to the tormentors, and is being gilded and furnished by the court upholsterers." The *Athenæum* of last Saturday remarks, "We shall scarcely be believed when we say that the Coronation Chair, perhaps to most Englishmen the most precious of all the relics in the Abbey, was handed over to some barbarian to be smothered up, and he has daubed it the orthodox Wardour-street brown and varnished it!" Mr. Plunket's explanation is that it was found necessary to fit in temporarily some few pieces of tracery which were missing, and to stain them so as to match the colour of the old work. That is to say, that the chair has been "restored." We should like to know by whom it was "found necessary" to undertake this purely gratuitous and mischievous piece of work. The chair has been used for the Coronation of every English sovereign since Edward II., and on these occasions the chair has been covered with gold tissue, or similar costly stuff, and one is at a loss to imagine why such a course should not have been adopted on the occasion of the Jubilee, if the chair were found to be too shabby for its tinsel surroundings. Dean Stanley says of the chair ("Historical Memorials of Westminster," p. 66):—"It is the one primeval monument which binds together the whole Empire. The iron rings, the battered surface, the crack which has all but rent its solid mass asunder, bear witness to its long migrations. It is thus embedded in the heart of the English monarchy,—an element of poetic, patriarchal heathen times, which carries back our thoughts to races and customs now almost extinct; a link which unites the throne of England to the traditions of Tara and Iona, and connects the charm of our complex civilisation with the forces of our mother earth,—the stocks and stones of savage nature." This "primeval monument" has been wantonly falsified,—the poetic element in it eliminated, and, as the *Athenæum* says, "the throne of six-and-twenty monarchs has been vulgarised into the semblance of the hall chair of a Cockney Gothic villa."

A COMPANY has, we learn, been formed for erecting a new concert-hall, to be named the Victoria, at the quite northern end of Regent-street. The site lies, in fact, in Langham-place, being by the corner of Riding-house-street, over against the Langham Hotel and Nash's church of All Souls. Its total area of about 20,000 ft. superficial is at present occupied by Nos. 3 and 4, Langham-place; by St. George's Hall, whither the "German Reed" company migrated from the quondam Gallery of Illustration which Nash had originally built for his own residence; and by the dismal pile of Portland Hall Bazaar, Nos. 20 to 22, better known, perhaps, some thirty years ago, as the "German Fair." St. George's Hall and the two adjoining houses are let for thirteen or fourteen years hence at an aggregate rental of 880*l*. a year, so that an area of about one half acre only is, as yet, available for building purposes. All the property is held for certain terms direct from the Crown. It has been valued by Messrs. Drivers & Co. at 49,000*l*., and at this price will be acquired by the Company. The new premises will comprise a great hall, nearly square in plan, with a capacity for 3,500 seats on the ground and in the balconies, and an orchestra of 700 performers, together with a subsidiary hall to accommodate from 900 to 1,000 persons. Messrs. T. E. Knightley and C. J. Phipps, F.S.A., are appointed as joint architects to this undertaking.

BY their scheme for readjusting parochial charities of St. Bride's, London, the Charity Commissioners propose to establish a "People's Palace" in the Ward of Farringdon-without, and open to all, somewhat like that which has just been opened by her Majesty in connexion with the Beaumont Trust at Mile End. The site chosen is now occupied by the vegetable market in Farringdon-street, lying between Stonecutter-street and Messrs. Pontifex & Wood's foundry (*olim* Oldbourn Hall). The market covers the ground,—some one acre and a half in area,—whereon formerly stood Shoe-lane workhouse and its burial-ground, the latter containing Chatterton's grave. It was built in 1828-9 from the designs of William Montague, City Architect, and at an outlay of nearly a quarter of a million sterling, to replace Fleet Market. That market, again, had been opened on September 30th, 1737, as a successor to the Stocks Market,—site of the Mansion House,—and extended, over the Fleet, all the distance between the Holborn and Fleet Bridges. Its green market was at the southern end, by the prison; in the centre stood the market-house, having a high tower and vane. The present vegetable market will be transferred to the building specially designed for the purpose by the late Sir Horace Jones, but latterly used for the Central Fish Market, for which new premises are to be erected facing Snow-hill.

IF we may credit a statement made by the Reverend Prebendary Billing as spokesman of a deputation from the Whitechapel District Board on the 24th ult., the condition of what is known as the Bell-lane area, Spitalfields, must be eminently unsatisfactory, and seems to call for redress. Taking the whole area of the metropolis, the average population is 54 persons to an acre, in Whitechapel it is 107 to an acre, in Spitalfields 286 to an acre, while in the area in question the number of persons to an acre is stated to reach the enormous total of 900 persons to an acre. As we have frequently had occasion to point out, density of population is an important factor in the consideration of sanitary questions. In a scattered community the death-rate is invariably lower than in closely-packed neighbourhoods, the other conditions being similar. Bell-lane was condemned by the medical officer of health for Whitechapel in 1884, and frequent representations have been made to the Metropolitan Board on the subject. It is difficult to understand why these representations have been hitherto disregarded, but there may be some influences at work of which the public have no knowledge.

THE most ancient Latin inscription so far known is to be found on a gold fibula recently discovered at Palestrina. The inscription is engraved from left to right, and runs as follows:—"Manios med Fhe Phaked Numasios," i.e., in ordinary Latin "Manius me fecit Numasios," Manius made me for Numasios. The form *Fhe*, for *F*, and the interesting reduplication now lost in the word *fecit*, make the inscription of the first importance for epigraphists. The fibula is in excellent preservation. The inscription is published in the *Mittheilungen des Arch. Instituts Römische, Abtheilung II*, No. 1, with full commentary by Dr. Dümmler. In the same number Dr. Helbig publishes in two phototype plates a fine marble head now in Paris, which he believes to be a portrait of Livia. The coiffure of the head is very elaborate, and of course, if it be Livia, false, as she was bald. The features are fine and well marked, notably the nose, which is thoroughly "Roman." The whole cast of countenance answers well to the character given by Tacitus to the Empress.

THE demolition of masonry built in the Middle Ages has often, in Rome and elsewhere, brought to light remains of Classical sculpture. Interesting discoveries of this kind are just now being made in the Via Labicana. The road runs through ground which was once the site of the gardens of Maecenas, and is therefore, *a priori*, likely to be rich in ancient treasure. The find is so far a miscellaneous one. Fragments of shattered limbs abound, which, it may be hoped, will some time in part be put together. Twenty heads have been found, of which the greater number are Isis types of late date. Some others belong to portrait busts. So far the finest specimen that has come to light is the head of an athlete, reported to be very like the Doryphoros. An account is given by Sig. Gatti & Visconti in the *Bullettino della Commissione Archeologica di Roma*.

ON July 20th next, two well-known properties at Richmond will be put up for sale by auction at the Mart in the City. One is the Castle Hotel and its stabling, in Hill-street, together with the adjoining Spread Eagle public-house; the premises and cellars tenanted by Mr. George Ellis, wine merchant; and those occupied in part by the London and Provincial Bank. These have a frontage extending down to the Thames, and include some boat-houses and cottages beneath the riverside terrace. Immediate possession of the hotel and its appurtenances can be obtained; the leases of the other tenancies have from ten to fifteen years more to run. The other property is the "Lass of Richmond Hill" tavern, with a cottage next thereto, by the end of Queen's-road, and close to the top of Richmond Hill. With this tavern will be sold two neighbouring residences on the Terrace, known as Lion House and Moreshead House, finely situated on the summit of the hill, and very near to the gates, bearing the date 1798, which "Capability" Brown set up for King George III. at the entrance into Richmond (New) Park. Sir Joshua Reynolds and Sheridan lived on the hill. The first-named painted the world-famed view from Wick House, by the Star and Garter. The New Park, originally made by Charles I., was given by Parliament to the Corporation of London, who returned it, with a present of 12,000*l*., to Charles II. at his Restoration. Here, on the occasion of his Saturday visits with Lady Yarmouth and others to the White Lodge, King George III. used to add to gallantry the pleasures of the chase by driving his flock of fat turkeys into the trees and there shooting them on their perches. In our columns of June 12th and October 10th, 1886, and in "Notes," June 4 last, we adverted to the purchase, recently effected by the local authorities, of the Duke of Buccleuch's estate on Richmond Hill, now known as "The Terrace Gardens."

THE late Mr. George Barnes Williams, whose death on the 23rd ultimo is announced, although a Fellow of the Institute, having been elected an Associate as early as 1848, was more a surveyor than an architect, although he



erected a number of buildings in the City of London and the suburbs. He entered the office of the late Mr. George Smith, surveyor to the Mercers' Company and the architect of St. Paul's School, at an early age, and afterwards joined Mr. Smith in partnership and carried on business at No. 4, Frederick's-place, Old Jewry. On the death of Mr. Smith he succeeded him as Surveyor to the Mercers' Company, and was also Surveyor to the Vintners' Company, for which latter Company he carried out extensive alterations to their premises in Lower Thames-street and rebuilt the hall. The extensive block of buildings on the north side of Cheapside between Ironmonger-lane and Old Jewry, in which the old entrance gateway to Mercers' Hall is reproduced, was from his design. Mr. Williams was District Surveyor for Plumstead and Eltham, and was largely employed in compensation cases, his experience in dealing with City property being extensive.

IN our columns of May 28th last we announced a projected sale of the Marquis of Huntly's Dee-side estates. Their net rental value is calculated at 12,260*l.*, with timber valued at 80,000*l.* At the Mart, on June 22nd, the estates,—as a whole,—were withdrawn at an offer of 150,000*l.* A bid of 70,000*l.* was then refused for the four properties lying on the northern side of the Dee, including Aboyne Castle with its park, &c., extending over 6,700 acres,—net rental nearly 4,000*l.* No offer being made for Glentanar and Birse Forest, south of the Dee,—net rental 3,000*l.*,—the property was submitted in six lots, all of which were eventually withdrawn. Some of these were reserved at the following prices:—Birse Forest, 11,000 acres, mostly grouse moor,—40,000*l.*; Glentanar, with residence, 29,000 acres, mostly deer forest, 140,000*l.*; Muir of Dess, 2,400 acres, 30,000*l.*; Culbleen, Kinnord, and Cambus o'May, 9,360 acres, 4,500*l.*

ON July 12 will be offered for sale, at the Auction Mart, No. 8, Carlton House-terrace, next adjoining to the German Ambassadors. For the thirty-nine years' lease, at a ground-rent of 170*l.* per annum, the upset price is 15,000*l.* On the 19th item will also be sold the house, Nos. 14-15, in the same terrace, by order of the trustees of the will of William, late Earl of Lonsdale. Of the Crown lease for the mansion and stabling, forty years are unexpired. The remaining sixty-five years' Crown lease of the premises next to Marlborough House gates in Pall-mall, recently tenanted by the Beaconsfield Club, has been sold to Mr. Ashton Lever, founder of the Club. The premises were built fifteen years ago, and the property is bought for 30,700*l.*, subject to a ground-rent of 550*l.* per annum.

IT appears that, the nightly-illuminated garden fêtes at South Kensington having now ceased, the same kind of entertainment is to be provided in an "Arcadia" to be formed at the Agricultural Hall from July 7th to near the close of September; flowers, lamps, promenade concerts, and a specially-arranged waterfall 50 ft. in height. There is, no doubt, that the "Feast of Lamps" of South Kensington supplied a new and most popular evening recreation, and an attempt to carry on something of the same kind will probably be a success, though it will not in this case be in the open air, nor in so attractive a neighbourhood.

MR. HOLLINGSHEAD has practically disposed of the site for a theatre in Shaftesbury-avenue, with which his name has been prominently associated. We hear that, *en revanche*, he is establishing two other theatres in the vicinity, and is about to exhibit M. Phillipoteaux's cycloramic painting of Niagara. The building for this picture, which is 50 ft. high and 390 ft. in circuit, will comprise a museum, together with an American *café* and restaurant after the style and model of "Delmonico's" in New York.

ONE of the results of the recent talk about architectural education has been the establishment in London of an *atelier* for architectural students, on the French system, under the direction of Mr. F. T. Baggeley (Royal Academy Gold Medallist) and Mr. Walter Millard (Royal Academy Travelling Student and Pugin Student). Both are well known as among the ablest of the artistic designers among the younger generation of architects, and their experiment is one which will, no doubt, be watched with interest and good wishes. The terms proposed are very moderate; and it should be observed that the *atelier* is intended to afford facilities not only to those preparing to enter an architect's office, but to those already engaged as pupils or assistants who desire to supplement the knowledge acquired in business hours.\* The question is whether an *atelier*, where the directors only make a visit in the course of the day, is a system likely to promote diligence and regularity of working among the students. We are sure Mr. Baggeley and Mr. Millard will use every effort to make it profitable to those who attend. But we confess that our idea of an architectural *atelier* would be one where the instructor was carrying on his own architectural work on the same premises and exercising constant supervision and authority over the pupils. We may add our conviction that in any *atelier* for architectural instruction a prominent place should be given to the study of the scientific side of architecture. At present there is certainly too little of that and too much of drawing; the latter is the popular element, no doubt; but for that very reason it should be kept in its right place in an *atelier* of architectural instruction.

THE rumour that we have previously referred to, that the provision of a new building for the Admiralty and War Offices was to be quashed altogether, has turned out to be correct, judging from the Report of the Committee's proceedings as given in last Saturday's *Times*. The following are the concluding words of the Report:—

"We are satisfied that by making additions to the present Admiralty, all the requirements of that department may be suitably provided for; that this work, including some repairs and improvements to the existing building, can be done at a moderate cost, and may be completed within two or at most three years; that a very large reduction of expense for buildings would thus be secured, and to this must be added, as against the cost of erecting a new War Office, the value, estimated at 268,000*l.*, of the portions of the Spring-gardens site which would be preserved after providing for the suggested additions to the Admiralty and for the opening of the Mall into Charing-cross. We therefore recommend that the entire official staff of the Admiralty and War Office respectively should each, as soon as possible, be placed under one roof, and that the two buildings should be situated at no great distance from each other; but we are of opinion that these recommendations can be carried out, and that a great saving of money and time can be secured by adopting other plans instead of those which have been referred to us for consideration; and we find that the main buildings of the Admiralty may with advantage be retained."

Thus, it will be seen that after all the fuss that has been made about this affair, and the sham parade of a large architectural competition, the whole thing is to be cut down into a cheese-paring muddle of bits of old buildings, to suit the miserable spirit of economy of the present day. It is true that the design which had been selected was architecturally a very poor one, which would have done little credit to Victorian architecture; but it is obviously not on that ground that the building has been thrown over: for one of the most prominent members of the recent Committee was also one of the most prominent members of the Committee for organising the competition and selecting the designs. It is only another example of the modern Governmental spirit, and the way in which modern England "stupidly travels her round," as a great poet has said, and subordinates all questions of art to the miserable consideration, "how much money can we save on it?"

\* Further information as to the *atelier* may be obtained on application to either of the directors, 5, Bloomsbury-square.

#### LETTER FROM PARIS.

THE painful feeling aroused by the disaster at the Opéra Comique is still far from being allayed, and the regulations now insisted on by the Prefecture of Police have necessitated the temporary closing of some theatres. The Municipal Council of Paris is naturally much occupied with the subject, and in the course of a discussion on it the Colonel of the Sapeurs-Pompiers declared that the Parisian theatres are so dangerous that he never took his family to one!—a remark which, coming from such a quarter, was certainly not calculated to reassure the public. Unfortunately, whenever stirred up by unhappy events of this kind, the Government masks its habitual indifference by an excessive zeal, which lasts only a very little while. Committees after committee is appointed, and a crowd of directions issued, the very multiplicity of which prevents their realisation, and then all this ardour suddenly goes out like fire in straw. The reports of the Committees go into the Ministerial portfolios, to repose with other perfunctory papers; the directors of the theatres occupy themselves busily in doing nothing; the Administration complacently closes its eyes, and all goes on as before till the day when another similar catastrophe comes to reveal that nothing has been done to provide for the safety of so many lives.

In the recent fine weather the works of the Exhibition have been actively pursued. The getting up of the supports of the "Palais des Galleries diverses" has been effected with great rapidity; and, thanks to modern constructive science, the weight of the construction has been much diminished from what would once have been thought necessary; and this portion of the work ought to have the framework completed by August. The contract for the Palais des Machines is to be let to the Maison Cail and to the Compagnie des Fives, Lille, in two divisions each, including about 6,400,000 kilogrammes weight of material. The work for the Palais des Beaux Arts is somewhat more extensive than either of these two contracts. The four bases for the Eiffel Tower are now complete, and the ironwork has been commenced in the shape of sixteen wrought-iron shoes of great weight placed at the angles of each pier for forming the footings of the angle-pieces. The work from this point will have, at all events, much of technical interest. M. Eiffel expects to complete it by the opening day of January, 1889. Generally, the state of the work leads one to think that before 1887 has passed the greater part of the works will be well in hand, and that everything may be completed on the Champ de Mars by the middle of 1888.

M. Saurestre, the coadjutor of M. Eiffel, it may be mentioned, has been named architect for the French Colonial Section. This part of the Exhibition, which will be one of the most interesting to the public, will have as its centre a palace including about 1,800 square metres of area, surrounded with pagodas, Indian and Cambodian, and villages inhabited by negroes from the Congo. A Cochinchina pavilion, a Creole habitation, and Senegalese huts will be grouped picturesque around a small lake on which will float various specimens of African boating craft.

The line of railway to serve the Exhibition is also under consideration. The scheme drawn out by M. Georges Berger includes three distinct lines: one from the Quai d'Orsay; near the angle of the Ministry of Foreign Affairs Office, and following the line of the quays till it comes to the old Champ de Mars Station; the second from the entrance of the Exhibition near the Seine, and leading to the machinery galleries; the third a high-level line uniting the Esplanade des Invalides to the entrance of the Avenue Lamotte Piquet. The construction of these lines will be the object of a competition, which will leave a large margin to the competitors in regard to the size of the roads and the method of traction (whether steam, electricity, or compressed air).

The State and the City are meanwhile occupying themselves with their usual acquisitions in the Palais d'Industrie. In recent years a committee, presided over by the venerable M. Bailly, and including such painters as Puvion de Chavannes and Laurens, such sculptors as Dalou and Falguière, architects such as Vaudremer and Lisch, made choice of the works of art worthy to be purchased by the municipality. But this year the new Municipal Council, which piques itself on its enlightened taste, and



recognises no other authority, not even that of talent, has chosen to buy for itself, without any guidance from artists. The result is a mélange of purchases more than questionable. We may mention among them, however, the "Douleur d'Orphée" of M. Verlet, and "La Seine," the pretty bas-relief which M. Puech has sent from the Villa Medici.

This pretension of the Parisian municipality to artistic infallibility is odd enough; and if the same idea goes on, we shall some day see it making itself the plans and elevations for the monuments to be constructed, and discarding the technical knowledge of architects as superfluous.

In regard to the purchases of the State, always too numerous, we may cite the graceful "Tête de Créole," by M. Henner, the "Guerre" of M. Roll, the "Curée" of M. Rochegrons, the "Défate des Casselets," by M. Tattetgrain, and three good landscapes,—"Soirée de Septembre," by M. Japy, "Soleil couchant," by M. Mesdag, and "Le Matin," by M. Rapin. All these are well chosen and do credit to the Committee of Selection.

M. Verlet, whom we have mentioned as having obtained the "prix du Salon" after three votings, is a young sculptor of high promise, pupil of M. Cavalier and M. Barrias. He had as rivals M. Soberrerr and M. Brouillet, both painters. As usual, the Council of the Beaux Arts has awarded a certain number of travelling bursaries. In the section of architecture, this recompense has been obtained by M. Albert Dureau, who had exhibited in the Salon a design for a country-house, exceedingly well studied.

This year the Académie des Beaux Arts is occupied about its great biennial prize of 20,000 francs, which is given in turn to each one of the sections of the Institute. The Committee has placed M. Mercié in the first rank for his tomb of Louis Philippe, of which an illustration appeared in the *Builder* for June 19, 1886. M. T. P. Laurens was classed second for his frescoes in the Pantheon. Lastly, after some discussion, M. Dettaille was placed in the third rank for his historical illustrations of the costumes of the French army. The first choice will be approved by all who know and appreciate the splendid talent of M. Mercié. The final voting will take place on the 2nd of July, and the decision of the Sectional Committee will, as a matter of form, be submitted to the five classes of the Institute in solemn convocation on the 6th of July.

At the École des Beaux Arts the decision has been given on the annual architectural competition between students of the higher class. The subject was "Une Porte de Ville"; the first medals were awarded to MM. Connil and Scadée, pupils of M. Guadet; the second to M. Risler, pupil of M. André, and to M. Guenet, pupil of M. Vaudremier and M. Raulin; and to M. Louvet, pupil of MM. Louvet and Guinain.

We are approaching the National Fête, which is not likely to differ from other celebrations of it, except in the extraordinary fact that there is no inauguration of a statue; that of Gambetta, which was counted on, will not be finished till the end of September. Nevertheless, in order to allow the sculptor and the architect, M. Aubé and M. Boileau, to give account of the progress of their work, the hoardings which masked the half-finished monument have been removed. Gambetta appears standing in the midst of combatants, and exhorting his country to resistance. There is a great deal of spirit in the arrangement of the groups, but all the talents of M. Aubé have not enabled him to give to the tribune of the people the expression of dignity, in which he was, in fact, totally wanting. Gambetta was of a vulgar and coarse personality, and the modern costume does not offer any help in carrying off this defect of physical expression. The principal figure, moreover, carved out of the same stone as the monument, does not stand tall itself sufficiently from the pyramid. It should have been white marble relieved against a grey granite or a darker coloured marble. On the opposite face, looking towards the Square du Carrousel, a cock, with wings outstretched, disports himself on a heap of crowns, flags, and other attributes. Various allegorical statues, which M. Barbedienne has been commissioned to cast in bronze, will complete the decoration (somewhat surcharged) of this monument, the effect of which in execution hardly carries out the promise of the model.

Possibly the monument to Admiral Courbet may prove to have been similarly deceptive;

but the design of MM. Falguière and Mercié, as now accepted by the committee, has undoubtedly all the appearance of a great work. It is in an elongated form, and the base will represent the prow or forepart of a ship. On the prow a nude female figure, symbolising colonial France, is seated, protecting another female figure, recumbent, which is supposed to represent Chinese India ("Indo-Chine"). Behind this group a figure, standing on a higher level, represents Admiral Courbet in the costume of a naval officer and in an attitude of command. At his feet is a winged Victory, holding to him a laurel crown. At the rear of the monument are disposed Chinese arms and armour, and at the sides will be represented the cannon formerly given to China by Louis XIV. and which have been collected at Abbeville, where the monument is to be erected, each figure in which will be about 3 metres high. The committee have not yet decided if the monument is to be in bronze or in marble; it will depend partly on the funds available. It is hoped, at all events, that this great work will be completed in a year from now.

We have already spoken of the monument which it is proposed to erect to Bastien-Lepage in his native town. M. Roden has been commissioned to execute the statue of the painter. The model for it, which we have seen, is a very remarkable one. It will be submitted shortly to a committee of artists presided over by M. Bailly.

A whole series of important works will shortly be undertaken at Paris. Without speaking of those which are intended in completion of the National Library, of which the new entrance from the Rue Richelieu is in progress at present, we may mention, in the first place, the reconstruction, so often announced, of the Collège de France. The new building will have a façade towards the Rue des Écoles, and the square in which M. Aubé's statue of Dante is erected will form a kind of *cour d'honneur* to it. It will require probably six years to complete the buildings, which will include eight laboratories and ten large lecture-rooms, at an estimated cost of 12,000,000 francs.

There is talk also of a new hospital, the erection of which has been long deferred, in the populous quarters of the XIXth Arrondissement, between La Villette and Belleville, behind the Parc des Buttes Chaumont. There is a probability also of the opening of a great competition among painters for the decoration of the new Salle des Fêtes of the Mairie of the Vith Arrondissement; the sum of 40,000 francs is to be spent on the decorations of this *salle*, which is being built from the designs of M. Guinain. We may note, also, that M. Hermant's remarkable building, the Maison de Repression at Nanterre, of which we have spoken before, has been completed and handed over to the Prefecture of Police.

The archaeological world has been much excited during the last few weeks about the excavations recently made at St. Maur les Fossés, a small place a few miles from Paris, by an architect, M. Macé, who, in staking out a road, discovered a number of skeletons, swords, lances, bucklers, bracelets, and other ornaments, of very artistic execution. The discovery is a very interesting one, if, as is supposed, we are here in presence of a cemetery of the ancient Gauls. It is even suggested that the remains are those of the "Bagaudes," peasants of Gaul who revolted under Diocletian, and who, driven from the Arverne district by the Roman army, took refuge in the peninsula of St. Maur, where they were destroyed. Whatever may be the origin of these remains, they are a real historic curiosity, and all the objects discovered have been carefully placed in the Musée St. Germain.

Two sculptors of great merit, though of a very different kind, have recently died; Carrier Belleuse and Lequesne. Albert Ernest Carrier Belleuse, who died at the National Stéves Manufactory, of which he was art-director for many years past, has occupied an important place in recent artistic history. He was one of those who were most inspired with the fine traditions of the eighteenth century, and who has mostly largely contributed to the development of French industrial art. He was born at Auzilly-le-Château in 1824, and studied in the atelier of David d'Angers. He obtained a medal of the third class in 1861, a medal of honour and chevalier's cross in 1867, and an officer's cross in 1885. Among his works were

a splendid group, "L'Amour et l'Amitié," exhibited in 1857; a "Bacchante," a "Jupiter and Hebe," an "Udine," the monument to Massena, a statue of Camille Desmoulins, besides a great number of busts, among which were those of Renan, Napoleon III., Fechter, Thiers, and Théophile Gautier. He exhibited in the last Salon a bust of General Boulanger, and also a pretty marble statuette of "Diana Victorieuse."

Louis Eugène Lequesne, who has died at the age of seventy-two, was a distinguished pupil of Pradier. He carried off the prix de Rome in 1844, and on returning from the Villa Medici he exhibited the model of the dancing faun, which has since become famous, and the bronze of which adorns the parterre Medici at the Luxembourg. He obtained medals of the first class in 1851 and 1855. He was engaged, on the death of Pradier, to complete the twelve Victories which adorn the tomb of Napoleon I. at the Invalides. We may mention also among his principal works a statue of Marshal St. Arnaud, a "Baigneuse," a "Soldat mourant," "Leabé," a "Préresse de Bacchus," and various statues which decorate the Church of St. Augustine.

The death is also announced of the sculptor Chas. Matabon, pupil of Duret and Caillouette, who made a speciality of busts and medallions. He exhibited a good many years ago a bust of Shakespeare, which excited much notice, and some years after one of *Félicien David*, commissioned by the Ministry of Fine Arts.

Two other artists of talent, a painter and an engraver, have also died during the month. The former, M. Vincent Vidal, had studied in the atelier of Paul Delarocque. He was a portrait-painter who had his hour of celebrity under the reign of Louis Philippe, and whose pastels were much sought after. He died at the age of seventy-two, having obtained several medals at different times, and the Cross of the Legion of Honour in 1852. The engraver, M. Eugène Bély, who had reached his eightieth year, had obtained numerous recompenses, including that of the Legion of Honour in 1846. He was an artist of great merit, and great rapidity of working, and was Professor of Drawing at the "École Spéciale des Beaux-Arts."

#### PROPOSED RECREATION-GROUND FOR LEWISHAM.

THE Lewisham Vestry, after having had for some time past under consideration two alternative sites for a recreation-ground for the parish, have just decided to purchase for the purpose the property known as the Ravensbourne Estate, and some on adjoining land, containing altogether an area of upwards of 50 acres. The land stretches from Catford at one end to Ladywell at the other end. A portion of the land, 42 acres in extent, belongs to several owners, and can, it is said, be purchased for 20,000*l.*, being at the rate of about 500*l.* an acre. At the Lewisham end the land agreed to be purchased consists of 9 acres belonging to the Earl of Dartmouth, for which 800*l.* per acre is the sum named, the entire amount for the purchase of the whole of the land required being about 28,000*l.* At the meeting sanctioning the purchase, Mr. Williams, the representative of the Vestry at the Metropolitan Board of Works, stated that he had no doubt the Metropolitan Board would advance 1,000*l.* towards the purchase, and that Alderman Whitehead, one of the owners of land in the locality, had intimated his readiness to contribute 1,000*l.* towards the cost of the purchase, and that Mr. Jerrard, another owner, would contribute 500*l.* He added that he had reason to know that the City companies, and others interested in the neighbourhood, would contribute about 4,000*l.* He said that it was proposed to keep the land as much as possible in its present condition, except as to one or two points, and that if the scheme were carried out they would have one of the finest recreation-grounds to be found anywhere in the metropolis. It had natural beauties connected with it which would make it a very pleasant recreation-ground. On one portion of the ground a lake of about three acres in extent could be formed, and a smaller lake on another portion. From one end of the grounds to the other there was a running stream, which could be bridged over with rustic bridges. The proposal to purchase the land was all but unanimous, there being only four dissentients.



## Illustrations.

## DECORATIVE PAINTING FOR THE NEW SORBONNE, PARIS.

**T**HIS great piece of decorative painting, about 80 ft. in length, which is the most prominent work in the *Salon* Exhibition, is designed by M. Puvion de Chavannes, the remarkably individual artist who has almost made a school of his own, and occupies a somewhat similar position in French art to that occupied by Mr. Burne Jones in English art. The work was fully described in our article on "the Paris *Salon* of 1887" in the *Builder* of May 21st, page 760. We are glad to be able to supplement the description by an illustration of a work which, whatever its mannerisms of style, is a fine example of ideal or imaginative painting, a type of art which, in spite of the realistic tendencies of much modern French painting, still finds more votaries in France than on any other soil.

## DESIGN FOR THE IMPERIAL INSTITUTE.

We give a perspective view of the design by Mr. Collcutt, which has been selected, subject to probable future modification. We have commented on it, along with the others, in another column.

## BRONZE GATES.

This plate represents the gates of the elegant little loggia at the foot of the campanile of St. Mark at Venice, on the side facing the Porta della Carta. They were designed and executed by one Antonio Gai, described as a Venetian sculptor and metal founder, who lived between the years 1684 and 1769; they belong, therefore, to the early part of the eighteenth century.

The loggia was erected from a design of Sansovino's about the year 1540. According to a passage quoted by Cicognara from an older writer, its original object was to provide a place whither the robes might resort for the purpose of entertaining themselves with learned discourse; it was, however, within a very few years, put to other purposes.

The main façade consists of a composite order, with three wide and four narrow intercolumniations; in the wider ones are open arches, and in the narrow niches containing bronze statues of Pallas, Apollo, Mercury, and Peace. Above the order is a high attic, panelled out with subjects in bas relief. The whole is raised on a little platform several steps above the level of the piazza. It is chiefly constructed of pure white Carrara marble, but the dies of the pedestals, the main architrave and cornice, and the cornice of the attic, are of Veronese "gentil rosso," and the shafts of the columns are of breccia.

## WEST DOORWAY, ORVIETO CATHEDRAL.

The Cathedral of Orvieto has been recently re-opened, after being closed for some time for restoration and repairs. The central western doorway, of which an illustration is given this week, is a fine example of that rich and almost jewelled type of work characteristic of the Gothic of North Italy, of which the Florence Campanile is the most famous example. The richness of the door-jamb, with its alternating orders of spiral shafts, carving and inlay, is remarkable. On the other hand, the weaker qualities of Italian Gothic come out in such details as the thin secondary impost mouldings above the genuine impost, and through which the archivolt mouldings appear to run; a detail the origin or significance of which it is difficult to understand, and which weakens the whole composition architecturally. But it is, nevertheless, a sumptuous piece of decorative work carried out without stint as to cost or labour. The illustration shows a portion of the remarkable wall diaper of small figures interwoven with foliage, which is one of the special points in the detail of Orvieto. The mosaic pictures on each side of the gablet are modern.

## SCULPTURE AT CHARTRES AND AMIENS.

## THE NORTH PORCH, CHARTRES CATHEDRAL.

ONE of our plates this week shows a portion of the north porch of Notre Dame de Chartres, and the statue of Christ from the west door of Amiens Cathedral. Both were executed

early in the thirteenth century. An interesting account of both examples of this beautiful period of French sculpture is to be found in M. Viollet-le-Duc's Dictionary (articles, "Sculpture" and "Christ").

M. Le Duc particularly speaks of the once-coloured decoration of this statuary. He says:—"La statue et l'ornementation des portails de Notre Dame de Paris, des Cathédrales de Senlis, d'Amiens, de Reims, des porches latéraux de Notre Dame de Chartres étaient peintes et dorées, et de même que la sculpture la coloration penchait vers le naturalisme." He goes on to say how, not merely were flat tints used, but that in the folds of the drapery, and in portions shaded from the light, dark glazes were put over the colour, which had the effect of accentuating those portions in full light. He would appear to show the sympathy existing between artists at that time, when he says:—"Les artistes qui ont fait les admirables vitraux des XII<sup>e</sup> et XIII<sup>e</sup> siècles avaient une connaissance trop parfaite de l'harmonie des couleurs pour ne pas appliquer cette connaissance à la coloration de la sculpture."

Beautiful drawings of the sculpture of Chartres are to be found in "La Monographie de la Cathédrale de Chartres," published in Paris.

## STATUE OF CHRIST, WEST DOOR, AMIENS

Speaking of the statue at Amiens (the local name for it is "Le Beau Dieu d'Amiens"), M. Le Duc says, "Amongst the statues of Christ remaining in France the most beautiful is that of the 'Christ man' (as opposed to other types, such as 'Christ triumphant') at Amiens, where the type is Byzantine, without any hardness and undue severity of character." He calls the attention of sculptors to the beautiful profile of the statue. He says, "This sculpture is treated like the heads carved by the Greeks of *Ægina*." The same simplicity of model, the same purity of outline, the same execution, at once broad and refined, the expression grave, without sadness. This head is the more remarkable, because in those of the apostles right and left, and which were carved at the same time, this divine character is not perceived. They are portraits of men, of the Picardy type; whereas that of the Christ is of a "type consacré."

A most interesting feature in this sculpture is the beautiful expression of Christ being the "son of David." David is not found in the ranks of the prophets on either hand, but forming the pedestal of Christ. As king he holds the sceptre, and the scroll as prophet. On the north side of the pedestal is sculptured a lily; on the south a rose, with a tendril of vine above. "I am the Rose of Sharon and the Lily of the Valleys." "I am the true Vine."

Represented above are the basilisk and the adder, typical of the most active evil principles of the earth; the basilisk half dragon, half cock; the deaf adder, laying one ear against the ground, and stopping the other with her tail.

Under the feet of Christ himself are the lion and the dragon, the images of sin.

A most interesting description of this and the other sculptures of Amiens is to be found in the "Bible of Amiens," by John Ruskin.

G. HORSLEY.

\* \* \* Mr. Horsley writes to say that he was not "Aldwinckle Student," as engraved on the plates of last week (and on some already engraved for this week's issue before his correction arrived), but "Owen Jones Student" for 1887.

**New Works in Paris.**—The *Journal du Génie des Arts et de l'Architecture* states that the loan of 1,600,000*l.* lately raised by the City of Paris will be principally devoted to the following purposes:—

1. New works connected with water supply.....	£288,000
2. New canal works.....	20,000
3. New sanitary works.....	92,000
4. Proportion borne by the Municipality in the suppression of level crossings on the Ceinture Railway.....	40,000
5. Highway works of all kinds.....	700,000
6. New school works.....	72,000
7. Subvention to new hospital works.....	32,000
8. Proportion towards the Sorbonne works borne by the Municipality.....	28,000
9. Proportion borne by the Municipality towards the Lycéeum on the right and left banks.....	66,000
10. New architectural works and improvements.....	145,000

A first annual contribution of 80,000*l.* will be made to the Universal Exhibition of 1889. The expense of raising the loan was 36,000*l.*

## SUGGESTION FOR THE SITE OF THE NEW WAR OFFICE AND ADMIRALTY BUILDINGS.

SIR,—I wish to offer the following suggestion for combining the erection of the new War Office and Admiralty with the eventual rearrangement on a symmetrical plan of the old and irregular buildings forming the south and east sides of the parade-ground and of the front towards Whitehall.

The plan [see next page] is so divided into sections (as marked by the lettering) that it may be executed in successive stages, in part only deferred, postponed indefinitely, or abandoned altogether at any stage, without the appearance of incompleteness in the parts already executed necessitating or suggesting the execution of the whole.

In adopting, therefore, a scheme of this kind, the Government would not be committed to anything beyond the actual necessities of the case at any period.

A glance at the parade-ground itself will show that with its breadth of 600 ft. and depth of 250 ft., approached from an open space like the park, it is one of the finest sites, if not the very finest, in Europe, and should be dealt with on some principle of symmetry, if it is possible. This plan simply suggests that it is possible.

This magnificent site, when the New War Office is built on the north side (a lofty mass nearly 90 ft. high) will be occupied on the other two sides by low, mean, and irregular buildings, which, in the nature of things, must be reconstructed at no very distant date.

This scheme is to provide for such reconstruction on a symmetrical plan, in the first place towards the parade-ground, and, secondly, on the Whitehall front.

At the present moment, no doubt, some feeling exists for the preservation of the Horse Guards building; it is not proposed to deal with this till the necessity for so doing arrives. Standing as it does now, and constituting the central and loftiest mass of a number of low irregular buildings, the effect is pleasing; but if a building like the proposed New War Office be erected in closest juxtaposition, and the buildings on the south side re-constructed, as they assuredly will be, on a more liberal scale, the conditions will be reversed. It will then be a low mean-looking building of very vulgar design, jammed in between loftier buildings possibly more than double its height, and yet it will be the central point of this magnificent site.

The scheme suggested, moreover, is not that of any specific design, but simply of applying the principles of symmetry to the arrangement of the buildings surrounding this magnificent site on a principle of economy.

It is not a question of elaborate decoration, since a plan spread over so wide a space suggests plain and simple treatment.

It is not a question of acquiring expensive property, for the whole of the area affected is already in the hands of the Government; indeed, a great economy, perhaps 100,000*l.*, may be accomplished, as hereafter shown, in the matter of the site alone. Neither is it a question of removing solid and substantial buildings, since those now occupying the site are mean and irregular, and cannot be suffered to remain very long.

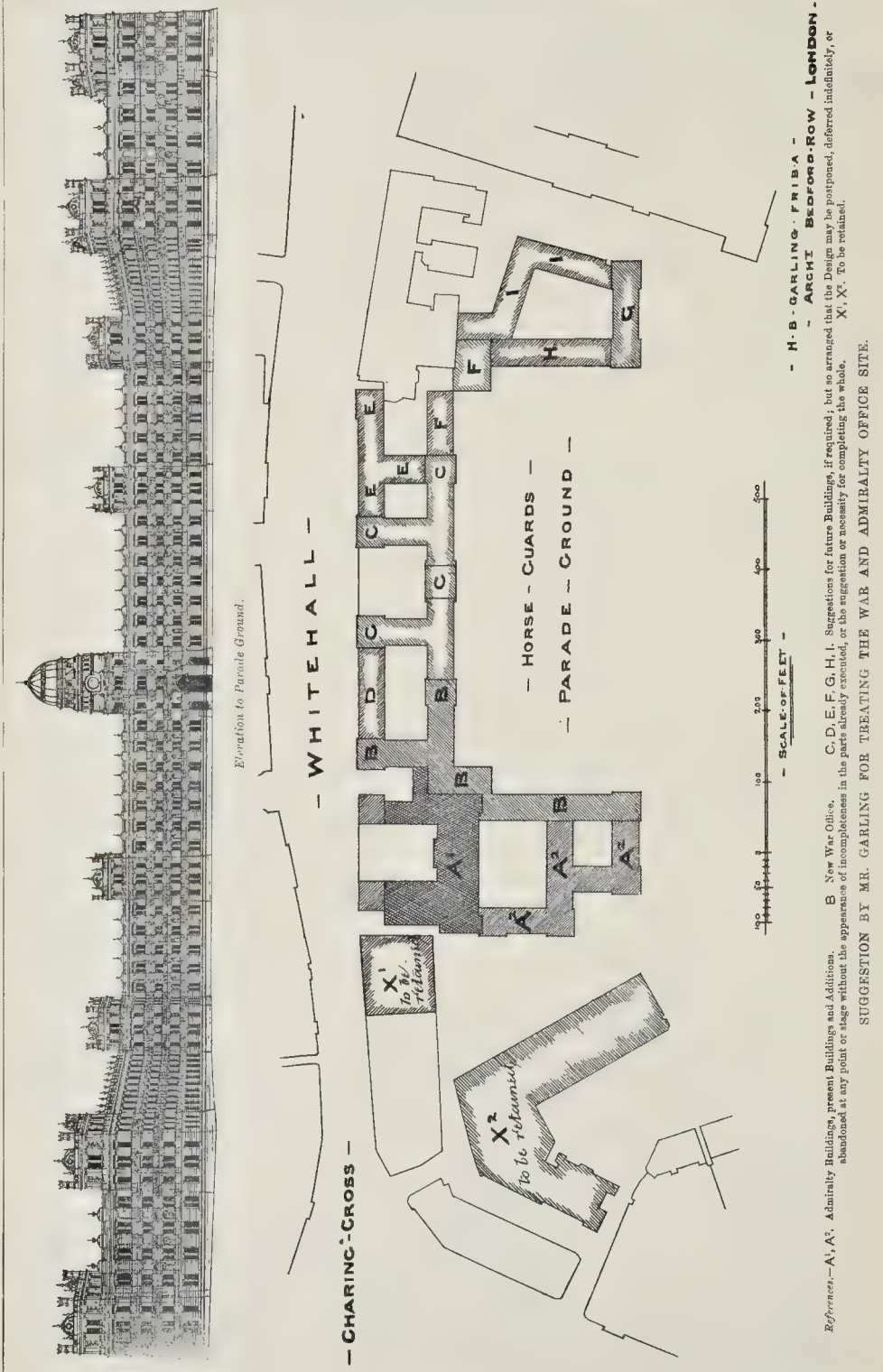
Lastly, by shifting the site southwards instead of northwards, not only will the further purchase of expensive property to enlarge the site of the proposed new buildings be avoided, but the block of houses marked X<sup>1</sup> and X<sup>2</sup> on the block plan, already purchased, may be preserved, and perhaps something like 100,000*l.* economised in this way only.

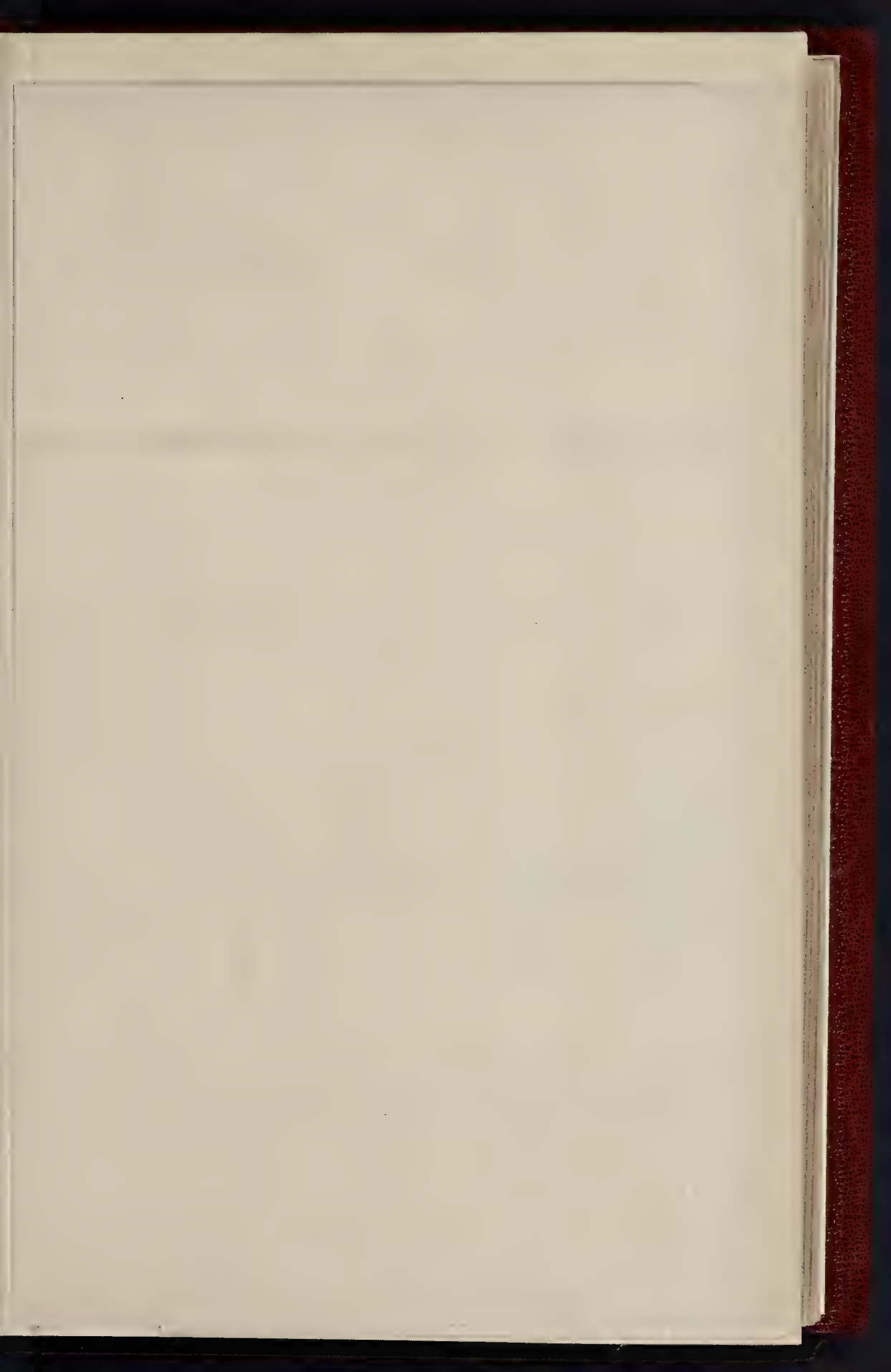
Note.—All the buildings are in the hands of Government, and must soon be reconstructed.

H. B. GARLING.

**The Lighting of Staircases.**—A legal decision has been given in Germany as to the obligation of householders to light passages and staircases in such a manner that no one can be injured for want of sufficient light. A postman in Stettin having fallen and hurt himself under these circumstances, the courts have inflicted a penalty upon the proprietor of the house. It has always been understood that factory staircases have to be lighted, and this supposition is now, it is remarked, confirmed by the above decision.













DESIGN FOR THE IMPERIAL INSTITUTE BUILDING (AFTER SUBJECT TO MODIFICATION)

MR. J. C. GOSSET, F.R.S.E., ARCHT.





SKETCHES BY MR. GERALD HORSLEY, ALDWINCLE STUDENT, 1887.



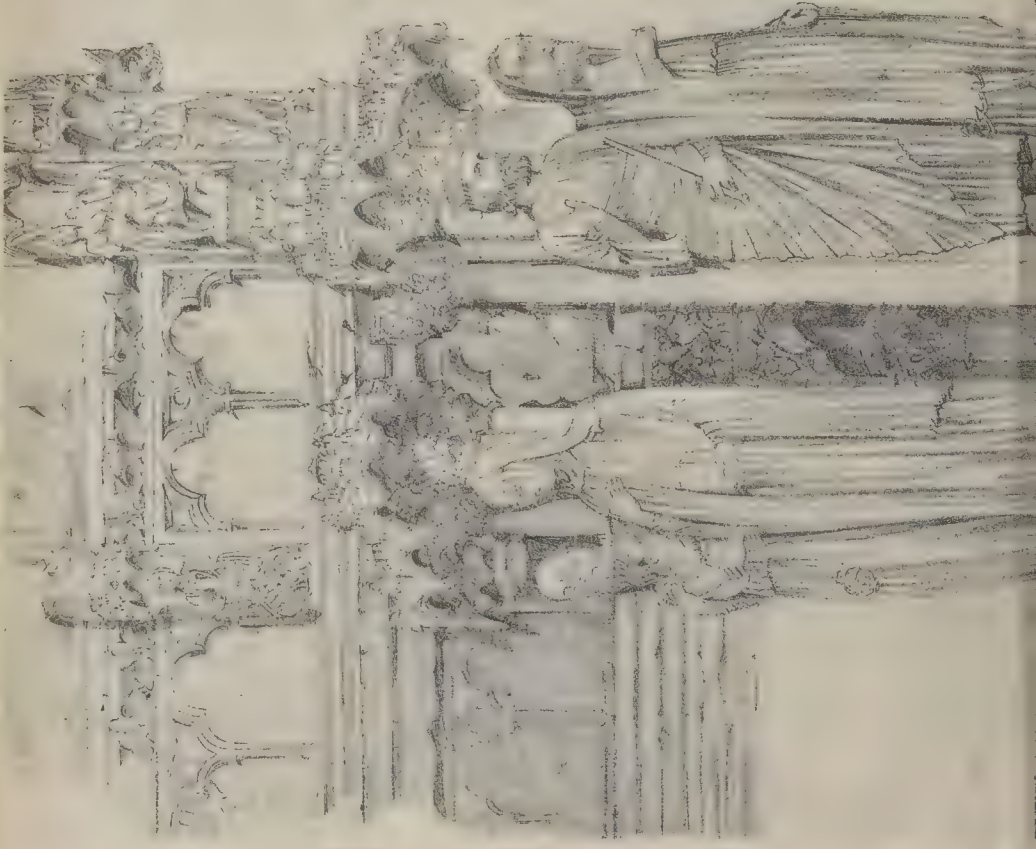
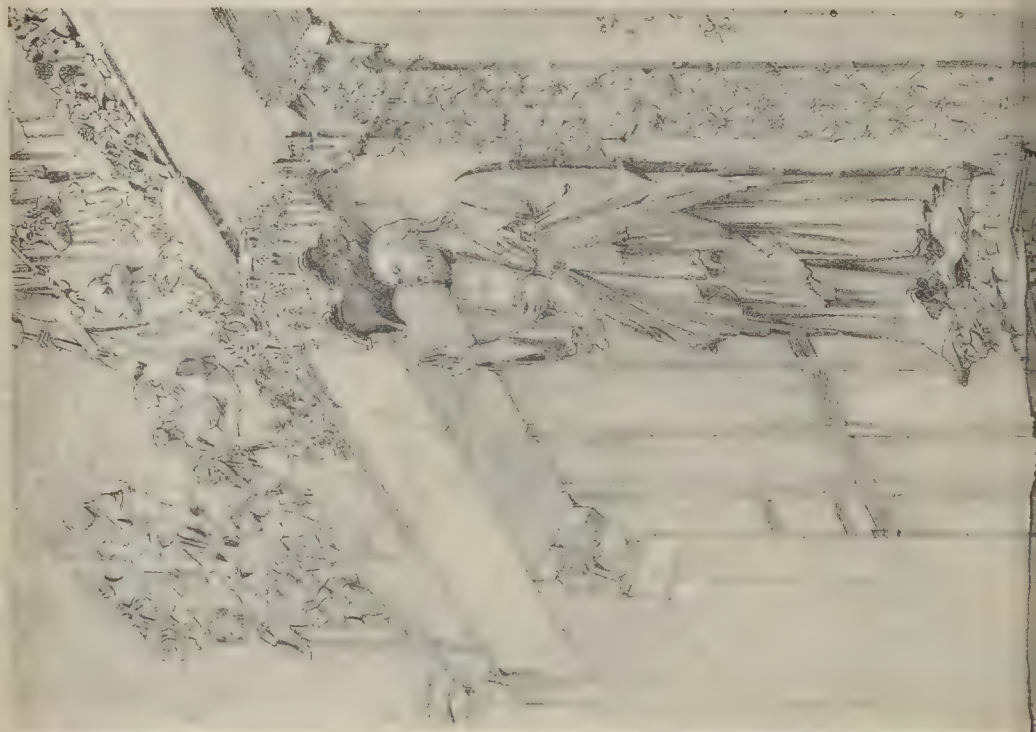


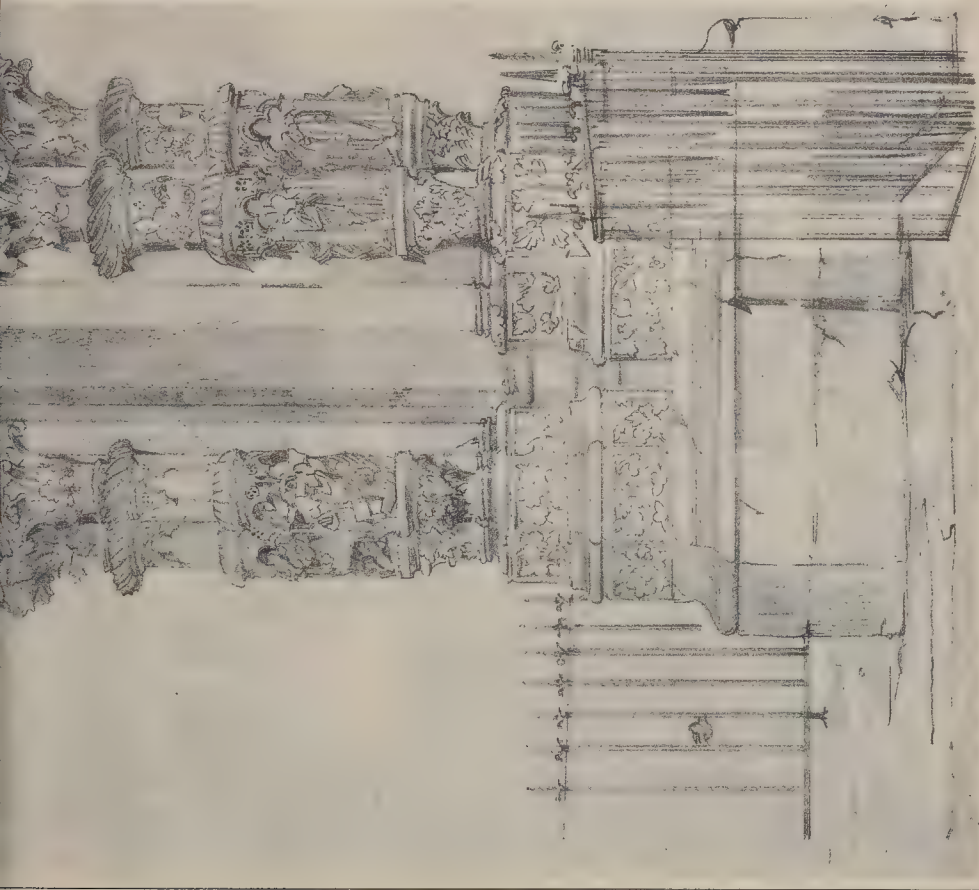
BRONZE GATES OF





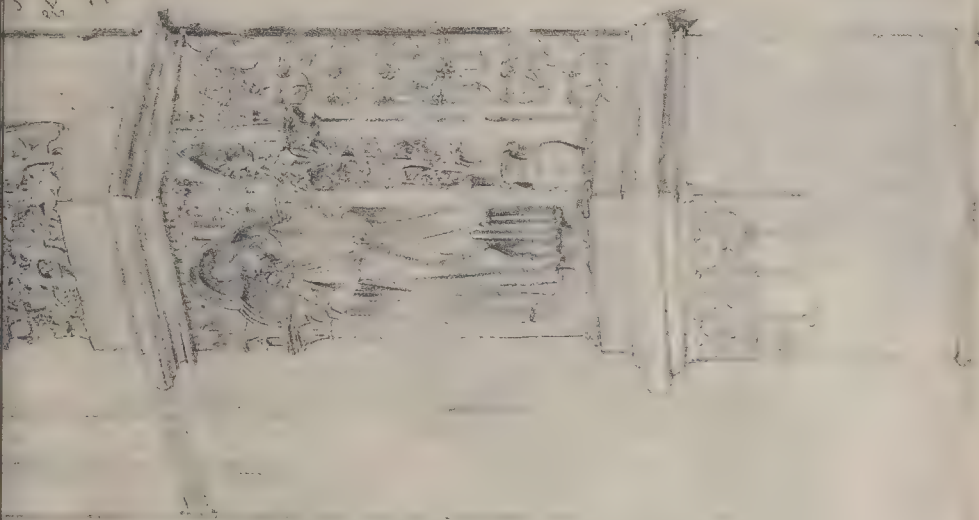






FIGURES FROM THE N. PORCH, CHARTRES CATHEDRAL.

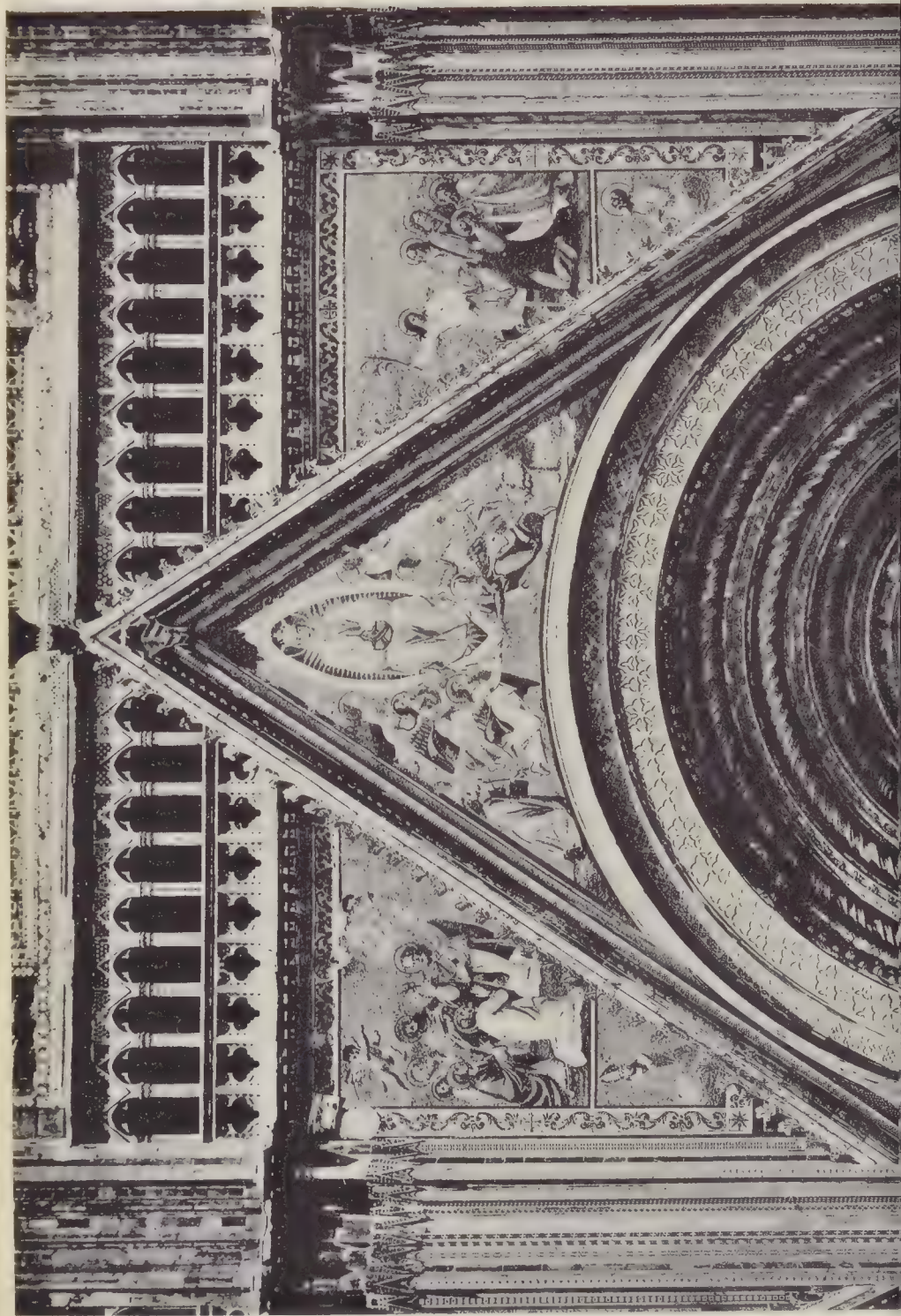
SKETCHES BY MR. GERALD HORSLEY, ALDWINCKLE STUDENT, 1887.



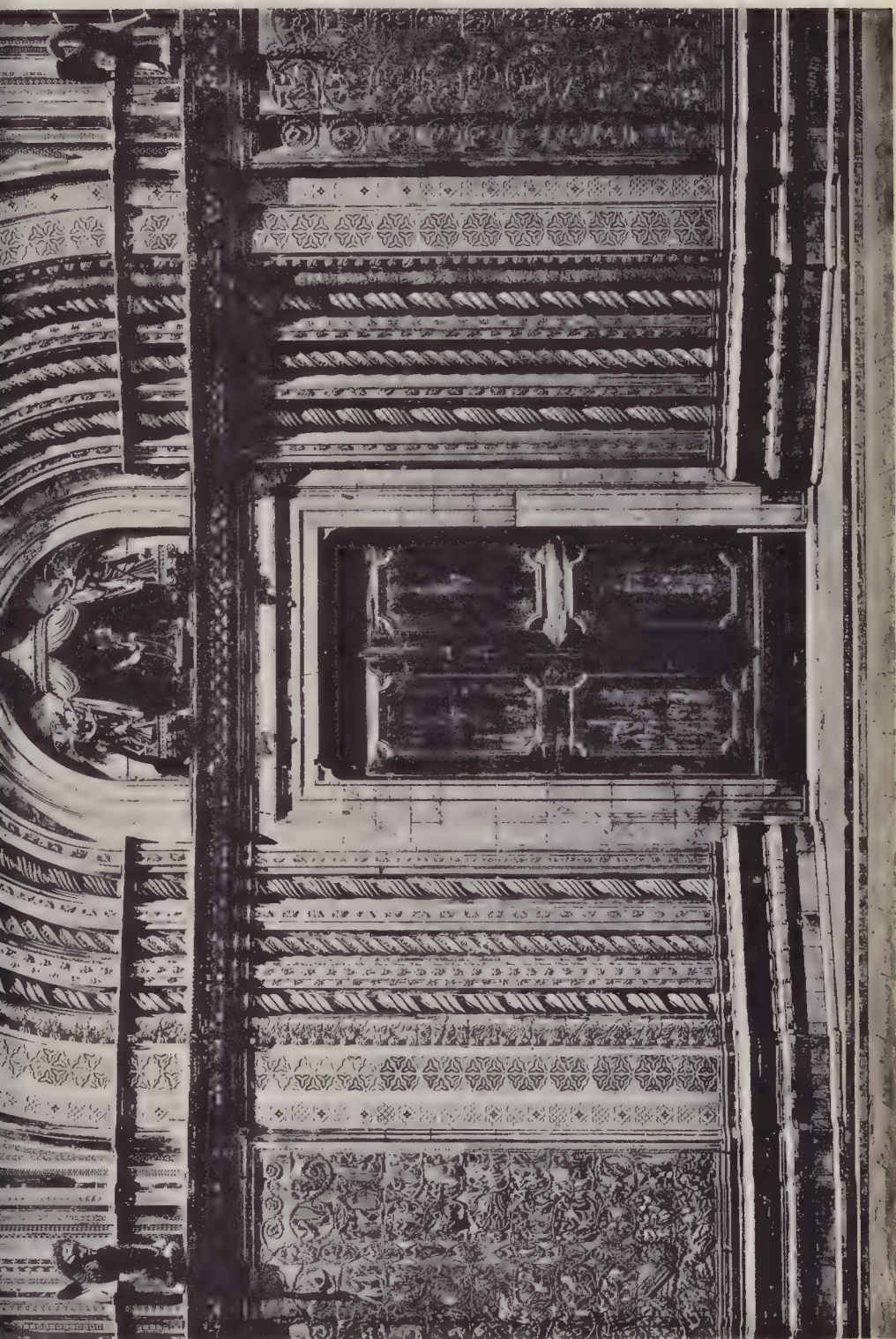
THE "BON DIEU D'AMIENS."

THE PHOTOGRAPH BY MR. G. H. HORSLEY, 22, MARK LANE, LONDON, E.C.









The University Co., 201, Strand, London







Ancient Palace of the Archbishops of Canterbury at Maidstone. (See "Note" in BUILDER of June 4 of this year.)

#### THE NEW TOWNHALL AT PORTSMOUTH.

DURING the visit of the Association of Municipal and Sanitary Engineers to Portsmouth on the 4th ult., as mentioned by us at the time (see *Builder* for June 11, p. 882), the members inspected the works now in progress for the erection of the new Townhall, with reference to which Mr. Boulnois, the Borough Engineer, read the following notes:—

The new Townhall at Portsmouth, now in course of erection from the designs of Mr. William Hill, F.R.I.B.A., architect, of Leeds, and under the superintendence of Messrs. W. Hill & Sons, of Leeds and Portsmouth, stands upon a site containing  $3\frac{1}{2}$  acres acquired by the Corporation (partly by purchase and part in exchange for other land) from H.M.'s War Department.

When the existing boundary wall and old buildings are removed, the east or principal front of the building will be seen at a distance of 160 ft. from the centre of Commercial-road, the chief thoroughfare in the borough, and near the central railway station. The south front of the structure faces a wide road called Park-road, and is 90 ft. from the Gas Company's offices, the nearest building on that side. The west front is open to a portion of Victoria Park, and the north front is also open to this park, but unfortunately separated from it by the railway embankment, which cuts off the whole of the basement of the building, and about 8 ft. or 9 ft., or one-fourth, of the order of pilasters, from the spectator's view in these ornamental grounds.

The following are the leading dimensions of the building on plan, viz., the east and west fronts from north to south on the plinth line 185 ft., and through the centre in the same direction 206 ft.; and from east to west 164 ft. and 194 ft. 6 in. respectively; the total area covered being 35,380 ft. super., the cubic contents of the structure being approximately 2,500,000 ft.

The under-mentioned figures give very closely the areas allotted to the several departments falling under the head of municipal offices. On the east or principal front, immediately north of the portico on the basement or ground-floor, are the rate offices, four in number, covering an area of 1,650 ft. super. On the north front, beyond the north-east stairs, is the sanitary department, the Inspector's with 925 ft., and the medical office with 700 ft., the north main entrance to the principal floor bisecting these offices; 380 ft. is then taken for lavatories, &c., and hall-keepers' and porters' rooms (together 560 ft.) fill up the north-west angle. Next to these on the west front come two stair-

cases,—a separate one to the Borough Courts and another to the principal floor; beyond this the police cells, eleven in number, with corridor and stairs to the court, occupy an area of 2,500 ft. Contiguous to these the police department, with two entrances and numbering eight rooms, take up 1,790 ft. of space, exclusive of stairs to floor above and corridor to cells. Passing the south main entrance to the next floor we find the whole of the south-east angle of the building from the last-named staircase to the portico devoted to the public library and reading-room, together occupying 5,260 ft., and an additional space under the great hall of 1,100 ft. for store-room purposes; the rest of the space under the hall being distributed as follows, viz., 800 ft. to the heating and ventilating apparatus room, 2,300 ft. to the police parade, and 1,500 to the store and testing-rooms; a further area of 3,790 ft. is taken by the corridors and stairs before named.

Following the same order, we find, on the principal floor, east front, the part north of the centre allotted to bookkeepers, cashier, clerks, &c., with a similar amount of room as in the rate-offices below, and connected with these and the Town Clerk's offices above by a private staircase, by which the strong-room in the tower can also be reached. On the north front are cloak and retiring rooms on each side of the north entrance, embracing an area of 1,600 ft. super. Beyond these are the barristers' and solicitors' rooms, filling, with the stairs, the north-west angle. The west front on this floor is given up to the Borough Court, magistrates', and witnesses' rooms, &c. The Court, running up through both floors, measures some 50 ft. by 40 ft., in which is also a separate gallery for the public. An apartment on the south front is set aside for a coroner's court, containing 560 ft. From the centre of this front to nearly the centre of the east front are located the Borough Engineer's offices (over the library). Of this space the drawing offices take some 800 ft., Borough and Deputy Engineer's 740 ft., while the public office, Road Surveyor, and Improvement Surveyor share 1,260 ft. between them, making a total of 2,800 ft. super. allotted to this department. The height of this floor is 17 ft. 6 in. from the floor below, the basement floor being 16 ft. from floor to floor.

The above-named offices are all reached from a corridor 10 ft. wide, surrounding the great hall, which is 108 ft. in length by 70 ft. 8 in. in width, exclusive of the semicircular apsidal projection at the south end to receive the organ.

On the first floor, the 10 ft. wide corridor, in communication with three staircases, is carried round three sides of the great hall, and connected with the balcony by eight doors on the

inside, and with the various rooms here described. On the outside, on the first floor, viz., opposite the portico, we get the mayor's reception-room in the tower; north of this comes the mayor's parlour, with 400 ft. area; adjoining are the town clerk's offices, three in number, containing 800 ft. super.; facing the north we get the council-chamber, a fine apartment with about 2,000 ft. of floor space; committee, robing, and other rooms occupy the rest of this front. The upper part of the Borough Court, grand jury and other rooms also fill up the west front on this floor.

On the south of the main hall, beyond the apsidal end forming the organ gallery, the remaining space of 1,400 ft. is set apart for a museum, over which the kitchen and culinary department will find a home. Returning to the east front we reach the banquetting-room, a fine apartment 72 ft. by 25 ft. 4 in., with the mayor's reception-room and parlour *en suite*, and opening into the upper corridor.

Should the fittings of the Borough Court not interfere with the view, a very unique effect will be obtained by opening all the doors on the principal floor from the entrance-hall across the minor axis of the building in the centre and through the centre window of the court; the view will extend over the railway to a distance of some 400 yards westward till lost among the trees in the distance.

The great hall will be 60 ft. high to the panels in the deeply-coffered ceiling, round which will run a deep cove, pierced by the numerous semicircular windows that light the hall above the adjoining roofs. Beneath this cove an enriched entablature runs round the hall, carried by a series of pilasters. There are two orders of these, divided by the balcony before described.

The ventilating and warming arrangements are in the hands of Messrs. Haden, of Manchester. The numerous flues for the supply of warm and fresh air to every room in the building, together with the extraction shafts for vitiated air, are in the course of construction from the designs of these gentlemen.

The style of the building is Classic, of a Roman type, and entirely carried out in Portland stone, from the bed known as the Whit or brown bed. A rusticated basement, with a bold plinth, above which are the ground-floor windows, 9 ft. 6 in. high, reaching to the subbase, 17 ft. from the ground-level, runs all round the building. From the top of this subbase starts the order of columns and pilasters, also surrounding the building. These are 3 ft. 4 in. in diameter, and ten diameters (33 ft. 4 in.) in height, and run through two floors, with a string course marking their division, the subbase marking the level of the principal floor.

The columns and pilasters carry an entablature.



ture 8 ft. 6 in. in height, surmounted by a balustrade 5 ft. 3 in. high. In the centre of the east front, and standing 21 ft. in advance, is a hexastyle portico 57 ft. wide, reached by a pyramidal range of steps on each side of the portico, and on the same level is a loggia 57 ft. long and 6 ft. 8 in. deep, with four columns in each, and double pilasters at the angles. On the south, the centre advances 10 ft. 6 in. carrying four three-quarter columns and coupled pilasters; the north and west fronts are treated similarly, but with pilasters only. In the centre of the east front, immediately behind the portico, rises the clock-tower, the lower stage rising boldly without a break for 29 ft., including frieze and cornice, making a fine base for the belfry stage, which is enriched with pilasters, carved capitals, and panelled semi-circular openings on each face, filled with ornamental iron grilles; above the cushion frieze and cornice of this portion comes the still more highly-enriched clock stage, with dials 9 ft. in diameter, surmounted by pediments and angle terminals; above this starts a copper-covered octagonal cupola or domical roof, over this again rises an open turret with cupola, all in stone, the whole reaching to a height of 205 ft. from the ground.

Taken altogether, the strong lights and deep shadows of the finely-grouped and well-balanced masses, the carefully-studied detail, the charming variety in size and outline of the turrets and cupolas, emphasising the salient angles of the structure, and leading up to the crowning central feature, unquestionably stamp the design as a grand, effective, and harmonious composition. The foundations rest on a firm, compact stratum of gravel throughout; the walls in all cases stand on a depth of 2 ft. 6 in. of cement concrete, except the tower, which has a depth of 5 ft. 6 in. under two courses of rough Portland stone covering the whole area.

The quantity of stone required for the whole building will be upwards of 200,000 cubic feet.

The contractors for the whole of the work are Messrs. Armitage & Hodgson, of Leeds. The stone sawing and working machinery introduced by this firm is quite a novelty in this part of the kingdom, as well as a most important factor in facilitating the work.

I am indebted for the whole of the foregoing particulars to Mr. Lawrence, the able clerk of works, who was appointed by the Town Council to superintend the erection of this important building.

We may add that the new Townhall is to a great extent a *replica*, though on a somewhat larger scale, of the new Town hall at Bolton, by the same architect. How this comes to be the case was explained by the Mayor of Portsmouth in the following words:—"We wanted a new Townhall, but how to get one to suit our requirements we did not know. We thought of initiating a competition, but we came to the conclusion that the result would be doubtful, so we determined to appoint a Committee to visit some of the most important buildings of the kind which have been erected of late years, particularly in the North of England, with the view of finding a building which came up to the ideal of our requirements. The Committee, after visiting numerous Townhalls, were so struck with the internal arrangements as well as with the external architecture of the Bolton Townhall that they recommended the Corporation to employ its architect to build a somewhat similar structure in Portsmouth, and their recommendation was adopted."

**Economy in Telegraphy.**—Messrs. R. Cull & Son, of Palmerston-buildings, E.C., having a shipping inquiry for glazed stoneware kitchen sinks beyond the quantity of their London stock wired their Works people as follows:—"Bricks, Halifax, wire stock sinks, Teyere."

The reply was:—  
"Teyere Ldn

112	24	by	18,	50
24	by	16,	6	30
by	18,	73	30	by
20,	20	36	by	18,
25	36	by	20,	stock."

The commas are ours, but the message was perfectly distinct to the recipients without them, the number of each sized sink and their measurements in inches being quite accurately given.

#### ARCHÆOLOGICAL SOCIETIES.

**Bradford Historical and Antiquarian Society.** The second excursion for the present season of this society took place to Wressell Castle and Selby Abbey. At Wressell the members were met by the Rev. R. Kennedy, the Vicar of the parish, who read a paper on the history of the castle from its foundation by Thomas Percy, Earl of Worcester, in the time of Richard II., about 1388, to its dismantling by order of Parliament in the time of the Commonwealth, and ultimate destruction of the interior by fire in 1796. At Selby Abbey the antiquaries were met by the Rev. Canon Harper, Vicar.

**Newcastle Society of Antiquaries.**—A meeting of this society was held on Saturday last at Hexham, and, under the guidance of Mr. J. P. Gibson and Mr. C. C. Hodges, the members visited the Abbey Church. Mr. C. C. Hodges read a paper on Hexham, in which he expressed the opinion that Hexham was not the site of a Roman station, and that the Roman stones found at Hexham had been brought from the neighbouring Roman station of Corstopitum (Corbridge), which outshone in splendour any other Roman city in Northumberland. Referring to the Roman altar taken from the bed of the river Tyne a few days ago, Mr. Hodges said he had a theory as to how it came there, and his theory was confirmed by the fact that there were two other Roman stones lying in the river beside it. His theory was that the carters, in carting Roman stones from Corbridge, to be used in the building of the church at Hexham, had had the cart upset in the river, and had not been at the trouble to get the stones out of the water again, but had returned for another load.

**Society of Antiquaries of Scotland.**—At the concluding meeting of this Society for the present session, the first paper read was entitled "Notices of St. Margaret's Chapel in Edinburgh Castle," by Daniel Wilson, LL.D., Toronto. This chapel, according to the *Scotsman*, was discovered by Dr. Wilson in 1845, with a wooden floor dividing it into two storeys, and the apse converted into a powder magazine. But its structural features had, fortunately, escaped the destruction of time and siege, and the little oratory that crowns the castle rock still presents much the same aspect as in the early days of the reign of David I., to which the features of the chancel arch most probably assigns its construction, though the other masonry is of diverse periods. After tracing the history of the two chapels,—St. Mary (which was demolished in the present century) and St. Margaret,—and noticing the relics of St. Margaret which were kept in the Castle, Dr. Wilson concluded by alluding to the work of restoration now being carried on in the Castle by the liberality of Mr. William Nelson, which, it was remarked, would add greatly to the attractive interest of the grand old fortress. St. Margaret's chapel was also included in the original scheme of operations, but every stone of the venerable little oratory is historical, and it was to be regarded as fortunate that it has escaped the renovating process. In the second paper, Mr. A. Hutcheson, architect, Broughty Ferry, gave an account of the excavation of a burial-place of the Bronze Age at Barnhill in that neighbourhood, exhibiting the urns and other objects that had been found. In the third paper Mr. J. Russell Walker, architect, F.S.A. Scot., gave some additional notices of baptismal fonts in Scotland, in continuation of a paper on the same subject read to the Society last session. The number of Scottish fonts which he has collected and figured, with measurements, now amounts to fifty-two. In the fourth paper Mr. J. W. Cursitor, F.S.A. Scot., Kirkwall, gave an account of several weapons of bronze recently obtained in Orkney and Shetland. The last paper was a notice by Mr. George F. Black, assistant in the Museum, of a sculptured slab recently discovered in the Isle of Man, on which are sculptured representations of the legend of Sigurd Fafnis Bane, as found in the Elder Edda. The stone was found by Mr. Kermode in the churchyard of Kirk Andreas. It is sculptured on both sides with subjects from the Norse mythology.

**Survey Archaeological Society.**—The annual meeting (for it can hardly be called excursion) of the members of this Society will take place this year on Tuesday, July 5th, when the Church of St. Saviour, Southwark, Lambeth Palace, and St. Mary's Church, Lambeth, will be visited. Viscount Midleton is the President of the meeting. At St. Saviour's, Southwark,

Mr. F. T. Dollman is announced to read a paper on its history and architecture. At Lambeth Palace the Library and Picture Gallery will be described by Mr. S. W. Kershaw, F.S.A., and Mr. John P. Seddon will offer some remarks on the architecture of the chapel. This Society has not visited Lambeth Palace since October 31st, 1856, when it was described by the late Rev. Charles Boutell. A full account of the meeting on that occasion, with illustrations, will be found in the *Builder* of November 1st and November 8th, 1856. St. Saviour's, Southwark, has not been visited by this Society since May 12th, 1858, when an "Architectural notice of the Nave of St. Saviour's Church, made during its demolition, accompanied by numerous drawings from actual measurement," was read, written by the late Mr. W. Pettit Griffith, F.S.A.

#### COMMISSION ON QUANTITIES.

MURPHY P. PAWSON AND OTHERS.

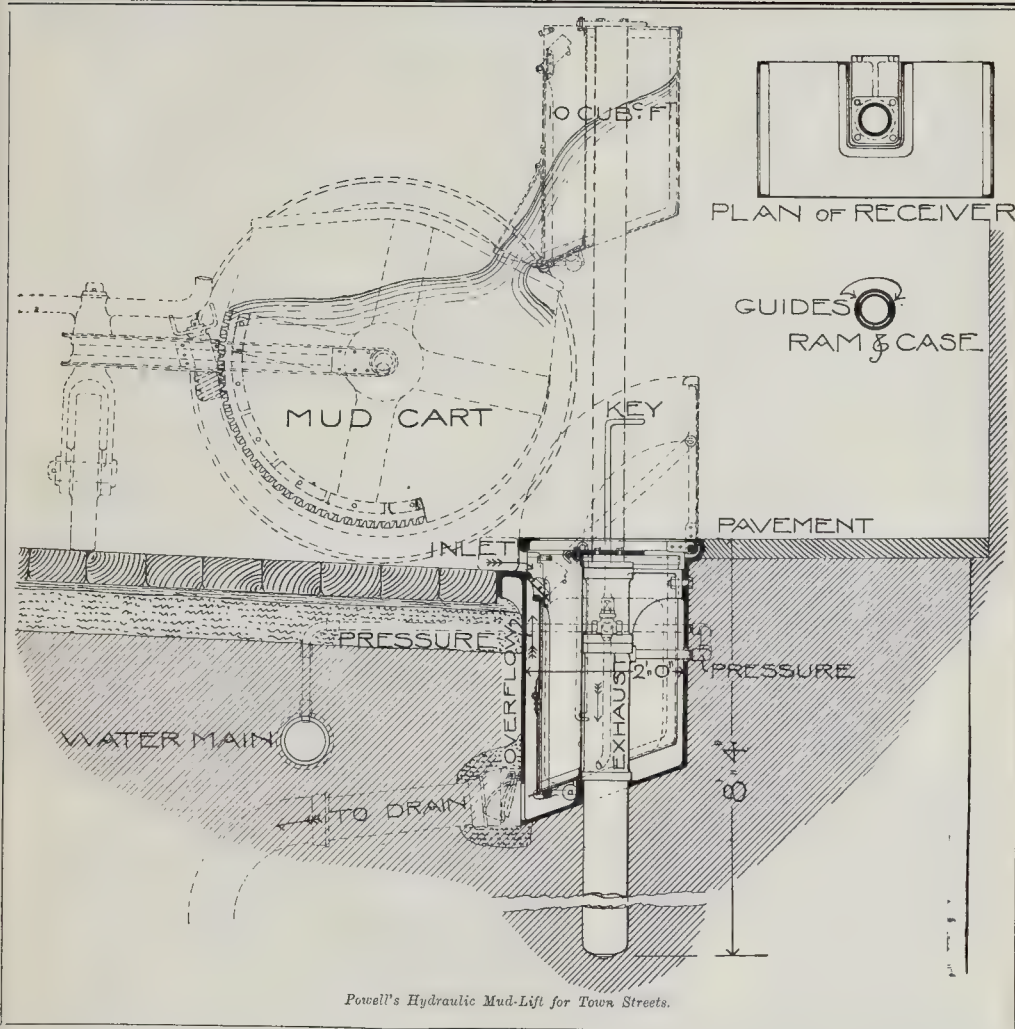
THIS was an action tried in the Sheffield County Court a few days since, before Judge Ellison. Mr. John M'Inery, quantity surveyor, High-street, was the plaintiff, and Mr. Henry Pawson, the elder, Mr. Henry Pawson, jun., and Mr. John Armitage Brailford, printers and stationers, High-street, were the defendants. The action was brought to recover commission for quantities. The plaintiff claimed three sums amounting altogether to 103*l.* 1*s.* 6*d.* He had, however, abandoned one item, leaving in dispute one sum of 22*l.* 5*s.* and another of 75*l.* 8*s.*, together 97*l.* 13*s.* The defendants had paid into court 53*l.* 2*s.* and 5*l.* 3*s.* costs, and that they said was all that they were liable for. The real point at issue, however, was whether the defendants were liable to the plaintiff or Messrs. Longden, the contractors. The case was entered for hearing in a superior court, but the defendants had paid the 53*l.* 2*s.* in order to bring the action within the jurisdiction of the County Court, and not because they admitted their liability for any part of the sum claimed.

From the statement of counsel for the defendants, who, by arrangement, opened the case, it appeared that in 1883 Messrs. Pawson & Brailford, who were three partners, proposed to build for themselves some large premises in Sheffield. For that purpose they employed an eminent firm of architects, Messrs. Hadfield & Son, who prepared plans, which amounted on their estimate to something between 14,000*l.* and 15,000*l.* Messrs. Pawson & Brailford thought that some of the materials which the architect intended to employ might be reduced, as a question of cost. They were regarded as over good, too expensive for the premises they proposed to erect. They suggested that in this way the architects' estimate might be reduced to 11,765*l.* Messrs. Hadfield & Co. introduced Mr. M'Inery to Messrs. Pawson & Brailford as a quantity surveyor, and he bargained absolutely that he should be paid a commission of 2 per cent. on the contract when fixed. That sum the defendants were perfectly willing to pay the plaintiff, and they believed that they had paid him. Afterwards there were interviews between him and Messrs. Pawson & Brailford as to the question of variation in the original contract, and the amount he ought to receive for such variation. The plaintiff agreed that if the value of the original contract was diminished by variation he should receive 1 per cent. on the omissions instead of 2 per cent.; if there were additions to the original contract then that he should receive 2 per cent. for the additions. The real question was, had the contractor paid the quantity surveyor the whole sum that was due to him, or ought he now to pay the sum? The defendants had paid Longden the whole amount of their contract, which included the charge of the quantity surveyor, and therefore they had discharged all their liability to the quantity surveyor.

Mr. James Longden was then called. He said that he and his father were the contractors for the new premises of the defendants. In answer to questions, he said his firm had paid the two per cent. for the quantities on which the contract was taken, but had not paid a claim from the plaintiff for 103*l.* dated 5th January, 1886, because when the work was measured up the proprietors always paid the commission on additions and omissions, unless the amount was added to the builder's account. The builder did not pay on measuring up unless he received it from the proprietors. They did not receive it from the proprietor.

Mr. Charles Hadfield, architect, was next called, and in reply to questions put by the defendants' counsel, Mr. West, said his firm were the architects of the new premises of the defendants in High-street. It was not his practice to give certificates of the amount due to the quantity surveyor. His certificates were given for the amount *de pro rata* according to the contract and including what was due to the quantity surveyor, but the amount was not specified. He dealt with the commission on the omissions and additions in a final certificate to the contractors. It was then specifically arranged that the sum of 103*l.*, the commission due to the plaintiff on those items, should be paid by the defendants,





Powell's Hydraulic Mud-Lift for Town Streets.

and he withheld his final certificate until that arrangement had been accepted by the solicitors on each side.

The Judge: You never called upon Messrs. Longden to pay it?

The Witness: No, your Honour.

Mr. West called in question the accuracy of Mr. Hadfield's statement, whereupon Mr. Barker (counsel for the plaintiff) read letters from Mr. Hadfield to the defendants in confirmation of his statement. The most important of the letters was dated December 11th, 1885, and it was not, Mr. Hadfield said, until the following March that he was given to understand that the defendants objected to the item of commission. At the same time the defendants objected to his charges.

Mr. West: I believe you had some legal proceedings about your charges?—Mr. Hadfield: Yes.

Which were compromised and arranged by a mutual friend?—Yes; honourable to both sides.

Mr. Barker: Compromised by payment in full and apologising.

In reply to further questions, Mr. Hadfield said he declined to give information as to what Longdens had paid the plaintiff, because he did not know. It was stipulated in the bills of quantities what the plaintiff should receive from contractors, and he had no more to do with it.

The Judge intimated to Mr. West that he did not see how he could go on with his case. Mr. Hadfield had told them that in this case it was expressly provided that the amount claimed should be paid by the defendants.

Mr. West admitted that as he could not go into the general account to calculate what commission the plaintiff had received on the whole, that the evidence was against him on the specific items. He had no evidence of the payment of the specific sums mentioned in the pleadings. He could not prove it.

The Judge: It has been the opinion for some time that you could not carry the case on.

Mr. Barker (to the witness): You had to bring an action against the defendants for your commission as the architect, and they counter-claimed against you?—The witness: Yes.

And charged you with fraud for having given these very certificates?—Yes; they did.

Then they paid the amount of the claim and apologised for the imputations?—Yes; paid and withdrew all their offensive imputations.

Mr. West: Who employed the plaintiff, you or the defendants?—The witness: I did, with the concurrence of the defendants.

Mr. J. A. Brailsford, one of the defendants, was called, and said that the arrangements as to the new buildings were left very much in his hands. He was under the impression that the whole of the commission due to the quantity surveyor was included in the builder's contract. He was quite willing to pay what was due, but they were unable to ascertain from any one what it was.

Mr. West said that was his case.

Mr. Barker asked if there was any case to answer?

His Honour said he thought all the case was in favour of the plaintiff, and, addressing the jury, said the evidence that had been called was in favour of the plaintiff's claim, although called on behalf of the defendants. It had entirely failed to support the defendants' case, and, therefore, it was not necessary to go into the case on the other side. He therefore directed the jury to find a verdict for the amount claimed, with the sum paid into court.

The jury laid their heads together, and then expressed a desire to retire to talk the case over.

His Honour reminded them that they were sworn to find a verdict according to the evidence. It was his duty to tell them what the state of the evidence was, and he had told them that all the evidence

given by the defendant had been in support of the plaintiff's case. Therefore they were bound to find a verdict for 44l., in addition to the sum paid into court.

The jury now complied, and returned a verdict for the plaintiff as directed.—(Abridged from the *Sheffield Evening Star*.)

#### POWELL'S HYDRAULIC MUD-LIFT FOR TOWN STREETS.

This invention is one the adoption of which, wherever possible, would, it appears to us, conduce greatly to the cleanliness and tidiness of town streets. The patentee is Mr. W. B. Powell, of Tintern-street, Ferndale-road, Brixton, and the main idea of the invention is that the mud, dust, and other refuse matter should be swept into sunk receivers placed at intervals at the edge of the kerb and underneath the footpath, the receivers being raised by hydraulic pressure (obtained from the water-mains) for the purpose of discharging their contents, an operation very quickly performed. The invention is so clearly shown by the accompanying diagram that it is not necessary to say much about it except that it has been materially improved and perfected since it was exhibited in the Inventions Exhibition two years ago. The diagram shows it in its latest form.

If these mud-receivers were placed, say, about fifty yards apart in some of our crowded town streets, the scavengers would be spared the temptation of sweeping mud down the gullies, — a practice far too frequent in London, to the detriment of the sewers, — and



"the public would be spared the spectacle, too commonly to be witnessed, of seeing heaps of mud swept up to the edge of the kerb, to remain there for hours, and sometimes days,—save and except so much of it as gets scattered and splashed by horses' hoofs over pavement, passers-by, or shop-windows, or gradually distributed over the surface of the road again by countless wheels,—just as printing-ink is "distributed" by rollers on a printing machine. Even where things are so well ordered under the present system (if such it can be called) that the mud-cart follows the scavengers' broom very closely, the adoption of Mr. Powell's invention would abolish the tedious operation of shovelling-up,—an operation fraught with danger to the hats and clothes of wayfarers. The contents of one of Mr. Powell's mud-receivers could be elevated and discharged into a cart brought alongside, and the receiver lowered into its place ready for future sweepings, in two or three minutes. The momentary occupation of a small portion of the pavement, and that near the edge, would be an inconvenience more than compensated for by the other advantages we have named; and the adoption of these lifts in certain town streets which are always more or less crowded with traffic might conceivably be worth consideration merely with a view to preventing obstruction to traffic by avoiding prolonged stays of the scavengers' carts. Water being the motive power, the exhaust water would go to flush the sewers. The inventor by preference would employ mud-carts of the type shown in the sketch ("Glehill's patent"), which are lower in height than the ordinary carts or wagons, and are readily "tipped" by the worm-wheel and toothed quadrant shown in the diagram. No doubt the first cost of fitting a street with these mud-lifts would be considerable, but against this disadvantage would have to be set the advantages of greater cleanliness and economy of time. At any rate, it appears desirable that the invention should be tried in the next new important street that is made. It is obvious that with certain modifications of detail the invention is applicable to the speedy removal of dust and refuse from large establishments, public institutions, &c., wherever there is access for carts.

The receiver, of 10 cubic feet capacity, is shown by the dotted lines in its raised position on the top of the ram-head of the lift, and in the set of discharging its contents through a flap-door. The inlet for the mud, below the edge of the kerb, is shown on the diagram, as is the overflow for water in times of heavy rainfall. From four to six gallons of water would be used each time the lift is raised.

#### HEAVITREE, DEVON.

##### JUBILEE CELEBRATION EXTRAORDINARY.

STR,—As a "Jubilee Memorial" it is proposed to pull down the old (fifteenth-century) tower and to build a new one.

A more wanton destruction of the sole surviving part of the church in which Hooker worshipped can hardly be imagined.

In order to justify its destruction the tower is stated to be unstable, but no authority is given for the statement, no external cracks are apparent, and the bells are rung on all occasions.

Several years ago, when the building of anything new was held to justify the destruction of anything old, a fund was started in the parish for a new tower to "correspond" with the church,—an example of Gothic architecture as rendered by a country architect forty years ago, would-be "Perpendicular," with small chancel and abundant galleries, a big, cold-looking building inside and out.

Since this fund was started, the old tower has had no care save in the removal of battlements and mullions, which required repair, and are now stacked in a corner of the churchyard. Of course, so far as neglect can bring it about, the tower is in a disgraceful condition; yet it had a look of dignity on Tuesday when a pit was dug near its foundations, to foreshadow its approaching destruction, and to receive the first scaffold-pole for the erection of its successor.

There is a strong feeling in the parish that building a new chancel would be a far wiser application of the funds collected, but much was given years ago, and some of the givers are dead, and others do not like to admit that

they have subscribed to a wrong object; and so it comes about that the poor old tower is doomed, unless a word of exhortation from you may induce the architects who are competing for the new building to protest against the task that has been set them to do.

CONSERVATIVE.

#### "LIFTS."

STR,—In your issue of the 18th June we find the letter of Messrs. Smith & Stevens. This letter contains a "catechism" which we think will be regarded by most of your readers as designed to bring out what Messrs. Smith & Stevens regard as a fault in the Standard (or Otis) hydraulic elevator, and the superior merits of the patent balance ram lift as made by Messrs. Smith & Stevens.

The closing paragraph refers to our repeatedly expressed desire for investigation, and assumes that we "would not wish to confine such inquiry to those who have everything to learn in connection with the subject." Our invitation is extended to all who have anything to learn. We must therefore admit the inquiry of Messrs. Smith & Stevens.

We take the questions in their "catechism" by their numbers. In order to save space we will not quote them in full.

1. There is in the Standard Hydraulic Elevator, as we now make it, a "positive entrapment of the charge of driving water," so that as "in all the best English lifts, the charge of pressure water, after lifting the cage, is trapped in a closed chamber, from which there is no escape except through a passage completely dominated by the starting-valve. The cage cannot move till the valve is opened. In case of overloading, the effect is only a greater pressing action on the entrapped water, but no movement can occur until something positively breaks." We have used exactly the language of Messrs. Smith & Stevens, and thus show that in regard to the point which they raise, we are precisely on a level with the Patent Balance Ram Lift to which they refer. It is proper to say, however, that this is a comparatively recent improvement, and that in our elevators, as they used to be constructed, there was theoretically a possibility that the charge of driving water might, by excessive overloading, be driven back upon its source. We say this was so theoretically: practically the point was not important, for the governor is always certain to prevent a descent at an unsafe speed. We have now built and fixed more than 4,600 of these elevators in all parts of the world, and in no single instance has there been such a degree of overloading as to force the charge of driving water back. The elevators have repeatedly been loaded to the utmost capacity; that is to say, passenger-lifts have been loaded until not another person could be crowded in, and nothing of the kind has happened. Our rule is to make the power of the elevator strong enough to lift the utmost load that can be put in. It would be possible, in the case of a passenger lift, to fill it with pig iron, for instance, until the effect described by Messrs. Smith & Stevens would be produced, in which case the car would descend until stopped by the governor, but it is not usual to fill passenger cars with pig iron.

Instances of our present method may be seen, for example, in the National Liberal Club (new building) the Hotel Victoria, the Great Northern Hotel, King's Cross, &c. In all these cases it is impossible "for the charge of driving water to be driven back." 2 and 3. These questions are substantially answered in the answer to No. 1. There is no "free escape for such water back to the supply," nor can "the driving water be forced back and the cage descend."

4. It has already been shown that no motion can take place except when the valve is open for the purpose. The governor, however, is, as all our friends know, always ready to perform its duty, and always does perform its duty whenever a pre-determined rate of speed is exceeded.

5. This question,—as, indeed, all the questions in the "catechism,"—is based upon the one point brought out in the opening part of Messrs. Smith & Stevens's letter, and the answer to one question virtually answers them all. Many years ago the point came up as to how to give the attendant in the car the ability to stop the cage at any moment. If any inquirer will call at this office he will see, in the models which have been here during all the time of my administration, the means shown by which the attendant has perfect control over the elevator under all circumstances. Other means will be pointed out. Long ago we have ceased to use these means for the reason that they were regarded as redundant and unnecessary. They can be supplied in a moment at any time to any person. Perhaps your readers will be willing to call upon us for all the details of this. Messrs. Smith & Stevens could hardly expect us to give them all these details.

6. There is ample provision. 7. The speed of the governor is that which we fix in accordance with the request of the owner.

8. All our details and appliances for every purpose are carefully explained to all who call upon us. To recapitulate them all, and to describe them here, would take altogether too much of your space.

We conclude by simply repeating emphatically our wish for the investigation and inquiry referred to in the closing paragraph of Messrs. Smith & Stevens's letter.

WM. AUGUS. GIBSON,  
President American Elevator Co.

#### THE LATE FATAL FIRE IN NEWMAN-STREET.

STR,—This sad affair exposes a great danger existing in the midst of us. Here were three families living on the top floor of a large three-story house, all the water supply being in the basement. A fire broke out in the night on the second floor. There are no hand grenades near, no easy way on to the roof, and a burning staircase is between the poor creatures and the water-taps at the bottom of the house,—a real death-trap. This, all will say, is dreadful, but it is a fact, and it may occur again any day. I consider that, in the interests of that community generally, it should be enacted that water be laid on to the top floor of all high houses let out in apartments, and also, if possible, that there should be a fireproof flat roof with easy access to it, and which will not cost more than any other good roof.

I hear that the surveyor to the Berners Estate had, some time back, sent in a requisition for some extensive repairs to be done to this house, but the lessee, unfortunately, objected to do them, as she had already, a few years ago, spent nearly 1,000l. for work required to be done by the estate surveyor.

##### PORTLAND CEMENT.

\* \* The Surveyor of the Berners Estate (Mr. E. C. Robins), informs us that the tenant has not spent 1,000l., as stated, but underleased the back premises fronting the house to a firm who rebuilt them at their own expense. The lease of the house had since fallen out, and was agreed to be renewed to the old tenant upon certain improvements being made to the house itself, which included the suggestions contained in this letter. The tenant had hitherto objected to do them, and has now suffered the consequence of the neglect, coupled with the loss of the renewal which was dependent upon the said works being done. The Surveyor justly observes that "it is only upon the falling-in of long leases that the freeholder gets the opportunity of bringing up the property to the more enlightened requirements of the day"; and he adds that "the practice of the Berners Estate is to require the houses to be brought into coincidence with the Building and Sanitary Acts of Parliament upon any renewal."

##### LICHENS UPON STONE.

STR,—I would like to endorse the views of your correspondent, Mr. F. J. Barnes, in last week's *Builder* (p. 952), as to vegetation on the surface being a safe test of the "weathering" qualities of stone. His brief exposition of facts, so far as somewhat extensive observation of mine shows, will apply to all kinds of building stone; and also to bricks and tiles on roofs.

The growth of the mossy covering is doubtless primarily set up by local atmospheric conditions and aspect, and certain kinds of stone or burnt earth with rough granular surfaces appear to give readiest soil to vegetation. It is not, however, unusual to find ancient masonry of smoother and finer texture, as magnesian limestones in Yorkshire and the North, covered with minute,—almost microscopic,—vegetation, equally attesting its endurance.

That this growth is not inimical to the material upon which it fastens must, I think, be conceded. Wherever in the country ancient tile roofs are good and sound, the northern slopes are almost invariably covered with lichens and moss; and I am disposed to think there is a preservative element in the vegetation,—or, at least, a counteraction to balance the warmth and dryness of portions exposed to the summer aspects.

On removing the tiles from an ancient roof of a church I am now restoring in the Eastern Counties, the moss-grown tiles from the northern roofs are found to be equally sound, and, in fact, less weathered than the tiles on the warmer and drier slopes.

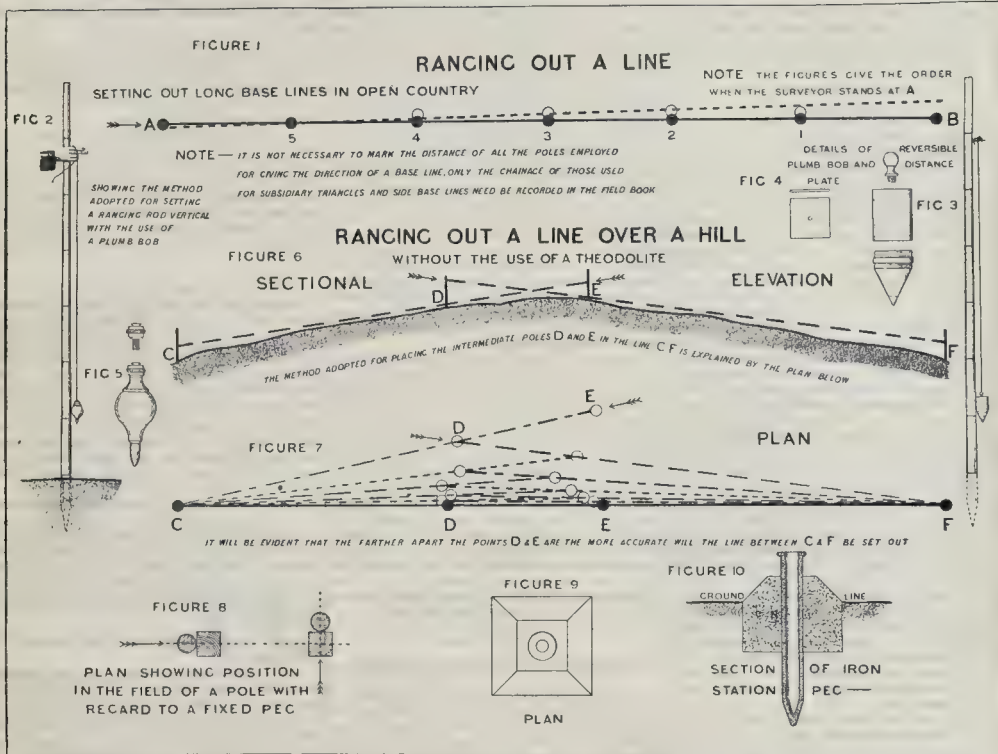
The proverb that "A rolling stone gathers no moss" is usually quoted as to the disadvantage of the restless *lapis*. Like many other ancient saws, it has, I believe, an origin in nature's providential laws.

SAMUEL KNIGHT.

##### WOOD-BLOCK STREET PAVING.

STR,—While it is admitted on all hands that wood paving is the best for our city streets, yet, in face of the fact that the common deal blocks now in use soon wear away, become irregular, and require constant renewal at great cost, and inconvenience to traffic, may I be permitted to suggest that blocks of eucalyptus wood (gum tree) be used instead, as in cities of Australasia? This wood is, of course, known to be as hard as the heart of oak, a great deal more durable, is not at all affected by water, and would wear six times as long as deal. Its use would be of especial value and saving of cost to all great cities, besides opening up a new trade with Australasia.





All who have visited these countries, especially Tasmania, will agree that it is a lamentable sight to see whole forests of this useful wood (trees 100 ft. to 150 ft. high) being "rung" and burned simply to clear the ground (a "caution" to immigrants). Let there be a demand for eucalyptus blocks for paving, and this wood will be well worth bringing to the coast in blocks ready for use and exportation.  
PRO BONO PUBLICO.

#### THE JUBILEE HOLIDAY.

SIR,—As an employé of Messrs. Thomas Crapper & Co., manufacturing sanitary engineers, Marlborough Works, Chelsea, I am glad to be able to inform you that the pleasures of the jubilee of Her Majesty the Queen were enhanced when on Saturday last the cashier of the firm paid a full day's pay for Tuesday last to each employé, both piece-workers and hourly men. This is one kindly act of many which the firm have shown to their workpeople during the time I have been with them.

W. A. COLLINS.

**Sale of the London Land Company's Estates.**—A large and important sale of building sites took place at the Auction Mart on Thursday week, the liquidation of the London Land Company having placed upon the market 320 plots of freehold building land situated at New Southgate, Willesden, and Chingford. The largest portion of the property submitted was that situated at New Southgate, comprising 215 plots on the New Southgate Park Estate. The property at Chingford comprised the Chingford Station Estate, adjoining the station, and close to one of the most picturesque parts of Epping Forest. The number of plots submitted was thirty-eight. The Willesden property comprised the West Stonebridge Park Estate, and contained sixty-seven plots. The largest sale-room at the Mart was much crowded. Mr. H. J. E. Brake, of New Bridge-street, conducted the sale, which commenced punctually at two o'clock, but was not finished till close upon half-past seven, being, no doubt, one of the longest sales that have taken place at the Mart. The amounts realised for each estate were as follow:—Southgate, 7,811l.; Chingford, 1,025l.; Willesden, 5,117l.; making a total of 13,953l.

### The Student's Column.

#### LAND SURVEYING AND LEVELLING.

##### Field Work.

**H**AVING in our last volume given an account of the construction of some of the principal instruments employed in land surveying and levelling, together with an explanation of their setting up and adjustment, we will now deal with the actual execution of work in the field, and show to what purposes these instruments are applied. We shall also describe the office work which is undertaken in connexion with the field work.

##### I.—RANGING OUT A LINE.

In making a survey the first thing to be done is to determine the best positions for running the straight lines upon which the survey is to be based, and the next is to range out the base lines before measuring them from one station to the other. Ranging rods, of lengths varying from 5 ft. to 7 ft., are usually made circular in section, and painted in lengths of one link (7·92 in.), 9 in., or 1 ft., white, red, and black alternately. When one colour at a distance cannot be clearly seen against a background, one of the other coloured portions can generally be distinctly observed.

The surveyor must agree with his assistant as to the signs he intends to adopt for directing him in the field when setting a pole or ranging rod in a required line; and the pole must not only be fixed in the ground upon this line, but be left vertically in position. The latter precaution can generally be accomplished by eye, but where great accuracy is required the aid of a plumb-bob, as shown in fig. 2, must be introduced, the string from which the plumb-bob is suspended being turned over the first and second fingers of the hand, so that when the string hangs vertically the pole may be set parallel to it. The detail of the plumb-bob in fig. 5 shows the top unscrewed for the purpose of attaching the suspending cord by means of a knot. Whip-cord is the best to employ, as it wears better than string. A good form of plumb-bob for carrying in the pocket is shown in fig. 3, with a reversible point which screws

up inside the hollow case forming the body-piece of the plumb-bob. Sometimes a square distance plate equal in width to the diameter of the cylindrical case is added, which is useful when checking the perpendicularity of walls.

A straight line may be set out by successively placing poles in the ground in line with one another at convenient distances apart, in the order marked 1, 2, 3, 4, 5, in fig. 1, when one station B is fixed, the line being found to pass through A. If both the stations A and B are fixed and the intermediate points upon the line have to be determined, the best order to place the poles in position, is to commence near the distant station and allow the assistant to work towards the surveyor along the line, as by this means each pole that is being fixed is distinctly seen by the surveyor, and is not in any way hidden behind the other poles. If pole marked 5 in fig. 1 is fixed first, the remaining poles might appear in line when a complete diameter out as indicated upon the diagram, because daylight could not be seen between them in the direction A B and the base line A B, would if continued beyond B or if the pole B does not stand perpendicular, take the direction of the dotted line. Although this would not affect the actual length of the line measured between the points A and B, it would affect the length of lines measured off A B upon either side of it.

Figs. 6 and 7 illustrate the ranging out of a base line between two fixed stations C and F when a hill intervenes. The poles C and F are fixed perpendicularly in the ground, and the surveyor with one of the intermediate poles D or E and his assistant with the other intermediate pole, each proceed to a distance as far apart from one another as will enable the top half of the pole at C to be viewed from E and the top half of the pole at F to be viewed from D. Then, by the process illustrated in plan in fig. 7 the lines C, D, E and D, E, F are eventually brought into one straight line.

When the position of a station point upon or at the termination of a base line is marked by a wooden peg driven into the ground, it is advisable to observe the precaution illustrated in fig. 8 in order that the pole may appear in the direction of the line viewed. In rough open moorland iron pegs fixed in concrete, as shown in figs. 9 and 10, may be advantageously employed for



the main stations. The hollow portion serves to hold a ranging rod which can be easily wedged up vertically in setting up, and the top of the peg serves as a reliable bench mark when taking the levels.

#### CHURCH-BUILDING NEWS.

**Asbridge.**—The parish church at Asbridge was reopened for service on Midsummer Day, after restoration. The church, dedicated to St. John the Baptist, is one of the finest and most perfect of the fifteenth-century period in the county of Somerset. The restoration of the church has been carried out in sections, and is now complete. The *Bristol Times* says that "the renovation has considerably enhanced the archaeological interest of this queen of churches." What will the Society for the Protection of Ancient Buildings say to that? The first part of the building taken in hand was the nave and aisles, which were completely restored and re-seated in 1879, at a cost of about 3,200l. In 1880 the chancel was restored by the then rector, the Rev. A. G. Dowell. On removing a thick coat of plaster which encased the walls, the existence of a triple sedilia and piscina was discovered on the south side, and on the north a small squint and doorway, which once opened into a now non-existent priest's chamber. The roof of this structure may, however, be plainly traced on the wall outside. The east window, formerly walled up, was also reopened and glazed. The work now carried to a successful completion was commenced in January of the present year. The large six-light window of the south transept, which was in an almost dangerous condition, has been rebuilt, every fragment of the old tracery which had escaped decay being again utilised. In the other windows the smaller parts of the tracery subdividing the heads had been cut away by un sympathetic workmen of a more recent age, apparently to make easy work for a clumsy glazier. These have been replaced and the windows filled with tinted cathedral glass. The oak roofs of the aisles have, in places where decayed, been renewed with faithful reproductions of the actual mouldings removed. The south chancel aisle, together with the south transept, will now be used as a morning chapel. A stained-glass window, the gift of Mr. Sidney Hill, of Langford, has been executed for the east end of the church by Messrs. Bell & Sons, of Bristol. The four lights represent respectively the Nativity, Crucifixion, Resurrection, and Feed my Lambs, the divisions of the tracery being occupied by figures of the four Evangelists, with their symbols, and Moses and Elijah, a central division containing the "Agnus Dei" emblem of St. John the Baptist and arms of the town. The temporary seats for the choir are replaced by oak stalls, and the church appears only to require oak screens to make it one of the most perfect in the diocese. The restoration, including the choir stalls, has been carried out at a total cost of 5,000l. by Messrs. Charles Trask & Sons, of Norton, near Ilminster, from designs by Mr. J. D. Sedding, the diocesan architect, and under the direction of Mr. W. J. Jane, of Congresbury, as clerk of the works.

**Lofthouse (near Wakefield).**—Mr. William Watson has been appointed the architect for the proposed new church at this place. The church is intended to accommodate 500 persons, is to cost about 3,000l., and will be built entirely of stone.

**Runcorn.**—A new reredos has been erected in Runcorn Parish Church to the memory of the late Canon Barclay. The design is in alabaster, relieved with coloured marbles and jewels. The work is from the studio of Messrs. Norbury & Paterson, Myrtle-street, Liverpool, and the total cost is about 300l.

**Sandridge (Herts).**—A few days since was reopened, after complete reparation and extension of the aisles westwards, the ancient Church of St. Leonards, Sandridge, near St. Alban's. The church contains several features of remarkable interest. The arcades are of the Late Norman period, and the north doorway. There is a remnant of a round-headed chancel arch, which was constructed in the Early Norman period of old Roman bricks, similar to those with which the tower and some other portions of St. Alban's Abbey were built. This arch was almost destroyed in the fourteenth century by the insertion of a fenestrated stone screen, extending right across the gable,

and cutting away the jambs and lower portion of the arch. The screen had become much crippled by the weight of the loose walling of the gable above, and in order to render it secure, this walling has been removed, and the space filled in with open framework of oak timber. The whole has been re-roofed. A clearstory has been added in place of one which was removed early in this century, when also a flimsy western tower was built in place of an early one which had fallen forty years before. This has been replaced by a massive tower, built in local concrete, finished outside with flint and inside with brick, and roofed with a low timber spire covered with oak shingles. New oak fittings have been provided upon floors of wood blocks. A considerable number of old encaustic paving tiles have been discovered and relaid in the chancel. The work has been carried out by Messrs. Thomas Gregory & Co., under the supervision of Mr. William White, F.S.A.

**Weymouth.**—Holy Trinity Church, Weymouth, has lately been re-opened, after restoration and enlargement, at a cost of about 7,000l. The work has been carried out by Mr. A. Clarke, builder, Weymouth, under the superintendence of Messrs. Crickmay & Son, architects. The whole of the sculpture and stone carving has been executed by Mr. Hems, of Exeter; Mr. Tett, of Weymouth, carried out the arrangements for heating the church, and Messrs. Jones & Willis supplied the altar-rails and standards. The altar-piece, the "Crucifixion," said to be by Vandijk, has been "cleaned, renovated, and reframed," but we are informed by a local paper (the *Southern Times*), that "owing to the reflection of the cathedral stained glass, it is not seen to the best advantage."

#### DISSENTING CHURCH-BUILDING NEWS.

**Galston (Ayrshire).**—A new Free Church is in course of erection here. It is designed in the Early English style, with a tower rising square to a height of 65 ft., above which will be a spire rising to a total height of about 100 ft. above the ground line. The total number of sittings provided for is 560, of which 340 are in the area and 220 in the galleries. The accessory accommodation is very ample, including a hall to seat about 100 persons, large session house, which can also be opened into the hall, vestry, ladies' room, &c., with retiring rooms. The estimated cost is 2,300l. The contractors are Messrs. J. & R. Anderson, masons; J. Glog, joiner; Robert Mason, Glasgow, plumber; A. Falconer, plasterer; Joseph Miller, Glasgow, glazier; Thos. Black, gasfitter. The architect is Mr. J. B. Wilson, A.R.I.B.A., Glasgow.

**St. Helens.**—A new Baptist church is in course of erection in Boundary-road, St. Helens, Lancashire. Mr. Gandy is the architect, and Mr. Robert Davis is the contractor. The building is to seat about 400 persons, and its estimated cost is 1,200l.

**Wakefield.**—The memorial-stone of a Primitive Methodist Chapel, at Bellevue, near Wakefield, was laid on Saturday week. The new building is entirely of stone, 47 ft. 6 in. by 34 ft., will seat 300, including the Sunday scholars. The roof is open, timbers wrought inside, and ceiling divided into panels. The fittings are entirely of pitch pine. The cost is 860l. 6s. 9d., exclusive of some of the stone, which is given to the committee. The architect is William Watson, of Wakefield.

#### RECENT PATENTS.

##### ABSTRACTS OF SPECIFICATIONS.

8,643. Fireplaces. H. Heim.

By this invention an elaborate system of pipes and "annular conduits" is arranged above, below, and around the grate. The admission of heated air to these is controlled by dampers, and a large heating surface is obtained. A fuel magazine in the form of an inclined tube of rectangular section, and arrangements for drawing off the water of condensation, are also essential parts of this invention.

8,697. Disinfecting. S. A. Johnson.

According to this invention a mechanical arrangement is so provided that on flushing the closet-pan, oil, or some greasy substance mixed with a suitable disinfectant is thrown in and disposed so as to entirely cover the entire surface of the water so as to prevent any upward rise of gases.

13,205. Terra-cotta Building Blocks. J. D. Denny.

The idea of this invention is to press or mould by improved machinery blocks of terra-cotta for use in building. Paterns or other ornaments are impressed at the time of manufacture, and a method of facing the blocks with various colours is claimed as an important part of the invention.

2,843. Sanitary Improvements. T. Kemp.

By this invention a water-closet pan and trap are combined in one, and the front part of the trap is fitted with an india-rubber washer, by which the drain is perfectly sealed and easily inspected. The top edge of the pan is also fitted with an india-rubber draught excluder. A delivery of the flushing water to the pan, sprayed for the purpose of giving a better cleansing, is also a notable feature.

4,937. Drain-traps. A. J. Boulton.

According to this invention, a drain tile pipe is so formed that any soil or sediment is carried out of the trap and prevented from returning. A hand-hole is placed in such a position that both the trap and the portion of the tile leading to the sewer can be readily and simultaneously examined. In all other forms of traps, the bottom of the outlet pipe leading to the sewer is substantially level with the top of the seal; consequently, solid matter is frequently carried by the backwash back into the trap. Owing to the formation of this trap, however, anything which has once passed through the trap cannot re-enter at the top of the seal, the trap is above the level of the outlet.

5,331. Saw-Setting Apparatus. C. C. Harris.

This invention relates to a small and handy appliance by which it is claimed that saws may be set without breaking the teeth. This freedom from chance of injury is attained by a peculiar construction of the hammers and anvils. The machine is operated by striking lightly a plunger or hammer, and different widths of saws are admitted and adjusted by gauge.

5,423. Bricks, Tiles, and Earthenware. F. Wallbrecht.

It is claimed that by mixing the raw materials with the sulphuric carbonic and nitric salts of the alkalies (soda, potash, &c.), the goods are enabled to be burned in a wet condition without in any way prejudicing the manufacture. Bricks, formed in hand moulds, are burned in a remarkably short time in an easier way, and the form is retained much better than with the customary process. A mixture of moist clay and coarse grain salt can be tried with like effect.

#### NEW APPLICATIONS FOR PATENTS.

June 17.—8,738, S. Reeve, Warming and Ventilating Apartments, &c.—8,752, E. Edwards, Tinting, Staining, and Colouring Glass.

June 18.—8,773, S. Jeffreys, Chimney Tops.—8,789, J. Watson, Imitating the Grain of Various Woods.—8,810, W. Wise, Flooring.

June 20.—8,849, S. Bastow, Door Cramp.—8,858, H. Thomas, Tools for Extracting Broken Wood Screws, &c.

June 22.—8,901, W. White, Ventilation of Rooms.—8,914, J. Daulty, Metallic Buildings.—8,923, H. Lake, Dry Closets.—8,925, G. Teideman, Water Works.

June 23.—8,939, J. and J. Crombie, Laying Concrete Pavements, Floors, &c.—8,965, R. Gamble, Burglar Alarm Detector for Windows, &c.

#### PROVISIONAL SPECIFICATIONS ACCEPTED.

4,464, G. Laurence, Ventilating Pipe for Water-closets, Buildings, &c.—6,251, H. Skerrett, Machinery for Cutting or Making Dovetails.—7,846, J. Anderson, Dovetailing Machines.—7,943, A. Williams, Door Scraper.—7,870, A. Easthope, Sash Fasteners for Windows and Casements.—10,625, J. Denny, Tiles for Enclosing Girders, &c.—6,539, F. Caulfield, Levelling and Surveying Instruments.—8,024, J. Stevenson, Process for the Preservation of Woods.—8,031, R. Gould, Composition for Distempers.—8,221, J. Hamilton, Band-saw Machines.—8,262, H. Lee, Circular Saws.

#### COMPLETE SPECIFICATIONS ACCEPTED.

##### Open for Opposition for Two Months.

9,577, J. Potts, Construction Bedding, and Laying Drain and Sewerage Pipes.—10,701, H. Sutcliffe, Ventilators for Preventing Down-draught.—15,224, J. Whitehead, Indicator Door Fastenings.—6,478, W. Thompson, Wood-working Machines.—6,581, H. Lake, Window Frames and Sashes.—10,554, W. Lake, Devices for Preventing the Slamming of Doors.—16,007, J. Dedden, Fastenings for Window Sashes.—4,237, C. Henderson, Construction of Chimneys inside Buildings.

**Cambridge University Library.**—The Vice-Chancellor has been authorised by the Senate to accept the tender of Messrs. Luscombe & Son, of Exeter, for the erection of the new buildings for the University Library at Cambridge. The architect of the work is Mr. J. L. Pearson, R.A.



## RECENT SALES OF PROPERTY.

## ESTATE EXCHANGE REPORT.

JUNE 14.

By S. &amp; G. KINGSTON.

Deeping High Bank, Lincoln—Congreve's Farm, 128a. 8r. 34p., freehold ..... £8,000

JUNE 15.

By J. G. ROBINSON &amp; SON.

Stansted, Essex—Two copyhold houses ..... 340

JUNE 22.

By BAXTER, PAYNE, &amp; LEPPER.

Shortlands, Kent—The freehold residence, known as Knebworth, and grounds ..... 1,630

By FURBER, PRICE, &amp; FURBER.

Notting Hill—29 to 29 even, Lonsdale-road, 55 years, ground-rent 28l. 16s. .... 1,060

By KELLY &amp; CO.

Fulham—2, Church-row, and a plot of land, freehold ..... 580

Kensington—18, High-street, freehold ..... 3,270

By FLOOD &amp; SONS.

Whitechapel—1, 2, and 3, Ann's-place, 51 years, ground-rent 30l. .... 855

4 and 5, Ann's-place, freehold ..... 835

JUNE 23.

By W. W. JERKINSON.

Peckham—1, McKerrill-road, 78 years, ground-rent 6l. .... 210

By W. B. HALLITT.

Holloway—1, Spencer-road, 59 years, ground-rent 6l. 6s. .... 500

Camden-road—No. 301, term 74 years, ground-rent 4l. .... 400

By BALL, MORRIS, &amp; HADLEY.

Finchley—3 and 4, Hatherly-villa, 96 years, ground-rent 13l. .... 578

Briston—16, Geneva-road, 79 years, ground-rent 6l. .... 360

By C. HEARN.

Cubitt Town 52 and 54, Stebondale-street, 63 years, ground-rent 6l. 16s. .... 390

97, Stebondale-street, 63 years, ground-rent 3l. 4s. .... 90

By LINMAN &amp; CO.

Manchester-square—34, Duke-street, 18 years, ground-rent 75l. .... 400

By E. WOOD.

Wandsworth-common—79, Salcott-road, 80 years, ground-rent 6l. .... 280

Fulham—19, Bauteur-road, 92 years, ground-rent 5l. .... 205

Barnsbury—82, Thornhill-road, 21 years, ground-rent 6l. .... 280

Westbourne Park—130 and 132, Herries street, freehold ..... 455

By H. J. E. BRACE.

New Southgate—186 plots of freehold land ..... 7,872

Chingford—Ten plots of freehold land ..... 1,025

Willesden—Sixty-one plots of freehold land ..... 5,117

JUNE 24.

By DYER, SON, &amp; HILLSON.

Blackheath—The lease and goodwill of Moore's Livery Stables, term 90 years ..... 1,600

By G. A. WILKINSON.

Fulham—Ground-rents of 138l. 2s. 6d., reversion in 92 years ..... 3,070

By JONES, LANG, &amp; CO.

Bedford-square—136, Gower-street, and 24, Gower-place, freehold ..... 1,330

By BAKER &amp; SONS.

Barking—A plot of land, 1a. 2r. 3p., freehold ..... 650

## MEETINGS.

MONDAY, JULY 4.

Royal Institution.—General Monthly meeting. 5 p.m.  
 Clerks of Works' Association.—Monthly Meeting (at Carpenters' Hall, London-wall).—Paper by Mr. Edm. Dillon. 8 p.m.

TUESDAY, JULY 5.

Surrey Archaeological Society.—Annual Meeting. Visit to St. Saviour's, Southwark, and Lambeth Palace and Church. Papers and Remarks by Mr. F. T. Dolman, Mr. S. W. Kershaw, M.A., F.S.A., Mr. J. P. Seddon, and others.

Glasgow Architectural Association.—Mr. Alex. McGibbon on "Italian Renaissance—The Order."

WEDNESDAY, JULY 6.

Builders' Foremen and Clerks of Works' Institution.—Ordinary Meeting. 8.30 p.m.

## Miscellaneous.

**An Altar**, dedicated to "Our Lady," has been erected in the north transept of the Convent Chapel at Sidmouth, Devon. It is carved in wood and decorated in white and gold. It has been made by Messrs. Luscombe & Son, of Exeter. The Rose window over the altar has been filled with stained glass, and has been executed by Mr. Drake, of Exeter.

**Wood-block Flooring.**—The business with which Mr. A. E. Geary (of the late firm of Geary & Walker) has long been connected, has been formed into a Limited Liability Company entitled the Wood-block Flooring Company, with Mr. Geary as manager. The offices of the Company are at No. 24, Charing Cross, S.W. Further particulars of the Company's work appear in our advertisement columns.

**Dr. Hunter's House.**—Mr. Hollingshead having lately described, in the *Daily News*, a house in Great Windmill-street, Haymarket, as "the deceased Café de l'Étoile," Mr. Charles Hawkins writes to that journal giving the history of this house, which, to the medical world especially, is an interesting one. He writes,—"In 1746 Dr. William Hunter, the elder brother of John Hunter, had commenced teaching anatomy in Covent Garden to a society of navy surgeons in the evening, but Garrick, at that time appearing at another theatre, was a rival that Hunter could not compete with, and he was obliged to lecture in the afternoon. In this school he taught with great success, and attained a great reputation as a surgeon as well as a physician, and having possessed himself of a considerable fortune, in 1765 he applied to the Government to have granted to him a piece of ground that he might, at his own expense, erect a building fit for a school of anatomy, and supplied a plan 'for a museum in London for the improvement of anatomy, surgery, and physic.' Upon this offer being declined, he commenced building the 'Hunterian School' in Great Windmill-street, comprising a mansion (the deceased Café de l'Étoile), a museum, and anatomical department. He took possession of these buildings in 1768, and he lived in the mansion until his death in 1783. The buildings contained the magnificent collection, said to have cost upwards of 100,000l., which he bequeathed to the University of Glasgow. Besides the scientific department there were pictures, prints, manuscripts, coins, &c. Upon his death his nephew, Dr. Matthew Baillie, the celebrated physician, went to reside in the house, which he did until 1799. The house was afterwards inhabited by Mr. James Wilson, the celebrated anatomist, who subsequently sold the property, reserving the 'school' buildings, which were at the rear of the house, and were demolished a few months ago."

**Fibrous Steel.**—Steel is scoring another point in its contest with iron. Ironmasters who, as sheet and plate and angle makers, have been suffering acutely from the distinct advance which steel has made as a metal possessing bending and shaping qualities, have hitherto assumed that, however malleable the opposing metal may become, it is unlikely to attain to a fibrous quality. The grand fibre which distinguishes the best qualities of Yorkshire and Staffordshire iron had been held to be a fortress impregnable to all the assaults of the most accomplished of the steelmasters. The security of the Staffordshire firms has just been rudely disturbed by the exhibition in several of the localities in the Black Country of a section of a 2-in. round bar of steel characterised by undisputed fibre. It is explained that it has been made by the granulating and balling-up of Siemens-Martin steel under a process which has been patented by Messrs. Dorman, Long, & Co., and Mr. R. Howson, of Middlesbrough-on-Tees. If by-and-by this "fibrous steel" should be shown by experience to be equal to the service of cable and rivet making, the best iron firms will be run very hard, since it will be impossible for them to compete with the steelmasters in the matter of price. The makers hold that the new metal is well adapted also for armour-plates, in the manufacture of which the pile has to return to the fire so often,—since the silicious coating of each fibre protects it, it is claimed, from the action of the fire, where pure iron would perish. For the same reason it might be used, it is inferred, for the bilges of ships, as to which recent experience has shown that homogeneous steel is subjected to rapid oxidation.—*Iron.*

**The Clerks of Works' Association of Great Britain** have removed their quarters from 31, Spring-gardens (the office of Mr. John Oldrid Scott), where they have been located for the past five years, to Carpenters' Hall, London-wall, the Worshipful Company of Carpenters having granted them the use of a room for the purpose of holding their meetings, &c.

**New Liberal Club Buildings** have just been commenced for the Liberal Association, Sudbury, Suffolk. The premises consist of large assembly or reading-room, recreation-room, committee-room, and card room. The contractors for the works are Messrs. George Grimwood & Sons, of Sudbury and Ipswich.

**The Third Annual International Amateur Photographic Exhibition**, under the auspices of the London Stereoscopic Company, is announced to be opened on October 25th next.

**Society of Arts.**—The annual general meeting of the Society of Arts was held on Wednesday, the 29th ult., concluding the 133rd session of the Society. The report on the proceedings of the Society during the year was read and adopted. There were eighteen papers at the ordinary meetings, seven in the Indian Section, six in the Foreign and Colonial Section, and six in the Section of Applied Art. Five courses of Cantor Lectures were given, and the usual course of Juvenile Lectures at Christmas. Prizes to the amount of 368l. have been offered for competition to art workmen, for articles to be sent in next December. Prizes have also been offered for motors for electric lighting. Entries for these prizes are to be made by the end of the year. Amongst other matters mentioned in the report were the reports on the Colonial Exhibition prepared by the Society, the presentation of the Albert Medal to her Majesty in recognition of the progress made in arts, manufactures, and commerce during her reign, and the erection of a Memorial Tablet on the house of the late Mr. W. M. Thackeray. The income of the Society during the past year amounted to 12,575l.

**The Jhelum Bridge on the Sindagar State Railway.**—The bridge over the River Jhelum at Chuck Nizam, which is a little more than half a mile long, being seventeen spans of 160 ft. from centre to centre of piers, was opened by the Lieutenant-Governor of the Punjab on the morning of the 16th of May. The foundations are single walls of brickwork, 25 ft. external diameter, erected on wrought-iron curbs, 26 ft. 9 in. in diameter, sunk 52 ft. below lowest water level. The brick setting is 5 ft. 3 in. thick. All the wells are heaved with a 10 ft. plug of Portland cement concrete, above which is ordinary semi-hydraulic lime concrete. These wells, from low-water level, are carried up to girder-bed level in solid brickwork as circular piers 25 ft. in diameter, finished off with plain massive cap projections. The well-sinking was begun in September, 1885, and was finished in December, 1886. The girders are 10 ft. above flood-level, and are of steel, 150 ft. span, of the ordinary triangulated type in use on State Railways with the railway on the bottom booms. The cross girders have been lengthened on both sides to carry two footways, 4 ft. 6 in. wide, outside the main girders. Somewhat extensive protection works have been carried out up-stream to steady the river through the bridge.—*Indian Engineer.*

**Artesian Water-Supply in the City.**—The scheme of the Corporation of the City of London to obtain independent water-supplies in the City, which has been discussed for a considerable period, and was referred to in detail in our last volume (p. 161) has at length taken practical form. Some weeks since the Commissioners of Sewers invited tenders for sinking an artesian well into the chalk at the artisans' dwellings close to Bishopsgate-street, E.C. At a subsequent meeting of the Commissioners the Streets Committee (who had the matter on hand) reported that the tender of Messrs. Z. Hills & Co., of Abbey Works, 136, Old-street, London, should be accepted. The report was carried, and referred back for execution. The necessary formalities having been completed, the works will forthwith be commenced. It was stated that Lieut.-Col. Haywood, the City Engineer, had taken great trouble in the matter, and hope was expressed that this well would be the means of relieving the ratepayers of a grievous impost.

**Jubilee Memorial Fountain, Reading.**—A public Memorial Fountain was opened here last week by the Mayores. The following inscription in relief letters runs round the frieze—"Erected to commemorate the fiftieth year of Her Majesty's reign, 1837." Bands of carving contain representations of the rose, shamrock, thistle, and British oak, and there are lions bearing shields, with the Royal arms and Borough arms, the whole being surmounted by a crown and coronet. The work has been carried out from the designs of Mr. G. W. Webb, A.R.I.B.A., Friar-street, Reading (whose design was selected in competition), the contractors being Messrs. Whisler Bros., of Reading.

**Mr. Berensford Hope.**—The *Banner* says:—"We wish that we could confirm the sanguine utterance of *Truth* in reference to Mr. Berensford Hope's recovery; but we regret to learn that, although his convalescence is reassuring, there is but little probability of his return to public life."



**The New Archaeological Museum of Rome.**—The construction of a special Archaeological Museum at Rome is reported to be secured, the negotiations between the Italian Ministry of Public Instruction and the municipality of the city having come to a satisfactory termination. As the plans are already prepared, it is expected that a portion at least of the proposed buildings will be shortly completed, with a view of concentrating the abundant and valuable material which is now distributed in the various collections in Rome. The total cost of the buildings is estimated at 2,204,989 lire (88,000*l.*), of which the Government will contribute two-thirds, the municipality at most one-third. The site selected for the new museum lies between the Colian and the Esquiline. The museum, when finished in its entirety, is to receive all art treasures and antiquities already found; and all future discoveries in the city and province of Rome; but the collections contained in the Capitoline Museums are to be retained there intact.

### PRICES CURRENT OF MATERIALS.

TIMBER.	£.	s.	d.	£.	s.	d.
Greenheart, B.G. ....ton	5	10	0	7	10	0
Tak, B.I. ....load	8	0	0	12	0	0
Sequoia, U.S. ....foot cube	0	3	0	3	0	0
Ash, Canada ....load	3	0	0	4	10	0
Birch " " " " " " " "	2	0	0	3	10	0
Elm " " " " " " " "	3	10	0	4	10	0
Fir, Dautsio, &c. ....load	1	10	0	0	0	0
Oak " " " " " " " "	2	10	0	4	10	0
Canada " " " " " " " "	3	0	0	6	0	0
Pine, Canada red " " " "	3	0	0	4	10	0
" " " " " " " " " "	2	10	0	4	10	0
Lath, Dautsio ....fathom	3	0	0	5	10	0
Waincoat, Riga ....log	4	0	0	5	10	0
" " " " " " " " " "	2	15	0	0	0	0
Deals, Finland, 2nd and 1st. ....100	7	0	0	8	0	0
" " " " " " " " " "	6	10	0	8	10	0
Riga " " " " " " " " " "	5	10	0	7	0	0
St. Petersburg, 1st yellow " " " "	8	0	0	13	0	0
" " " " " " " " " "	7	0	0	8	0	0
Sweden " " " " " " " " " "	6	10	0	8	10	0
White Sea " " " " " " " " " "	7	0	0	16	0	0
Canada, Pine, 1st " " " " " " " " " "	16	0	0	24	0	0
" " " " " " " " " " " "	10	0	0	15	0	0
" " " " " " " " " " " "	8	0	0	9	10	0
" " " " " " " " " " " "	8	0	0	9	0	0
" " " " " " " " " " " "	5	0	0	7	0	0

### COMPETITIONS AND CONTRACTS.

*Epitome of Advertisements in this Number.*

#### COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Local Board Offices	East Grinstead Lel. Bd.	5 <i>l.</i> 5 <i>s.</i>	August 1st	ii.

#### CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Wrought-Iron Hurdles and Gates	Southend Local Board.	F. H. Tulloch	July 5th	ii.
Erection of School	Swansea School Board.	Official	do.	ii.
Making-up and Paving Roads	Wandsworth Bd. of Wks	Official	do.	ii.
Sewerage Works	Kington R. S. A.	B. Latham	July 6th	ii.
Water Supply Works	Brighthelm Local Board.	E. Ellis	July 8th	ii.
Buildings and Works for Supplying Gas	Mountain Ash Local Bd.	G. W. Stevenson & Sons	July 14th	ii.
Brick Sowers, &c.	St. Marylebone Vestry	Official	July 14th	ii.
Stables, Lambeth	Com. of Sewers	do.	July 16th	ii.
Postal Sorting Office Hackney	Com. of H.M. Works	do.	July 18th	ii.
Footbridge	Teddington Local Bd.	G. Pooley	July 18th	ii.
Coast Guard Station	Admiralty	Official	July 22nd	ii.
Farm Labourers' Cottages, Gosport	War Department	do.	Not stated	ii.
Painting, White-washing, &c., Taunton	do.	do.	do.	ii.
Painting, &c., Works, Aldershot	do.	do.	do.	ii.
Rebuilding Schools, Kew	do.	do.	do.	ii.
House and Stables, Putney Hill	Alex. Mier, Esq.	E. Dolby	do.	ii.
Painting, &c., Repairs	Schl. Board for London	Waterhouse	do.	ii.
Staircases, &c.	do.	Official	do.	ii.

#### TENDERS

**BEDFORD.**—For alterations to the Gardeners' Arms public-house, Caulwell-street, Bedford, for Mr. C. Walls, Messrs. Usher & Anthony, architects and surveyors, Bedford.

T. Spencer	2193 0 0
Warton & Walker	125 0 0
Freshwater (accepted)	120 0 0

[All of Bedford.]

**BROMLEY-BY-BOW.**—For alterations at the Imperial Crown, St. Leonard's-street, Bromley, for Messrs. Smith, Garrett, & Co. (Limited). Mr. Thomas W. Fletcher, architect.

Salt	2419 10 0
Satney	423 0 0
Robey	412 10 0
Toole	410 0 0
Alexander	4-1 0 0
Cordery	389 0 0
Banes (accepted)	351 0 0

TIMBER (continued).	£.	s.	d.	£.	s.	d.
Deals—New Brunswick, &c.	5	0	0	6	10	0
Battens, all kinds	4	0	0	10	10	0
Flooring Boards, sq., 1 in. prepared, First	0	8	0	0	11	0
Second	0	8	6	0	7	6
Other qualities	0	6	0	0	6	0
Cedar, Cuba	0	0	33	0	0	33
Honduras, &c.	0	0	3	0	0	33
Australian	0	0	3	0	0	33
Mahogany, Cuba	0	0	4	0	0	7
St. Domingo, cargo average	0	0	4	0	0	6
Mahogany, Mexican, cargo av.	0	0	31	0	0	7
Honduras	0	0	33	0	0	63
Maple, Bird's-eye	0	0	8	0	0	8
Rose, Rio	8	0	0	11	0	0
Bahia	8	0	0	9	0	0
Bor, Turkey	5	0	0	12	0	0
Satin, St. Domingo	0	0	5	0	0	9
Puerto Rico	0	0	6	0	0	10
Walnut, Italian	0	0	33	0	0	63

#### METALS.

IRON—Bar, Welsh, in London, ton	4	7	8	4	15	0
" " in Wales	4	3	6	4	7	6
" " Staffordshire, London	6	10	0	8	0	0
Sheets, single, in London	6	16	0	8	10	0
Hoops	6	0	0	7	0	0
Nail-roads	5	15	0	6	10	0
COPPER—						
British, cake and ingot, ton	43	10	0	44	0	0
Best selected	44	10	0	45	0	0
Sheets, strong	60	0	0	0	0	0
Chili, bars	90	2	6	40	10	0
YELLOW METAL—						
LEAD—						
Pig, Spanish	12	2	6	0	0	0
English, common brands	12	7	6	0	0	0
Sheet, English	13	7	6	13	12	6
SRELTER—						
Silesian, special	14	12	8	14	15	0
Ordinary brands	14	10	0	14	12	6
TIN—						
Strait	102	17	6	0	0	0
Australian	103	0	0	0	0	0
English ingots	106	0	0	0	0	0
ZINC—						
English sheet	0	0	0	0	0	0

#### OILS.

Linseed	21	15	0	32	0	0
Cocanut, Cochiti	30	0	0	33	0	0
Ceylon	24	5	0	0	0	0
Palm, Lagos	21	10	0	0	0	0
Rapeseed, English pale	24	0	0	24	5	0
Cottonseed, refined	22	10	0	23	15	0
Tallow and Oleine	25	0	0	45	0	0
Lubricating, U.S.	5	0	0	8	0	0
TURPENTINE—						
American, in casks	1	7	9	1	8	0
Archangel	0	11	6	0	14	6

**HASTINGS.**—For steam, hot water, and cooking apparatus, at the Palace Hotel, Hastings, Mr. Arthur Wells, architect, 25, Havelock-road, Hastings.—

Edwards & Son	21,270 0 0
James, Dray, & Co.	1,160 0 0
Benham & Son	1,130 0 0
Rosser & Russell	895 0 0
Fotter & Sons (accepted)	845 0 0

[All of London.]

**HOLYWELL (Flintshire).**—For the erection of a farm cottage at Pen-y-Bryn, Holywell, Flintshire, for the Earl of Kilmorye, Mr. John H. Davies, architect, Northgate-chambers, Chester. Quantities by the architect.—

M. Rogers, Flint	2416 6 8
D. Sheen, Chester	367 0 0
J. Prince, Connaught Quay	328 0 0
T. J. Bessy, Connaught Quay	309 0 0
T. W. Gibson, Holywell	300 0 0
J. Hughes, Holywell	273 0 0
J. Williams, Buckley, Chester	255 0 0

\* Accepted.

**ISLEWORTH.**—For the erection of six villa residences on the Byon Estate, for the Duke of Northumberland, Mr. S. Woodbridge, jun., architect, High-street, Brentford.—

Bloomer	23,300 0 0
Wisdom	2,150 0 0
Dorey	1,705 0 0
Barnes (accepted)	1,673 0 0

**KILBURN.**—For the erection of stables, &c., at Quex-road, Kingsgate-road, Kilburn, for the London General Omnibus Company, under the superintendence of Mr. G. T. Latham. Quantities by Mr. A. J. Bolton.—

Edmund Toms	2969 0 0
Turtle & Appleton	387 0 0
Riches & Mount	367 0 0
Geo. Parker	486 0 0
Garrud	977 0 0
Stephenson	965 0 0
John R. Hunt	854 0 0
Knight	916 0 0
Haynes	909 0 0
Evans	890 0 0

**KILBURN.**—For proposed house and shop, Waterloo Estate, High-road, Kilburn, Mr. Wm. J. Watts, architect, North Kensington.—

Dainton	2610 0 0
Martin	490 0 0
Lyford	573 0 0
Colwill	543 0 0
Fryor	435 0 0
S. Hargill	460 0 0
Oldrey (accepted)	485 0 0

**LEYTONSTONE.**—For erecting a house in High-road, for Mr. W. Whittingham. Mr. F. W. Howe, architect.

Northwood	21,629 0 0
Ashey & Horner	1,425 0 0
Beale	1,379 0 0
Calley	1,220 0 0
Arber	1,157 0 0
Cains	1,187 0 0
Staines & Son (accepted)	1,144 0 0

**LINGFIELD (Surrey).**—For the erection of new infants' school, Dorman's Land; additions to master's house, Dorman's Land; and new class-room at Lingfield, for the Lingfield School Board. Messrs. H. Hardwicke Langston and Wm. Thorold Lowdell, joint architects, 9, Great James-street, Bedford row, London.—

H. Booser	2690 0 0
Head Bros.	687 10 0
John Wallis	692 10 0
Henry Wallis	679 15 0
John Fuller	652 15 0
Thos. Fuller (accepted)	525 0 0

John Wallis	4215 0 0
Head Bros.	214 0 0
Henry Booser	212 0 0
Henry Wallis	206 5 0
John Fuller	193 4 0
Thos. Fuller (accepted)	154 0 0

John Wallis	2361 0 0
H. Booser	359 0 0
H. Wallis	347 0 0
John Fuller	337 4 0
Thos. Fuller	330 10 0
Thos. Fuller (accepted)	310 0 0

**LONDON.** For repairing and painting fencing, hurdles, &c., at Leicester-square, London Fields, Stoke Newington common, Rosal Heath, and Shepherd's Bush common, for the Metropolitan Board of Works.—

Cutting & Co.	2535 0 0
Vigo	465 0 0
Bishop Bros. & Marlow	396 0 0
Laphorne (accepted)	386 0 0

**LONDON.**—For new shop-front and sundry alterations to 49, Piccadilly, for Mr. Thos. Gullick. Quantities supplied by Messrs. T. Marcus Houghton and Robert Henry Kerr, Imperial Buildings, Ludgate-circuit.—

F. Sage	2354 0 0
G. H. Bywaters	290 0 0
Cocky & Lumley, Newman-street, Oxford-street (accepted)	280 0 0

**TOTTENHAM.**—For alterations at the City Arms, Tottenham, for Messrs. Smith, Garrett, & Co. (Limited), Mr. Thos. W. Fletcher, architect.—

Stringfellow	2638 0 0
Limn	596 0 0
Cocky & Lumley	573 0 0
Toole	509 0 0
Salt	467 0 0
Banes Bros.	467 0 0
Clark Bros. (accepted)	460 0 0

\* Accepted.

† Objected to do so small a work.

WAKEFIELD.—For alterations to business premises, Old Market place, for Laborers' Trustees. Mr. William Watson, architect.—

*(Accepted Tenders.)*

<i>Recreating Brick and Stone</i>	
Flower Bros. ....	£170 10 0
<i>Slating.</i>	
Pickles Bros. ....	126 17 0
<i>Plastering.</i>	
Chas. Driver. ....	86 0 0
<i>Carpenter and Joiner.</i>	
John Loyd. ....	274 16 0
<i>Plumbing, Glazing, and Ironwork.</i>	
John Brooks. ....	155 7 0
<i>Painting.</i>	
George Powell. ....	15 15 0
[46 tenders received.]	

WAKEFIELD.—For Primitive Methodist Chapel, Belle Vue, near Wakefield. Mr. William Watson, architect.—

*(Accepted Tenders.)*

<i>Stonework.</i>	
Edward Langton. ....	£300 0 0
<i>Slating.</i>	
John Illingworth. ....	41 13 9
<i>Plastering.</i>	
Charles Driver. ....	28 0 0
<i>Carpenter and Joiner.</i>	
John Loyd. ....	275 15 0
<i>Plumbing, Glazing, and Ironwork.</i>	
George Thompson. ....	98 0 0
<i>Painting.</i>	
Geo. Powell. ....	15 14 0
<i>Hot-water Apparatus.</i>	
Alfred Oakes & Son. ....	41 4 0
[98 tenders received.]	

WARE (Herts).—For the erection of a kiln and other works at Ware, Herts, for Messrs. H. A. & D. Taylor, Messrs. Davison, Inskip, & Mackenzie, architects, No. 5, Bedford row, W.C. Quantities by Messrs. R. L. Curtis & Sons:—

Hunt, Ware. ....	£1,397 0 0
Smith, London. ....	1,349 0 0
Mortier, Stratford. ....	1,336 0 0
Brown, Brantree. ....	1,166 0 0
Hitch, Ware (accepted). ....	1,100 0 0

WARRINGTON.—For new loading stage, hop store, and other works, at the Widderspool Brewery, Warrington, for Messrs. Greenall, Whiteley, & Co. Messrs. Davison, Inskip, & Mackenzie, architects, 5, Bedford row, W.C. Quantities by Messrs. R. L. Curtis & Sons:—

Greenall & Son, Warrington. ....	£4,713 0 0
Neill & Son, Manchester. ....	4,532 0 0
Beckett, Hartford. ....	4,378 0 0
Collins, Warrington (accepted). ....	5,950 0 0

WEST KENSINGTON.—For alterations and additions to studio, Beaumont-road, West Kensington, for Mr. A. Bruce Joy. Mr. J. Emsley Inglis, 6, Great Russell-street, architect. Quantities supplied by Mr. T. Marsell Strongin, Imperial Buildings, Ludgate-circuit:—

Lucas & Son. ....	£330 0 0
H. Smith. ....	327 0 0
Fusey & Lumley. ....	311 12 0

Alterations at No. 52, Strand.—In regard to this work (as to which we inserted last week, at the request of Mr. Frederick A. Dovey, a statement that he, and not Mr. Banister Fletcher, is the architect), Mr. Banister Fletcher has sent us documentary evidence to show that he is the architect, and that Mr. F. A. Dovey is one of the firm of contractors. The meaning of such a gratuitous statement on the part of Mr. Dovey (which we naturally accepted in good faith) we entirely fail to comprehend.

\* SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than 12 Noon on THURSDAYS.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

T P M—R E M T M R. (not within our province)—T. J. C. H. E.—R. M.—T. T. & Sons.—H. J. S. (see later).—J. H. (see later).—Mr. W. (ditto). All statements of facts, lists of tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline pointing out books and giving addresses. Note.—The responsibility of signed articles and papers read public meetings, &c., of course, with the authors. We cannot undertake to return rejected communications. Letters or communications beyond mere news items which have been duplicated for other journals, are NOT DESIRED. All communications respecting literary and artistic matters should be addressed to THE EDITOR, all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

FIRE BRICKS.

BEST STOUT-BRICK, FIRE BRICKS, and Cement Fire Clay, Gas Retorts, Muffles, &c. Fire Bricks and Bricks for the Highest Grade, for Iron Blast Furnaces, Furnaces, Rolling, Milling, and Steel Furnaces, Plant, Glass Furnaces, Roasting and Refining Furnaces, Chemical Works, Coke Ovens, &c. Bricks, Refractory Bricks, Fire Clays, Insulating Bricks, Tapers, Street Burners, Grate Bricks. Special Bricks and Shapes made to Engineers' Drawings. Prices quoted to any Porter Railway Station. London Agents:—

R. CULL & SON, Palmerston-buildings, E.C.

GLAZED BRICKS.

GLAZED BRICKS (White and Coloured), Special Salt-glazed Bricks, Sanitary Tiles, Glazed Earthenware Bricks, Cattle, Sheep, and Pig Troughs, Horse Mangers, Patent Automatic Trough Covers, Patent Flush Tank Ventilating Bricks, Patent Ventilating Gullies and Traps, Patent Chimney Pots for Down Draughts, &c. &c. By Wire Moulds. Copies of Testimonials sent if required. London Agents:—

R. CULL & SON, Palmerston-buildings, E.C.

BLUE BRICKS.

THE KELLY BRICK COMPANY, KINGSWINFORD Staffordshire, Manufacturers of Blue Bricks. London Agents:—

R. CULL & SON, Palmerston-buildings, E.C.

DRAIN PIPES.

Best Cement Bricks, Tiles, Laths, Hair, Plaster, Wall Copings, Channel Bricks, Blue and Red Ridges, Red Plain Tiles and Pan Tiles, Gullies, Traps, and Traps. Roads, Junctions, &c. all sizes. Chimney Pots, Red and White. PRICES on APPLICATION. R. CULL & SON'S Stores, Railway Arches, London-street, Bethnal Green Station, E. Chief Office:—75, Palmerston-buildings, Old Broad-street, E.C.

Best Bath Stone.

CORSHAM DOWN. FARLEIGH DOWN.

BOX GROUND. COMBE DOWN. WESTWOOD GROUND. STOKE GROUND. RANDELL, SAUNDERS, & CO., LD., CORSHAM, WILTS.

Bath Stone.

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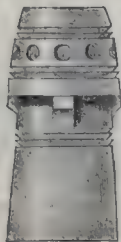
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1914-1915



# The Builder.

VOL. LIII. No. 2318.

SATURDAY, JULY 9, 1897

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### A West Midland Waterway.



**B**IRMINGHAM, as the centre of a large district in the Midland counties, desires to have a waterway capable of carrying to and from the nearest seaports,—those of the Bristol Channel,

—loads of 200 tons, or about as much as an ordinary goods train on a railway. The promotion of the Birmingham and Bristol Channel Improved Navigation, as the scheme is called, is in the hands of a committee formed from the Gloucester and Birmingham Navigation Company, the Corporation of Gloucester, and the Corporation of Birmingham, and appears to be fast approaching a practical issue. Situated centrally in England, the district round Birmingham is on or near the Warwickshire and South Staffordshire coal-fields, and hence arises its industry of the manufacture of iron and other metal goods. Iron and coal being usually found together or near each other in the earth, those manufactures in which iron is used as the chief material are set up where coal and iron are found, and, in this district, to the manufacture of articles in iron have been added brass work and a multitude of industries of cognate character. The town of Birmingham itself is, perhaps, generally thought to be a poor place, but it is as worthy of the name and position of a city as Liverpool or Manchester, or other town of rapid growth in modern times; it is not so smoky as Sheffield, and is nowhere so squalid as parts of Liverpool, or so unlovely as some parts of Manchester and Salford. Perhaps most of the manufacturers of Birmingham are little masters, whose trade individually is on a scale which may be called small by comparison with some of the great firms, but which, in the whole, makes up a very large amount when brought together and distributed by the merchants; and there are also in the district some individual works of great magnitude; and the transit of all these goods is dependent chiefly on railways, and, like other centres of industry, this one has felt the hard grip which railway companies lay upon the public when there are no other means of conveyance of goods than those which have been created by the railway system and its peculiar management. When that system has once been established anywhere, the previous means of transit are rendered nugatory and become disused. But inasmuch as the system does not,—whatever it was supposed it would do,—satisfy the requirements of the public at the

present day, other means of transit are being sought for, and these are found in the re-establishment of canals in an improved form. Already on the eastern side of the country, Leeds, Wakefield, and other Yorkshire towns have been put into communication with the sea by the Aire and Calder Navigation, which terminates at Goole, but the transit of goods is continued down the Humber to the ports of Hull and Grimsby. Time was when this Navigation could not compete with the railways, before it was deepened and widened and the locks enlarged, but it is now a very prosperous undertaking, notwithstanding that the cost of haulage is less than it is anywhere else, not excepting the waterways of France or Belgium. But it has become prosperous only by the expenditure of a large amount of money, and this will probably be found to be a necessity in any similar case. Regular boat trains for general goods are run at fixed times between Leeds, Hull, Goole, and Wakefield, and goods are delivered as quickly as by railway. The Aire and Calder Navigation affords a striking example of a dock and canal company, prompted by a spirit of enterprise, recovering lost ground by improving the water communications, and with great and satisfactory results. Its circumstances are, in many respects, similar to the Gloucester and Birmingham Navigation. Goole has docks high up in the estuary of the Humber, as Gloucester has, at Sharpness, in that of the Severn. The Leeds and Bradford district may be compared to the Birmingham and Staffordshire district, and Goole and Goole Docks to Gloucester and Sharpness Docks. Moreover, Hull and Grimsby may be compared to Bristol and the Channel ports. There is at present a canal from Birmingham to Worcester, on the Severn, a distance of thirty miles, but it is only four or five feet deep and 33 ft. wide, and it ought to be twice as deep and twice as wide to meet the requirements of the present time; because, if any improvement is to be made, steam haulage must be adopted: moreover, the present locks are only 7 ft. wide. But arriving at Worcester is not arriving at a seaport, and the key to the position of the whole scheme is the navigable condition of the river Severn for thirty miles below Worcester, that is, down to Gloucester. The whole route may be said to consist of four portions. First, thirty miles of canal from Birmingham to Worcester; secondly, thirty miles of river navigation from Worcester to Gloucester; thirdly, seventeen miles of canal (the Gloucester and Berkeley Ship Canal) to Sharpness Docks; and, fourthly, thence to the sea-ports of the Bristol Channel for certain portions of the goods to be carried.

The second portion, the river between Gloucester and Worcester, is, or can easily be

made, nine feet deep, but perhaps not more than that easily, and, if so, that is the depth to be adopted in the upper portion of the navigation, from Worcester to Birmingham. Arriving at Gloucester, the boat leaves the river and enters the old Gloucester and Berkeley ship canal, avoiding the long detour of twenty-eight miles of river, and arriving at Sharpness, on the estuary of the Severn, in seventeen miles only; and here the boat may either ship its cargo into an ocean-going vessel or may enter the tideway and proceed to one of the ports of the Bristol Channel, Avonmouth or Portishead on the eastern side, or Newport, Cardiff, or Swansea, on the western side. A boat which could safely navigate the Bristol Channel, as well as the river and the improved Navigation, of a carrying capacity of a hundred and fifty or two hundred tons, must be specially designed to economise space and headway, and would be approximately 100 ft. long, 18 ft. wide, and 6 ft. draught of water, and would be provided with means of safety in the windy weather which would be met with in the Channel. Such a vessel would require locks in the improved canal between Worcester and Birmingham 110 ft. long, 20 ft. wide, and 8 ft. deep, but if steam-tugs were employed the locks should be 210 ft. long, so as to hold the tug and one vessel, or two vessels, at the same time.

These are the dimensions recommended by Mr. G. W. Keeling, C.E., the appointed engineer, who further recommends that the new locks be built alongside the old ones, and that they should have a lift of not less than 14 ft. The present locks, of which there are fifty-eight between Birmingham and Worcester, are mostly of 7 ft. lift, but it would economise time in passing the locks to make the lift greater. Commencing at Birmingham the present canal is level for fourteen miles to Tardebigg, and then falls 217 ft. by a flight of locks, thirty in number, in a distance of two miles; it then falls 42 ft. by six locks, in the next mile; then a level length of one mile, and a descent of 42 ft. by six locks in the next mile. Here commences a level length of five or six miles, and at the distance of about the first mile the Droitwich branch takes off to the right, and passing that town, joins the Severn at Hawford, three miles above Worcester, and just above the Bevere lock on the river. Proceeding, however, with the canal direct to Worcester, at the end of the five or six-mile level there is again a fall of 42 ft. by six locks in the length of little more than half a mile, and then, in the next five miles, to the river, there is a further fall of 82 ft. in a succession of short levels and locks, through Worcester to Diglis Weir, just below the city. So many locks would be a hindrance to the passage of boats on the



improved canal, although, if there were water enough for the enlarged locks, boats would pass up through the locks as easily as downwards; there would be no mechanical effort, but the time occupied in opening and shutting the sluices would be against the economy of working. The flight of thirty locks at Tardebigg would, perhaps, be done away with altogether by substituting an incline, which is thus described by the engineer:—The boat passes into a carriage caisson or trough filled with water, and closed at both ends by gates or lifting sluices. The caisson is carried on a large truck, the framework of which is deeper behind than in front, so as to carry the caisson in a horizontal position, and the truck rests on wheels running on a railway. There are two caissons, one descending the incline whilst the other is ascending. The motive power is a steam-engine fixed at the top of the incline, the gradient of which is 1 in 10, and when drawing up the ascending caisson it is assisted by the one descending. The road bridges over the canal, and culverts and archways under it, of which there appear to be sixty, would require widening. There are three short tunnels, of about a quarter of a mile each, and one of a mile and a half, and these would have to be enlarged, except that a considerable portion may be cut open. The canal ends in Birmingham at the Worcester Wharf, in the very centre of the town, and for the accommodation of the traffic of the town this wharf would be retained, but for the traffic to be transferred from the boats navigating the numerous canals in the manufacturing districts round Birmingham, and converging there, increased space for quays would be required near the town.

There are, as we have said, two points of communication with the river Severn, one at Diglis Weir, below Worcester, the other at the Bevere Weir, above the city, at the end of the canal from Droitwich, and either of these may be enlarged. The Droitwich route is the shorter, but by entering the Severn above Bevere Weir the lock there would have to be lengthened. This, however, would perhaps be no great difficulty; a greater one would be that Worcester Bridge would not allow sufficient headway for the navigation when the river is flooded. Mr. Keeling's proposal is that the roadway should be raised a little. It would certainly bear raising, without detriment to the roadway, as a matter of gradient, and if the footway and parapets could be re-arranged so as to coincide with the alteration, the general facade of the bridge would be improved. Perhaps a feasible plan might be found, which might also be satisfactory to the City Council, if the whole question were left to the decision of an architect, or to the engineer of the Severn Navigation; but if the question becomes one for general discussion in the Council, its settlement may be long delayed; so long, indeed, that the new navigation authority may regret that the question was ever raised; and, all things considered, perhaps the better plan would be to enter the river at Diglis, and enlarge the branch from the junction with the main canal as far as Droitwich, a distance of two miles only; and in consideration of Worcester Bridge being left untouched, the City Council might render some facility for the enlargement of that portion of the canal which borders on city property. In any case, it is not expected that the city of Worcester would desire to stop the scheme altogether.

We have said there are some very large works in the district of which Birmingham is the centre. Proprietors of large concerns might prefer to remove their works to the seaboard rather than submit to the terms of railway companies, but such a move, if at all general, would require careful consideration. If works be removed, men will go too; if men go, houses will be unoccupied; and if houses have no tenants the owners will receive no rents, and no rates can be collected by the Local Authority. Shop-keepers will lose customers; business generally will decline; and a sorry state of things altogether will be the result. It will hardly do to say that what one place loses another will gain; there is

absolutely no compensation for waste; and the destruction of property is waste of material, and of the labour which has been employed in putting it together. Then, although large works may be removed, small ones cannot, and if the one class of works be enabled to avoid the heavy charges for transit of goods, by shortening the distance, the other class, left behind, will be still less able than before to work profitably.

On every hand may be discerned the necessity of enlarging the waterways we have mentioned, and we consider the scheme to be whole and complete as described; but in addition it is proposed to extend the ship canal, which now has its entrance into the Severn at Sharpness, to Sheperdine, five miles lower down the estuary of the river, where there is deeper water. It appears that some of the largest of the ocean-going ships can hardly enter the Sharpness docks by the present entrance at neap tides.

The approximate estimate of the cost of the undertaking is as follows:—

Purchase of the property of the Sharpness New Docks and Gloucester and Birmingham Navigation Company...	£950,000
Enlargement of the Worcester and Birmingham canal .....	600,000
Making new entrance to the Gloucester and Berkeley canal at Sheperdine, with the extension of the ship canal .....	300,000
Widening, deepening, and improving the canal between Sharpness and Gloucester.....	40,000
	<b>£1,890,000</b>

This amount includes ten per cent. upon the estimated cost of the works, as a margin, but allowing for Parliamentary and other expenses, and a wider margin for works, the sum of 110,000*l.*, the total outlay on the undertaking comes out at 2,000,000*l.*

#### ARCHITECTURAL PHOTOGRAPHY.

BY J. EATON FEARNS.



HOTOGRAPHY has proved a useful handmaid in even the stern, prosaic business of everyday life, and the whole of the professions stand greatly indebted to this interesting art-science. Nor is there now any excuse for neglecting it, since cameras are so inexpensive and dry-plate photography so easy to manipulate. The modern operations, too, are so clean that even ladies are numbered by thousands amongst the ever-increasing band of amateurs.

The aim, therefore, of this paper is to give practical elementary instruction in the art, enabling any one who carefully carries out these directions to take within an hour a fairly successful picture.

To enable the reader to do so, he will require a camera, a lens, a tripod, some dry-plates, a few chemicals, some sensitised paper, a printing frame, and a few shallow dishes.

As the camera and lens are of the greatest importance, we will deal with them first.

How large do you wish to take pictures? Of course, the larger your picture, the heavier and more cumbersome your apparatus. Bear in mind, when deciding the point, that it is always possible to have small pictures enlarged when required. The size most strongly to be recommended is that known as the half-plate size, enabling you to take a photograph 6½ in. by 4½ in. The quarter-plate (4½ in. by 3½ in.) is too much of a toy to be of practical service, and should pictures of this size answer every purpose required, they can be taken with the half-plate camera as well as with the quarter-plate.

Now the all-important question arises, "Which camera in the market is the best?" If money be no object, very certainly buy a "McKellen" or a "Shew," but if you wish to spend the minimum of money for the maximum of value you had better turn your attention to the cameras of Messrs. Lancaster & Sons, of Birmingham. One of their numerous cameras will be sure to correspond with your purse, and very creditable work can be executed with even their cheapest "set," but the most useful camera of theirs, to my mind, is the "International." It has every modern improvement.

The lens supplied, however, with this camera is unsuitable for architectural work, since it somewhat distorts straight lines, although it is admirable for portraiture or landscape. For a slight extra cost, however, it can be exchanged for one of their excellent "Rectigraph" lenses.

Do not forget, the lens you must purchase for architectural subjects must be a rapid, symmetrical doublet, equally good for all-round work, and any of the following may be strongly recommended:—The "Rectigraph" (Lancaster & Sons); the "Optimus" (Perkin, Son, & Rayment); the "Orthopanacitic" (Newton & Co.); or a lens by John Browning, the well-known optician of the Strand.

Any of the above lenses are exceedingly cheap, considering the quality of work they produce, and are equally adapted for buildings, portraits, landscapes, or groups.

As this is principally written for architects it is not deemed necessary to go into "shutter" or "instantaneous" work. Buildings will at all events stand still to be photographed.

The next matter in importance is the "dark room." In developing your negative it is imperatively necessary to exclude all white light. Every chink must be carefully stopped up, as even a streak of white light coming through the key-hole is fatal to your picture.

If you possess a small room in your house which you can conveniently spare, purchase a few yards of ruby calico and tack it double thickness over your window. The ruby light filtered through the calico will afford a good safe light to work by in the daytime, and for night work a photographer's red lamp must be resorted to.

Having provided the above you are now in a position to set about taking your first picture.

Of course you have provided yourself with a dozen or two dry plates. For first experiments the ½-plate size will be the best, and the "Ilford" brand are equal to anything in the market. Open the packet in your dark room. Take one out and examine it. One side of the plate you will quickly perceive to be coated with a thin layer of pink-looking gelatine. This is the sensitive or film side of the plate. Now get your double dark back and place two plates in the grooves, one film-side upwards and the bottom one film downwards. Fasten securely, and, to make thoroughly safe, wrap up with dark cloth. Now for the exposure. An opposite house will do very well for your first experiment. Rear your tripod and fasten the camera securely to the same. Then focus by pulling out the bellows till the image is sharp and distinct on the ground glass. In order to see this properly, cover your head and camera with the black focussing cloth. Possibly when the centre of the picture is beautifully sharp the edges will be a little out of focus. If such be the case, insert in the slit in your lens one of the stops till the picture is perfectly "sharp" all over. The smaller the stop the sharper the definition, but the longer the exposure required.

Now cap lens, slide your dark back into its proper groove, cover with dark cloth, then draw out very carefully the slide of your double back. Now comes the critical moment. The point is, what is the correct exposure? Well, experience alone can guide you in this. Give this plate say two seconds, then reverse your double back, and give the second one four seconds. One of the two is almost sure to give a good printing negative if properly developed.

There are numerous ways of developing, but the one here recommended gives pleasing black negatives. The following is the formula:—

Pyrogallol acid .....	½ ounce.
Sodic sulphite .....	1 ounce.
Ammonium bromide. . . . .	150 grains.
Citric acid .....	60 grains.
Nitric acid .....	5 drops.
Water up to 3 fluid ounces.	

The above will keep any length of time, and any ordinary chemist will make it up for you if you wish to be spared the trouble.

Should you prefer "dispensing" yourself, dissolve first the sodic sulphite in two fluid ounces of hot water. Next add the citric acid. Now pour this solution over the pyrogallol acid and ammonium bromide; when these are dissolved, make up to three fluid



ounces with cold water, and finally add the nitric acid.

Now procure a small bottle, which you had better label A (accelerator) for distinction. Into this put 1 ounce of 0.880 ammonia, diluted with half an ounce of water.

Now, you are ready to develop your negatives. Take the exposed plates out of their slide in your dark room and, for safety's sake, do not go too near the artificial red light. Lay the plate film upwards in your developing dish, having previously soaked it in a pail of clean water for a few minutes. Measure out a dram of the developing solution into a cup, then add two ounces of water (if distilled so much the better). Flood this over the plate. Now drop four minims (every drop being practically a minim) of solution A into the cup. Pour the developer back into the cup and thoroughly mix. Then pour over the plate again. If properly exposed the image should show signs of appearing. The high lights will appear first, then the other lights according to their gradations. If the picture does not come in a minute or two add a couple more drops of A. If this does not fetch it add a few more. If it shows no signs of coming in five minutes the plate was under-exposed. A little practical experience will soon teach you the correct exposure. When all the detail is plainly visible take the plate out of the developing solution and wash well.

After this has been done place for a few minutes in a saturated solution of alum. Then wash again.

Finally, it is placed in the fixing solution.

Hyposulphite of soda ... 5 ounces.  
Water ..... 1 pint.

The object of this bath is to disperse the white appearance which is to be seen at the back of the plate. When this has all disappeared the plate is fixed. White light now has no effect on it, so you may leave the dark room and perform the final washing under the tap. The negative should now be left to dry of its own accord.

The printing from the negative is an easier matter.

The negative is placed, when dry, in the printing-frame, film upwards. A piece of sensitised paper (which can be bought very cheap from any photographic dealer) is placed in contact with it, the prepared side of the paper downwards. It is then exposed to good diffused light till printed. Print a little deeper than you would like the picture, as in the after-operations it will fade considerably. When you take the prints out of the frames, be sure to keep the pictures from light. When you have printed as many as you require, wash them well in several changes of water. To change their disagreeable colour it will be necessary to tone them. The following is a good toning formula, and may be used immediately after mixing:—

Gold chloride..... 1 grain.  
Soda ..... 60 grains.  
Water ..... 12 ounces.

Pour this solution over your prints, which should be face downwards. The red-brick colour will soon be changed to pleasing purple. When this has taken place the prints are toned.

At this stage put them in a clean dish and wash well under the tap.

When this is done place them for ten minutes or a quarter of an hour in a solution of:—

Hyposulphite of soda ... 2 ounces.  
Water ..... 12 ounces.

Both the toning and fixing dishes should be kept in constant motion, or unevenness of tone will be the result.

The prints when taken out of the fixing bath must be thoroughly washed. After washing leave them in soak all night, and give them a thorough rinse under the tap next morning. If not properly washed the photographs in the course of time will fade.

Next dry between blotting-paper and mount.

**The National Liberal Club.**—Messrs. G. A. Williams & Son, of Queen's-road, Baywater, are fixing spring roller blinds throughout this new Club-house, recently described by us.

## SOME SCULPTURE OF THE YEAR.

**T**HE Royal Academy sculpture of the year, as we have before observed, is not up to the best mark of some former years. The three works in it which are of the highest interest we have already illustrated and commented on,—Mr. Thornycroft's model for a monument to Gordon, and Mr. Armstead's "Ladas" (*Builder*, May 7) and his Bishop Ollivant memorial (*Builder*, June 25). In regard to the Gordon monument, we may remark on the excellent and original design of the pedestal; and well-designed pedestals are perhaps even less common than good statues.

Mr. Boehm's large marble group of the "Bull and Herdsman," which is conspicuous in the octagon, does not seem to us to have been quite worth execution in marble on that scale. The bull is a grand animal, and very finely modelled, in the hind quarters especially, and the herdsman's smockfrock is, no doubt, very sculpturally treated,—quite Attic, indeed: it shows what can be done with a simple garment like this, but there is not much of character or interest in the man, and, on the whole, the feeling of most persons will be that a great deal of material has been used without a commensurate result.

Mr. Williamson's "Sister Dora," a cast of a statue more than life-size erected at Walsall, is interesting as a spirited and expressive portrait of a noble woman; of the nursing dress nothing can well be made in sculpture. Mr. Mark Rogers exhibits another of his caryatide figures for a chimney-piece supporter, a finely-modelled and powerful male figure; it would have been better if some attempt had been made to model the superincumbent entablature so as to look more fitted to be upheld by the figure without pain and discomfort; there is something new to be done in this way in caryatides generally; in the present case the sharp edge of the entablature on the neck of the figure, whose head is twisted aside to avoid it, is almost painful to look at. The two portrait-busts of ladies by M. Jean Antonin-Carlès (1788, 1789) are curious examples of a kind of would-be aristocratic mannerism: upright pose, long neck, very small head carried with a great air of pride; it is fine in its way, but so completely a mannerism that the busts give at once the idea of representing sisters, though apparently the ladies are not related; at least the catalogue gives us no reason to suppose so. Mr. G. A. Lawson sends a bronze of his fine figure of a boy reclining on his back, the plaster of which was in a former Academy, and was illustrated in our pages (*Builder*, May 29, 1886). Miss Emmeline Halse's "Jerusalem in Captivity" (oddly described as a "statuette," as it is a large life-size work) is expressive in pose, and shows fine broad treatment of drapery.

In the Lecture-Room, the principal work, besides those we have already mentioned as the finest works of the year, is Mr. Onslow Ford's "Peace," of which also we have given an illustration (*Builder*, May 7, 1887). There is a little ambiguity about the precise meaning of this work. If the intention is to represent "Peace" as a personification, the figure is quite wanting in dignity and appropriate expression for that; but if it is meant as a young girl sent out as a messenger or announcer of peace, it is very pretty and spirited, though the face seems rather wanting in vivacity. The action, on the contrary, is full of life, perhaps a little too realistic if anything, but at all events it is, as a study of a nude figure, decidedly original in character and movement. The feet seem a little large. Mr. Bates's small triptych bas-relief of "Psyche" "Psyche borne away by Zephyrus" and "Cupid," is a charming little work in low relief; Psyche, on the left, a breezy figure seated on a rock, and in the centre compartment a recumbent figure borne away on the back, or rather on the mantle of Zephyrus, a group reminding us of some of Flaxman's Homer illustrations. Miss Halse's "The Pleiades" is a pretty and fanciful piece of high relief, but of a much more ordinary type. "Dawn," by Miss E. Gwyn Jeffreys, is a

graceful conception, a female figure holding up some drapery which makes an inverted festoon over her head, as if carried upwards by the breeze; it would be better without the rather vague assortment of Cupids and other accessories which form a rather shapeless pedestal to it. Sir F. Leighton's bas-relief for the reverse of the Jubilee Medallion, about which much has been said, is a most graceful and refined work of the kind, in very low relief, very delicately modelled. Mr. A. Gilbert exhibits a circular decorative panel in alto-relief on the old subject (not often treated in sculpture, however), "Post equitem sedet armatura," in which an armed knight seems in chase of a floating figure before him, and the sinister figure of "black Care," heavily cloaked and hooded, clings to him behind; there is a strong and stern Gothic feeling in this fragment. Mr. Mullins's two boys, kneeling over some game apparently, are called "Conquerors," but the significance of the title we do not appreciate. Mr. Maclean's statue of Tragedy, a finely-modelled, heavily-draped figure, with a dagger in her hand, is not equal to its companion, Comedy; the face is wanting in tragic expression. Among small things that are worth noting are Mr. Conrad Dressler's "Bust of Mr. Stanley," Miss Louisa Jacob's head of a monk, with the title "Fiat voluntas tua"; Mr. Arthur G. Walker's "Love," a kind of Paolo and Francesca group; M. Emile Chatrousse's "La Lecture"; Miss Hallé's bronze medalion of Herr Joachim, with a reverse showing Orpheus taming the beasts; and Mr. W. R. Stephens's wax statue of a girl with birds perching about her, under the title "Pigeons."

Of the larger collection at the Paris Salon, whose short season has now closed, we can only speak briefly. As in our Academy, the collection has been below the average in general excellence, though it included some very remarkable works. The statue of "Fau Monseigneur Dupanloup," by M. Chapu, to be executed in marble for Orleans Cathedral, is a very fine specimen of pure monumental design. The prelate, in his vestments, is shown reposing on a couch supported by an antique sarcophagus, on which is a tablet supported by two genii, with dates "1802: 1849: 1878"; those of his birth, consecration as bishop, and death. To right and left of the niche in which the monument will be placed, will stand two figures representing "Faith" and "Courage." The latter, a very noble figure, forms the subject of one of the illustrations in our present number. Another episcopal tomb by M. Louis-Noël was exhibited, that of Mgr. Lequette, kneeling on a cushion, with mitre and cross in his hands; the long draperies are finely treated. The monument is intended for the church of Notre Dame des Ardents at Arras.

M. Mercié, whose talent shines in all forms of sculpture, exhibited a charming design for a tomb to the painter Cot; a child mounted on a stele, holding in its hands, with an expression of grief, a palette and brushes. Nothing can be more simple,—there is no crowd of accessories; but the effect is complete.

Most of the French sculptors of the new school, unfortunately, have a tendency to the employment of contorted and unnatural attitudes, exaggerating natural defects, as in M. Cordonnier's "Protection," under pretext of seeking "vigour." The fine group by M. Boissieu, of which we give an illustration this week, "Défense du Foyer," is free from these defects, and is a fine representation of the ancient Gaul on whom the minds of the French artists are so much set at present, the people who,

"Agriculteurs, guerriers,  
Savaient, jusqu'à la mort, de défendre leur foyers."

The group by M. Boucher, "Vaincre ou Mourir," shows the same influence of political pre-occupation which has pushed the painters this year towards military subjects. It shows a woman, symbolising France, supporting a young warrior, who is dying, while his child tries to take the sword, to fight in his stead. Behind the principal group a kneeling man is forging a new sword. M. Boucher, at least, puts a remarkable exuberance of life into these



violent and sensational subjects. "On Veille," by M. Desca, was another group, representing the ancient Gaul looking out for his enemy, with, of course, a well-understood intimation that the modern Gaul is similarly employed.

The bas-relief by M. Lecoq, "Après dîner chez Madame Geoffrin," is a realistic work, totally wanting in decorative effect, and giving portraits of some of the eminent encyclopedists, Diderot, Marmontel, Grimm, d'Holbach, and others. The portraits are supposed to be good likenesses, but the effect of the whole is heavy and uninteresting, and shows the mistake of attempting to bring the characteristics of a *genre* picture into bas-relief.

The enormous group by M. Hébert, with the equally enormous title, "Le génie de la libre pensée glorifiant la mémoire du Chevalier de la Barre, supplicié pour n'avoir pas salué une procession," is as confused and indigested as is its subject, but curiously typical of some of the tendencies of modern French art, which, unlike our own, often allies itself so enthusiastically with the political and moral ideas of the day. This often leads to artistic mistakes, yet it argues more active intellectual life than the worn-out and meaningless subjects which too commonly content English sculptors and painters. An abstract work of a different character was M. Marqueste's "Art," intended for the Hôtel de Ville, and as a pendant to the "Science" of M. Blanchard. Of the "Rousseau" statue by M. Berthet we have given an illustration (*Builder*, April 23); and we may record among the monumental works a fine statue of Handel, commissioned from M. Salmonson for the Grand Opera.

The tendency of the new French sculpture towards the illustration of modern life we have several times noticed. M. Falguière's "A la porte de l'Ecole" is a good example; a little girl with a satchel of books on her arm rising on tip-toe to kiss her little brother in her mother's arms; the figures and the feeling are very simple and natural. Of the same school is the "premier album" of the late M. Mathias Schiff, a young artist who died just as he was making a reputation. M. Escoüla's young rustic girl, "Pastorale," is also of the modern note, and the "jeune mère" of M. Lenoir, a mother washing her infant; a work which by its grace and naturalness escapes what might be the commonplace nursery character of the subject.

Among the number of mythological personages, we counted this year three Dianæ, of which by far the best is that of M. Falguière, a splendidly-modelled figure, but with a rather feeble and commonplace head. The pretty "Circé" by M. Delaplanche should be recorded among the list of the Classicities.

Among other sculpture works of the *Salon* of 1887 may be named the "Galathée," by M. Roland, —Pygmalion's marble lady,—a finely-treated figure; the "St. Cécile" of M. Gautherin; the "Belles Vendanges" of M. Vital Cornu; and the "Espérance" of M. Ludovic Durand; but of all these allegories, the one most worthy of attention, after the Diana of Falguière, was the beautiful bas-relief, representing "The Seine," a nude figure in low relief profiled on a background representing distant Paris. This was the work of a young Villa Medici student, M. Puech. Among the animal sculptures, M. Frémiet obtained a "succès de curiosité" as one may express it, with his "Gorille enlevant une Jeune Femme," a wonderful study from nature, but very disagreeable in outline and in subject; a sort of work which would find its proper place in a natural history museum. The marble bust of the late M. Ballu, commissioned by the Municipality for the Hôtel de Ville, is a remarkable work by M. Barrias, to be placed on a pedestal designed by M. Albert Ballu, and adorned with a *génie* in bronze by M. Coutan. A more life-like resemblance could not be given to marble. Two bronze busts exhibited by M. Dalou were interesting as showing the excellent results to be obtained from the process of casting *à cire perdue*, which we venture to think will soon be the only process accepted for bronze work of the highest class.

## NOTES.

HERE appears to be a difference of opinion as to the desirability of bringing on the Railway and Canal Traffic Bill in the House of Commons for the second reading at once. It was proposed in the House by Mr. Heneage that this should be done, in order that the Bill might be sent to a Select Committee with a view to its becoming law during the present Session, and the Government seem to be willing to adopt this course. Mr. Mundella, —who naturally takes a great interest in the subject,—is in favour of deferring the second reading of the Bill so as to ensure a full discussion of its provisions at that stage. The weight of opinion on both sides of the House appears to be in favour of proceeding with the measure as soon as there is an opportunity; but, in any case, it is very necessary that no effort should be spared to render the law clear and intelligible, and not, as at present, open to various interpretations. A case was heard before the Railway Commissioners only last week which illustrates the uncertainty of the law relating to preferential rates. In giving judgment, each of the Commissioners expressed different views. Sir Frederick Peel held that the applicants had not given proof of such an undue preference as to entitle them to a decision in their favour. Mr. Price considered that the rate charged could not be justified, and was, therefore, undue; while Mr. Miller, though also looking upon the rate in question as unjustifiable, did not consider that the applicants had proved that they were prejudiced, and judgment was given against them, no order being made for costs.

ON Friday last week the Metropolitan Board of Works put up to public auction the lettings (Mr. Robert Reid being the auctioneer) of the whole of the surplus lands in Charing-cross-road and Shaftesbury-avenue, with the exception of a few that were not ready. Forty-eight sites were so put up before a large assemblage, and forty-five were let in the room at rentals varying from 5s. to about 9d. per superficial foot. It is a new and important departure on the part of the Board, it being very unusual to let lands by auction, the ordinary practice hitherto having been to let by tender. We think there is much to be said in favour of the new system, as unsatisfactory results have often followed blindfold tendering for land. It seems to us that in this particular case fair and satisfactory results have been obtained. In connexion with this subject it is of importance to note that within the next year or eighteen months, 150,000l., or upwards, will be spent on these sites, which are in the centre of the metropolis. Much of this outlay will, of course, go in wages in one or another form, and extensive outlay on neighbouring properties may be expected, so that business in the building trade ought to be sensibly improved by the development of this new thoroughfare as the centre of a business neighbourhood.

THE Rector of St. Martin's-in-the-Field's has written to us calling attention to a model at the Vestry-hall of a proposed alteration of the steps of his church, asked for by the Metropolitan Board of Works, in order to widen the roadway at that point. The Rector and his Churchwardens have to decide what answer shall be given to the application, and Dr. Kitto very rightly, in a matter which concerns the architectural appearance of the church, wishes to elicit some expression of opinion from those who feel interested in the matter. We have looked at the model: the proposed alteration is cleverly contrived, and will be less of a blemish to the church than we should have expected. The colonnade of the portico stands at present on an unbroken range of steps, seven steps in height at the north falls. It is proposed to form five steps in each intercolumniation, abutting against the pedestals formed beneath the columns, and thus throwing the whole of the steps inward

by the width of five steps. It will certainly deteriorate the effect of the portico; there is no doubt about that; it will lower the continuous base-line of the columns, show pedestals where none were intended, and contract the floor area of the porch. It is not what can be called a flagrant disfigurement; that is all that can be said; and it has evidently been planned with a desire to make the best of the alteration. On the whole, however, we should recommend the Rector to defer his consent until it can be fully considered whether the impediment to traffic just there is really a serious enough evil to warrant even partially spoiling a rather celebrated building. If the alteration is made it will never be un-made.

THE *Times* of Tuesday, in an effusively laudatory and evidently "inspired" notice of the new staircase at the National Gallery, referred to the double staircase which has been removed to make way for the new staircase, as if it formed part of the original design. This is not the case. The double staircase was put up by the late Sir James Pennethorne, at the instance of some cheseparing First Commissioner of Works (who was no doubt at that time very proud of his achievement), in order to obtain some little additional room; and to effect this alteration a noble staircase, by Wilkins, of very original design, and with a dignity and mystery in its aspect which are rare in our public buildings, was destroyed without any protest from any quarter. Those who are old enough to remember this staircase cannot fail to recall the impression created by it on entering the building,—a sense of spaciousness and an indefiniteness which, perhaps, no other building of its size possesses. This has now wholly disappeared.

WE observe that although Mr. John Taylor is named, in connexion with the Office of Works, as having had something to do with the new work at the National Gallery, some notices in the daily papers attribute the design to Mr. G. Shaw-Lefevre. It is not difficult to guess how this comes about, and many of the papers know so little of these matters that they will believe anything that is told them on official authority. Perhaps we shall be told in the course of a few years that it was Mr. Ayrton who designed the Law Courts. It was known that he had something to do with the design, but the part he took was generally supposed to have been confined to jamming a large and complex building upon an inadequate site and cutting out as many of the architectural features as possible. We know that Mr. Lefevre, in conjunction with Mr. Mitford, cut (after a fashion) the Gordian knot of the improvement at Hyde Park Corner, and we may, perhaps, find that he was the architect for the restoration of Westminster Hall, and that Mr. Pearson merely acted under his direction. It is commonly reported that Sir Antonio Panizzi designed the Reading-room at the British Museum, and his bust is placed at the entrance in a conspicuous position, as if he were the tutelary genius of the place; but those who have any knowledge of the subject are aware that all Panizzi did was to suggest the circular arrangement of the readers' tables, and the placing of the room in a position that no architect in his senses could by any possibility have proposed. In like manner, Sir Joseph Paxton was credited with the design of the First Exhibition building in Hyde Park on the strength of a few scrawls on a sheet of blotting-paper, which were afterwards rendered intelligible by Sir Charles Barry.

WE may call attention to the fact that the value of the Godwin Bursary, founded by Mr. G. Godwin, in connexion with the Institute of Architects, for the promotion of the study of works of modern architecture abroad, has been increased from 40l. to 50l. for the year 1888. Candidates for it must apply to the Institute before the 1st of January next. It may be useful to give further publicity to the following brief statement in regard to it from the last number of the



"Journal of Proceedings" of the Institute:—"The selection of a holder of the Bursary is made by the Council after comparison of the candidates' applications, testimonials, and general acquirements; and the successful candidate has to make a visit, of not less than five weeks, to some place or places outside Great Britain and Ireland, specially to study and report on a specimen or specimens of modern planning or construction, drainage, water-supply, ventilation, or other sanitary arrangements to be found there." Perhaps we must not expatiate too much on the value of this particular prize of the Institute, founded by the former Conductor of this Journal,—

"This comes too near to praising of ourselves," but we may point out that, with the exception of the Grissell Medal, it is the only scholarship of the Institute founded to encourage and promote practical knowledge in architecture, and it certainly, to say the least, filled a gap that wanted filling.

FROM a manufacturer's point of view it is possible to insist upon too high a test of the breaking strength of Portland cement, because, as Mr. Collins says,\* it leads to the increase of time in the manufacture to the highest possible point, which does not make a safe cement, although it may ensure a high tensile strength at short dates, and the danger of doing this cannot always be counteracted by heavy burning. He has seen briquettes made from a cement weighing 123 lb. to the bushel break at 1,200 to 1,300 lb. on the  $1\frac{1}{2}$  in.  $\times$   $1\frac{1}{2}$  in. section in seven days, which a few months later broke at less than 800 lb., and this he considers entirely due to the excess of time which it was necessary to use in the original mixture. He suggests for a section of  $1\frac{1}{2}$  in.  $\times$   $1\frac{1}{2}$  in., a test of 700 lb. under ordinary conditions, or, if the time test of one minute be insisted upon, 600 lb.; and this he believes will give safer and ultimately better work than any higher requirement. For engineering work he recommends a weight of 112 lb. per bushel, a tensile strain per square inch of 350 lb. at seven days and 450 lb. at twenty-eight days, and that the fineness of grinding should be such as to leave a residue of less than 10 per cent. when passed through a 2,500 mesh sieve. For special work he would have the same strain with a weight of 110 lb. per bushel, and a residue of less than 10 per cent. through a 3,000 mesh sieve. Weight per bushel, Mr. Collins says, is only of much importance when taken in conjunction with fineness of grinding, but to get accurate results the cement should be fed through a standard hopper into a bushel measure in the manner specified in Sir John Coode's work, of which he gives an illustration with dimensions. The cement formed by the mechanical mixture of the slag of iron with slacked lime must not be confounded with Portland cement, which is a chemical combination. If it be mixed with Portland its presence may be ascertained by dropping the mixture into dilute sulphuric acid, and then, whilst stirring, allowing Condy's fluid to fall in drop by drop until the red colour remains permanent. If there is no admixture of the slag cement with the Portland twenty drops will be sufficient, while a cement made from slag only will probably require 200 drops. Mr. Collins gives some useful advice also on the general treatment of Portland cement, such as air slacking, exactness of quantity of water used in gauging, and several other requirements necessary to its successful use.

ON July 14, Thurgarton Priory, in the County of Nottingham, will be put up for sale. This property, lying on the Trent, between Nottingham and Southwell, is situated in Thurgarton, Epperstone, and Southwell parishes, near to Sherwood Forest and "the Dukeries." It includes a modern house of brick, on the site of an old convent, with a park of 120 acres, and six farms of about 1,750 acres in all. The Early English tower and three bays of the (St. Peter's) parish church form part of the

priory church belonging to some Austin Canons, who were established here, in 1130, by Ralph de Ayncoort. At the suppression their income was computed to be 259*l.* 9*s.* 4*d.* In 1853, the priory church was renovated by Mr. Hine, of Nottingham, architect, who added a chancel and north aisle. The living of Thurgarton and Hoveringham is in the gift of Trinity College, Cambridge, who own most of the land.

MR. EDWARD FELLOWES, who sat as M.P. for Huntingdonshire from 1837 to 1880, will take his newly-created title as Baron De Ramsey from his country seat of Ramsey Abbey in that county. That abbey of the learned and wealthy Benedictines was founded in the year 969 A.D. by Ailwin, Eorlorman of East Anglia, on Ram's Island, a remote and desert tract amid the great Eastern Fens. Bishop Oswald, nephew to Odo of Fleury by the Loire, sent twelve monks from his priory of Westbury in Gloucestershire; Ailwin gave lands, and 30*l.* for organ pipes of copper; King Edgar gave much money and a bell for each of the church's two great towers. Successive benefactions were increased by varied arts of acquisition which are naively set forth in the chronicle of Ramsey,—a beautifully-executed MS. of the early fourteenth century, by an unknown monk,—which was exhibited in the Record Office at the recent Domesday Commemoration. At the Dissolution its annual revenues were assessed to the amount of 1,983*l.* 15*s.* 3*d.* In 1540 the demesne was granted to Sir Richard Cromwell, in whose family it continued for a long time. Tradition has it that a piece of cloth which had been ordered from London for the making of a coat for Colonel William, cousin to Oliver, Cromwell, carried the Plague into the town. His death, and burial on the next day, February 23, 1665-6, and the visitation of the pestilence, are chronicled in the register of St. Thomas à Becket parish church. From the Cromwells the property passed to Colonel Titus Salt, whose eldest daughter devised it to two of her servants. These sold it, circa 1736, to Mr. W. Coulson Fellowes, ancestor of the now possessor. Nothing of the abbey exists beyond a ruined gateway and some arches which stand in the walls of the manor-house that has been built on the former site. An earlier MS. relating to the abbey's history is preserved in the Bodleian. A fourteenth-century catalogue shows how rich was the monastic library. It contained as many as 600 written volumes; seventeen or eighteen of them being transcribed in the Hebrew tongue. The Jews are known to have settled themselves in the Eastern counties from a very early period. Those MSS. were doubtless acquired for the abbey at the general confiscation of the Jews' possessions temp. Edward I., when the contents of the synagogues at Stamford and Huntingdon, and elsewhere, were sold by auction.

OWING to the death of Sir Henry Charles Paulet, Bart., certain good sporting properties in Hampshire will be sold at the Mart in course of July current. These comprise the freehold manorial estate and house of Little Testwood, a tithing of Eling parish, at the western head of Southampton Water, and overlooking the pretty Test valley. For the convenience of purchasers the whole estate of 350 acres can be divided into five lots: one consisting of Little Testwood House with its well-timbered grounds of sixty-six acres; the others of various plantations, and the Brookeswood, Broadmoor, and Paulet's farms. Besides salmon and trout fishing in the neighbouring rivers, a licence to shoot over New Forest, 65,000 acres, could be obtained by the purchasers on easy terms. At the same time will be offered for sale the Canterton Estate, which formed portion of the settled estates of Sir Henry and the late Lord Henry Paulet. Canterton lies in Bramshaw and Minstead parishes, in the New Forest; its southern limits being barely 300 yards distant from Stoney Cross, where is preserved the Rufus's stone. The Manor House has been long noted for its rhododendron plantations.

The property, mostly woodland and copse, covers in all about 600 acres, which could be divided amongst several lots. To the Manor of Canterton appertain certain sporting rights over the Wastes, containing altogether 320 acres.

THE ancient and once royal manor of Cheylesmore, in Coventry, will give his new title to Mr. W. H. Eaton, M.P., of that city, silk manufacturer. Mr. Eaton purchased this property some twelve years ago from the Hertford family, to whom the Crown had sold the manor, which had been an inheritance of our Princes of Wales since King Edward III.'s reign. Wishing to join the third Crusade, Roger de Monthault sold his lordship of all Coventry, except this manor, together with its fortified house, to the famous monastery that Leofric, Earl of Mercia, husband to Godiva, had founded in honour of SS. Osburgh and Peter. Amongst its possessions, by the way, was included Eaton manor in Cheshire. Robert de Monthault, his descendant, entailed Cheylesmore upon Queen Isabella of France, with remainder to her second son John (of Eltham). But at John's death in 1336 this manor passed to his elder brother, Edward III., who settled it upon his eldest son Edward, the Black Prince. Up to these events Coventry was unaltered; but in 1346 the king incorporated the city, and during the latter years of his reign its walls were built. By the sovereign's command, the manor-house and its Little Park were enclosed within the lines. Four years before Richard II.'s accession the tower and spire of St. Michael's Church were erected by Adam and William Botoner, who ranked amongst the earliest mayors of Coventry. Though the turbulent citizens once laid waste the grounds of Cheylesmore temp. Henry V., they did not alienate themselves from out of sovereign favour. Henry VI. made the city into a separate county; in 1458 he held here what the Yorkist party stigmatised as his "Diabolical Parliament"; Edward IV. celebrated a Christmas here with his queen (1467), and kept a feast of St. George at his son's manor of Cheylesmore. In course of time the Park was built upon, and merged into the inhabited city. And so, to pass on to later days, we find that many martyrs were burned within its limits, and that from Cheylesmore Hill Charles I., just before the raising of his standard at Nottingham, bombarded the city on its refusal to admit the royal forces. The citizens were relieved by Hampden's and Hollis's levies of foot; soon after the Restoration the city walls were overthrown. Some vestiges of the manor-house are said to exist to this day, whilst the manor's old association with our Princes of Wales is commemorated by the three plumes wherewith the civic shield is charged. Our own generation may take pleasure in being reminded that in her thirteenth year George Eliot,—who was born at Griff House, by a bend of the road between Coventry and Nuneaton,—went to Miss Franklin's school in Coventry. In 1841 Robert Evans removed to Foleshill with his daughter, who, in the words of her biographer, Mr. J. W. Cross, "transfigured these Warwickshire scenes, dear to Midland souls, into many an idyllic picture, known to those who know her books."

STUTTON HALL, Suffolk, erected by Sir E. Jermy, Kt., and remarkable for its ornamental chimneys and brickwork gateway, is to be put up for auction, on July 12th, at the Great White Horse Hotel, Ipswich. This old Elizabethan house stands on the banks of the Stour, about seven miles from Harwich harbour; the property extends over 470 acres,—for the larger part rich pasture.

OF building of theatres in London there appears to be no end. As we mentioned some few months ago, another theatre is about to be built in Oxford-street, on a large plot of vacant ground formerly occupied by the Star Brewery, in the rear of the Oxford Music-hall, for Mr. Alexander Melville, of the Grand Theatre, Birmingham. The new theatre will accommodate about 2,500 persons. Messrs. Essex & Nicol, of Birmingham and Chancery-

\* A few Words on Portland Cement, by a Manufacturer. D. L. Collins (Gibbs & Co.) London; R. & F. N. Spott. 1887.



lane, are the architects of the building. The *Daily News* announces also that a site has been secured by Mr. John Clayton for a new theatre in Chelsea, near the Court Theatre, which is about to be removed for an improvement on the Cadogan Estate, but the site is not further indicated.

ON Thursday, June 30th last, was laid the memorial-stone of the new London and South-Western Bank in Fenchurch-street. The premises have a frontage of nearly 50 ft. to that thoroughfare, by 110 ft. in depth, with an entrance out of Gracechurch-street. Mr. James S. Edmeston is the architect, the contractor being Mr. Wm. Shepherd. The site thus covered is said to have been that occupied by certain premises, which, having been rebuilt without delay after the Great Fire, were long known by the signs of the Cross Keys, the Three Kings, and the Black Lion. Their neighbour, the Rose Inn, formed part of Mr. Birch's presentment of Old London, made for the Health Exhibition, 1884.

UPON the invitation of the East India Art Manufacturing Company we have visited their premises, 13, King-street, St. James's, to see some carvings from the Palace of the late King of Burmah. The carvings consist of two compositions of pyramidal form, beautifully carved in teak in high relief, and very much under-cut. There is no information as to what part of the palace or what features they have belonged to, but their form and size suggest that, if architectural at all, they may be the upper members of architraves to doors or openings. The carving represents conventional foliage and rocks with groups of figures engaged in various occupations, ordinary and otherwise, from driving a goat to protecting, with a sacred umbrella, a figure on horseback rising from the ocean. In one opening in the foliage is to be seen a group of monkeys. In the centre of each composition a branch rises and expands into a flower, on which is seated a large male figure of a god or monarch, who is trying to look indifferent to the homage of six female figures of like size, kneeling in an attitude of adoration on similar flowers, three on each side. The execution is as free as if teak were as soft as cheese, and there is a touch of colour on the lips of some of the figures.

THE female scarlet fever wards of the London Fever Hospital, Islington, have just received a notable and very valuable addition in the shape of some decorative wall paintings. These paintings consist of groups of flowers painted on the varnished surface of the walls, and have been executed by Miss Emily Wall whilst a patient in the hospital. As works of art they are of a very high order of merit, and the brightness and beauty they add to the ward it is hardly possible to overstate.

AT his premises in Charlotte-street, Bedford-square, Mr. J. Aldam Heaton has on view an altar-table with a decorated front and ends, designed to "obviate the constant trouble and expense involved in the use of embroidered altar-vestments." There are no architectural features or even mouldings in the work; the front has seven upright panels containing figures of angels with censers and musical instruments, painted by Mr. W. H. Margeson, on a highly-burnished gold background. Above the panels appear the words *Sapientia, Intellectus, Consilium, Fortitudo, Scientia, Pietas, and Timor Domini*, but they do not appear to be connected with the figures. The framework of the front is ornamented with a freely-drawn pattern in brown and yellow stain on a dead gold ground. The whole work is beautifully executed and harmonious in colour, but rather harsh in outline, and wanting in thought as regards the general scheme.

IN the *Antiquary* for this month Mr. J. F. Hodgkiss commences a series of papers on "The Smith and Wright," intended to give a brief outline of the work performed by the two classes of artisans thus designated; regarding

the "smith" as a worker in metal, the "wright" as a worker in any other materials. The first paper promises well for the series; it is eloquently and picturesquely written, and shows both learning and enthusiasm. The same number of this useful periodical contains an interesting account of the old house called "The Oak House," at Bromwich, accompanied by a sketch.

ANOTHER case of the vested right in a chantry chapel has just been decided by Lord Coleridge in favour of the descendants of the original owners and against the churchwardens. This was in the case of a chapel attached to the parish church of Louth. This had been erected as the chantry chapel of a guild established under a charter of Henry VI., in 1450. After the suppression of the chantries at the Reformation, the dissolved chapel was assigned to the then lord of the manor, Sir John Bolles, of Thorpe Hall, and to his heirs the possessors of Thorpe Hall "for ever," in consideration of Sir John having assigned the tithes to the prebend of Louth, who was rector. A recent owner, Mr. Fyfe, had consented to the chapel being seated for general use, but without giving up his right to it; and he having sold Thorpe Hall to Mr. Bennett, the plaintiff in the case, the churchwardens, rather disingenuously, endeavoured to dispute his right to ownership of the chapel. Mr. Fowler, of Louth, under whom the church was restored, gave evidence in support of the plaintiff. The church, he said, was originally built in the thirteenth century, but rebuilt in 1450, and the seats in the chapel were coeval with the church as thus reconstructed. It was, he said, what was called a parclose; it was evidently *in situ*, and as originally erected, and the pew or row of seats supposed to be substituted for it was in a peculiar position, not corresponding with others of the seats in the church. Lord Coleridge said the evidence in favour of the user of the chapel by the Fyfe family was unanswerable, and confirmed the right of the present possessor of it by purchase. So Mr. Bennett, like the gentleman in the "Pirates of Penzance," "has bought the chapel and its contents," including ancestors. The *Times*, by the way, devotes a short leader to this case, and, apparently inspired by a sudden idea of "justice to architects," remarks specially that both this and the Fitzalan Chapel case were decided mainly by the evidence of architects. But the *Times* cannot avoid blundering about architects and architecture even when its intentions are friendly, and the name of Mr. Butterfield, one of the most eminent and popularly known architects of the day, who gave evidence in the Fitzalan Chapel case, appears in capitals as "MR. BUTTERWORTH"!

#### THE NEW WORK AT THE NATIONAL GALLERY.

THE new staircase and rooms at the National Gallery constitute a piece of work well carried out, and creditable to Mr. John Taylor, of the Office of Works, who, we believe, is the actual architectural designer of the work. We do not know that more than that can be said for the staircase and entrance, which does not show any stroke of architectural genius, and really depends for its effect more on the materials employed and on the decorative work done by Messrs. Crace & Son than on anything remarkable in the design architecturally considered, in spite of the peans which have been sung over it in the daily press. This is, of course, only what is to be expected as long as public architectural work of this kind is turned out by an official staff, however practically competent, instead of being entrusted to an independent architect of genius.

The additions comprise a grand staircase in two main flights with a broad landing between, lighted by a glass dome above; a large vestibule at the top of the staircase, leading to a large gallery running north and south, with two small rooms opening from the centre of the east and west sides of it, and numbered II. and III., on the plan attached to the new edition of the official catalogue; the main room being numbered I. From the north end of this latter room we reach another small room of the same size as the vestibule and numbered V., and through this we pass into another large gallery

running east and west, like the cross at the top of a T, and which forms Gallery VI. From the intermediate landing of the new staircase two subsidiary flights of stairs rise eastward and westward, each landing in a good-sized vestibule, which is available for picture-hanging, the floors of these vestibules being returned round the stairs to the edges of the main flight. From these east and west vestibules access is obtained to the old range of galleries extending along the Trafalgar-square front. The old staircases, approached from the outer lobby on either side, are still retained, and these and the new subsidiary stairs result, therefore, in the rather incongruous arrangement of two parallel flights of stairs, both leading to the same ranges of galleries. Architecturally the effect of this is certainly odd and confused, but we understand it is thought convenient, on occasions when the Galleries are crowded (as on public holidays), to have the old stairs to be utilised as exit stairs, the new stairs forming the entrance stairs. This may, no doubt, be a practical advantage if the public will take it that way; there is nothing at present to compel them to do so. But the whole as it at present stands looks like a very odd effort in planning. Further communication between the new and old galleries is obtained from the east side of Gallery III., which opens on the back of the former *cul-de-sac* gallery, westward of the octagon hall, where the Crivellis and other examples of early Italian painting need to have place; and from the east end of Gallery VI., which opens into the end of Mr. Barry's long gallery (VII.), formerly devoted to the Italian pictures by the masters of the great period of Italian painting. Another curious result of this more grandiose entrance now made in the centre of the building is that Barry's octagon hall, the loftiest and most sumptuous apartment in the interior, which a visitor would expect to find on the axis of the principal entrance, becomes merely a side feature in reference to the entrance. This could not be avoided, but the result is to add to the effect of architectural confusion and want of purpose in the planning of the interior. If the back portion of the building is ever extended westward, this octagon hall will no doubt be balanced by another in a similar position on the west of the main axis of the building; and there would then be something of uniformity and principle in the whole plan. We cannot but regret that a great plan for the rebuilding of the National Gallery was not resolved upon and carried out in a manner worthy of the nation, instead of these piecemeal additions to a building the main façade of which is quite unworthy of its position, and the ultimate rebuilding of which is rendered, by each of these additions, more improbable and more difficult.

The approach to the new staircase is somewhat hampered and crowded by the necessity of retaining the piers and arcade which carry the north wall of Wilkins's cupola; the approach is between these piers, and then between a new arcade, similarly spaced, at the foot of the staircase; the new piers being, however, of marble, — these two arcades, close to each other, combining again to increase the effect of confusion in the planning. The new stairs ascend between flanking walls faced with a very transparent yellowish-toned Giallo-antico marble, with a capping of fine and broadly veined Pavonazetto marble. The main architectural decoration consists of columns and pilasters of red Numidian marble, with base mouldings in Pavonazetto, and Corinthian capitals of Derbyshire alabaster for the columns, and of white Carrara marble for the pilasters. The following list of the various marbles employed was furnished to us some time since by Mr. Taylor, and may be of interest:—

*Rouge Etourque Numidian* (quarried near the coast in Algeria, between Algiers and Oran).—Used in columns and pilasters of staircase and doorways of exhibition rooms.

*Pavonazetto* (obtained from the old quarries in the Apennines, Italy, Province of Modena).—Used in bases of columns and moulded curbs of top landing of staircase and the pilasters of screen in vestibule.

*Verde di Prato* (obtained from the old quarries in the Apennines, Italy, Province of Florence and Prato cathedrals were built).—Used in moulded pilasters of exhibition-rooms and staircase.

*Giallo Antico* (obtained from the ancient Roman quarries in Tunisia; it used to be shipped to Rome at Tabarca).—Used in sides and spandrels of staircase up to level of exhibition-room floor.



*New Zealand* (obtained from New Zealand).—Used in sub-bases of columns and pilasters in staircase.  
*Alabaster* (obtained from Derbyshire).—Used in capitals of columns and pilasters in staircase.  
*White Statuary of Carrara* (obtained from Carrara).—Used in capitals of screen, pilasters, &c.

According to the account furnished to the *Times*, it is stated that the idea of working the old North African marbles was that of Mr. Shaw-Lefevre; and this statement has probably given rise to the notion of some of the daily papers (referred to in another column) that Mr. Shaw-Lefevre "designed" the staircase; that would be quite sufficient hint for the architectural reporter of a London "daily." The *Times* contributor, it is amusing to notice, mentions it as a special value of the red marble that it harmonises so admirably with the red background against which the pictures have been hung; his notion of decoration apparently being that if you have a red wall you want a red setting to it to "harmonise"! Messrs. Crace & Son, it will be seen below, give the red colour of the marble pilaster as the precise reason why they could not use the red background in the staircase portion of the work. Their description of the scheme of decoration they employed, and the reasons which governed it, we subjoin in their own words:—

"The additions to the National Gallery consist of two large rooms, three small rooms, and the grand entrance staircase, with its vestibules on the level of the rooms.

The two large rooms, alike in most of their details, differ mainly in their length, and in the fact that the longer room has two large tie-beams below the lantern level. Both are lighted by lantern lights and skylight, and both have a wide cove, subdivided vertically into numerous plain panels above the frieze and cornice of the walls. None of the surfaces are enriched, the relief enrichments being confined to the mouldings of cornices and to the trusses and rosettes of the upper structure. For ornamentation, therefore, the new rooms (unlike those by the late Ed. Barry, adjoining) depend entirely on the coloured decoration.

The walls are hung with double flock paper of a deep red tone, the result of many experiments, and it will, we hope, be admitted that the paintings already hung, notably the "Blenheim Raffaello," show to great advantage on the ground selected. The cornice and architrave are in stone colour, with the enrichments in a golden bronze colour, heightened by gilding; whilst the frieze is of a dark low tone of warm green, with a key fret pattern in stone colour thereon, its repetition being broken at long intervals by a block of other colour at the points from which the main ribs of the upper structure spring. These ribs, and the soffits to which they lead, are ornamented with a guilloché in dull white on a deep yellow ground, whilst the long array of panels in the cove are left in two tones of dull white, the mouldings in orange colour and gold, defined only by a firm red line, which a little helps to carry up some repetition of the walls. A series of long narrow panels under the lantern again recall the stronger colouring on the walls. All the remaining upper-structure may be said to be in a warm tone of subdued white, relieved with the same pale bronze and gold as below.

The smaller rooms, which have neither cove nor lantern, have their walls and entablature precisely like those of the larger rooms, whilst the small strip of ceiling which divides these from the skylight is subdivided in a simple manner by coloured lines.

The skirtings throughout are of a cool, very dark green marble.

The staircase is an exception to the absence of relief ornamentation, which here is carried into some of the constructive lines; all these enrichments are treated with the same 'old gold' tone which prevails throughout the cornices.

The fine display of real marbles in columns, pilasters, and other constructive features, have here governed the colouring. It was impossible to continue the red walls where the rich reds of the 'Numidian' columns would come into direct contact with them. A warm dull green has therefore been adopted for these walls as the next best ground for the pictures which will hang here. And in the friezes and the margins of the upper panels, the deep maroon red tone of the columns is again recalled. The large, plain panels of the upper cove are decorated with ornament painted in the dull gold colour, neutral grey, and dull red. In the screen which separates the staircase from the first large gallery, the tympana within the three arches of the doorways contain *alti-relievi* portraits of great painters. These are treated as dark bronze, the better to emphasise the arched, the doors themselves being square-headed.

Mr. Crace has personally directed the decoration throughout."

Messrs. Crace are justified in claiming for the result that it is harmonious and suitable to the position. We do not care, we confess, for the decorative filling of the cove panels on the staircase ceiling. It is neat, elegant, what you

will of that kind, but it is not the highest type of decorative detail. We may observe also that the white finish of the arcade at the foot of the staircase, on the staircase side, butts harshly and inharmoniously against the red pilasters; it should not have been left so white. The band of ornament in relief over the entrance-doors to Gallery I. is a very good little bit of decoration, well treated in colour. On the outside of these doors are medallion heads of Leonardo in the centre, Raphael on the left, and Correggio on the right; and over the inner side of same doors Titian occupies the centre, with Rubens and Rembrandt on each side; but where is Buonarroti?

The new rooms are very well lighted, and the classification of the pictures, far more systematic than was possible before, is a great improvement in the effect and the significance of our great collection. The *Anaïde Madonna*, in its sumptuous architectural frame, appropriately closes the vista on the north wall of Gallery VI., facing the axis of the entrance; this room being devoted to the Umbrian School. Barry's long gallery (VII.) is now devoted to the Venetian and Brescian schools, and shows how rich we are in Venetian work. We could have wished that the glorious Titian, the "Bacchus and Ariadne," which to our thinking is the richest jewel of the collection, had been given a central place at the end of a vista; size, of course, is some consideration, but it is well worth a place of the highest honour that could be conferred. As it is, it is hung as a pendant to the "Venus and Adonis," in a side position. It is much better seen, however, than it was, and its details and background come out in quite a new fashion. Into the general scheme of hanging we do not go at present, our remarks just now referring rather to the new work in the building; but in general it seems exceedingly satisfactory, and has evidently been the result of much care and thought.

#### THE "GERMAN GERMAN" \* ON FERGUSSON.

AN architectural critic who could well defend himself has gone from among us; it is left for those who valued his character and reputation as a critic to vindicate them. It is very true that "the Englishman, James Fergusson, the author of a 'History of Architecture in all Countries,' in his account of the Cathedral of Cologne, does take general exceptions to its proportions,—'externally the proportions are as mistaken, if not more so than those of the interior';—that he notes of the nave that it is too short, and that it would have had a better effect had the transepts been curtailed; that a true architect would have reduced the height of the towers by a third, and that the west façade is rather the noble conception of a mason than of an artist in the highest sense of the word." That he should have said all this might fairly give occasion to Professor Adolf Göller, as 'Architekt, Professor am K. Polytechnicum zu Stuttgart' to express and to do his best to justify a difference of opinion. That this is not the particular course which he has taken in advertising to the criticism is to be lamented in so appropriate an opportunity as a publication "Zur Ästhetik der Architektur." A striking inconsistency in Fergusson's criticism might have been fairly noticed; this is an alternation of enthusiastic expressions with stringent objections. There was the same variation of tone in his conversations on this building; he would speak of it as he wrote of it, as "certainly one of the noblest temples ever erected by man in honour of his creator," p. 613, as "one pre-eminent example, possessed by Germany alone, in which all the beauties of the Pointed style are united";—of one of its principal beauties being the uniformity of style that reigns throughout,—and as "a glorious temple." But these were enunciations of confiding,—not of incompatible expressions. A critic of architecture is constantly in the same difficulty as an estimator of personal character. Perfection is as little the rule in one case as the other. Substantial truth can be asserted and maintained for each of two representations, which may leave quite different impressions, unless fairly balanced one with

\* See Heine's description of the way he was called to order at a Teutonic gathering: "At this German meeting must the German German speak."  
 † Stuttgart: K. Wittwer, 1887.

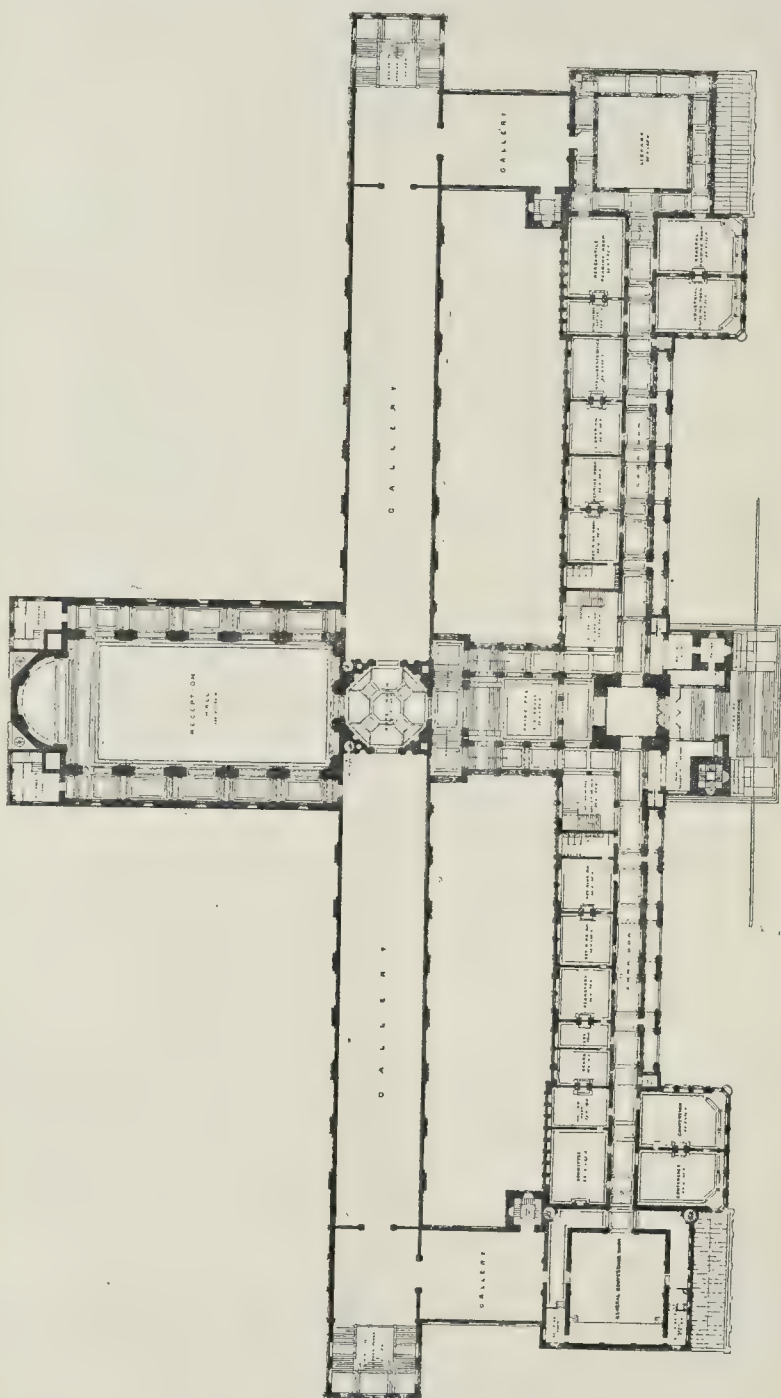
the other. Moroseness or ill-nature may give credit for virtues only as relieving lights upon a general ground of vicious qualities; charity or favouritism, on the other hand, with equal conscientiousness and truth, sums up the very same items with the intimation that failings, of which the seriousness cannot be denied, are only drawbacks upon an essentially noble character; such is the difference between,—a character or a building as "very admirable, but—," or a character or a building "has abundance of faults, but still—." Truly there seems no help for it when there is an honest desire to dissimulate neither genuine admiration nor concurrent conscientious objections, but to take, like Fergusson at Cologne, first one attitude and then the other, and now indicate faults as drawbacks, and now excellencies as redeeming from denunciation; so Fergusson did in this case of Cologne, and it may confidently be said many others will be inclined, and are inclined, to do so after him. For, indeed, are not all the indicated objections fully sustainable? Let each speak for himself; but there are those who, uninfluenced by our lamented critic, have found Cologne Cathedral in the interior tame, mechanical, monotonous,—have experienced that the first effect is the sole effect,—and that its interest is as speedily, as entirely exhausted; that the limits have not been felt by the architect, within which simplicity becomes baldness, and beyond which loftiness offends as exaggeration. Years have gone by, and yet at the moment of present writing, the remembrance comes back ungratefully of the unrelieved level from end to end and from side to side, of the oppressively abundant repetition of identical forms, and absence of that suggestion of exuberant inventive resource which is the charm of Gothic,—of a yearning for such a prolongation of the perspective as would admit of taking in consciousness of the enormous height without a strain. James Fergusson had ever the courage of his opinions,—frequently very courageous opinions indeed,—and they who knew him best and often disagreed with him, always appreciated his honesty and sincerity, as well as his knowledge. We turn to his Historical Notice of German Architecture (i., p. 558), and find as little trace there as in his criticism of particular buildings to justify reflections on narrowness of view or imputations of spite or unfairness;—we do find much truth very tersely expressed as was his wont without fear or favour, and assuredly the glory of Germany not extenuated wherein it is worthy. As undeserved by him as surely is unworthy of a writer who claims to take the attitude relatively to a common study, of a philosopher as well as an historian are such sentences as the following:—

"The case is clear: he is accustomed to the lengthy plans of the English cathedrals with the low towers of the west fronts like those of Lichfield, for example; in consequence, the decidedly different concentrated proportions of Cologne do not suit him, and in blind self-sufficiency he rejects these other proportions as tasteless contrivances (*geschmacklos erfunden*). In similar fashion, he passes judgment on all other German architecture, not always simply after his peculiar English standard, but frequently also with venom and gall (*mit Gift und Galle*). Is there any other answer to all this than to formulate the psychological principle according to which every tomfool is charmed with his cap and bells" (p. 86). It is poor reward for some hours spent in toiling "through the long, heavy, painful pages" of Herr Göller's æsthetic treatise to be brought up by such an unhappy specimen of international amenities as this. It admits of a ready retort, but it would be encouraging what we denounce to bandy his own words.

**The British School at Athens.**—The first annual meeting of the subscribers to this school was held on Wednesday afternoon. We defer a notice of the meeting until next week, but may say that Mr. Penrose, the Director of the School, was present, and gave an account of the working of the school.

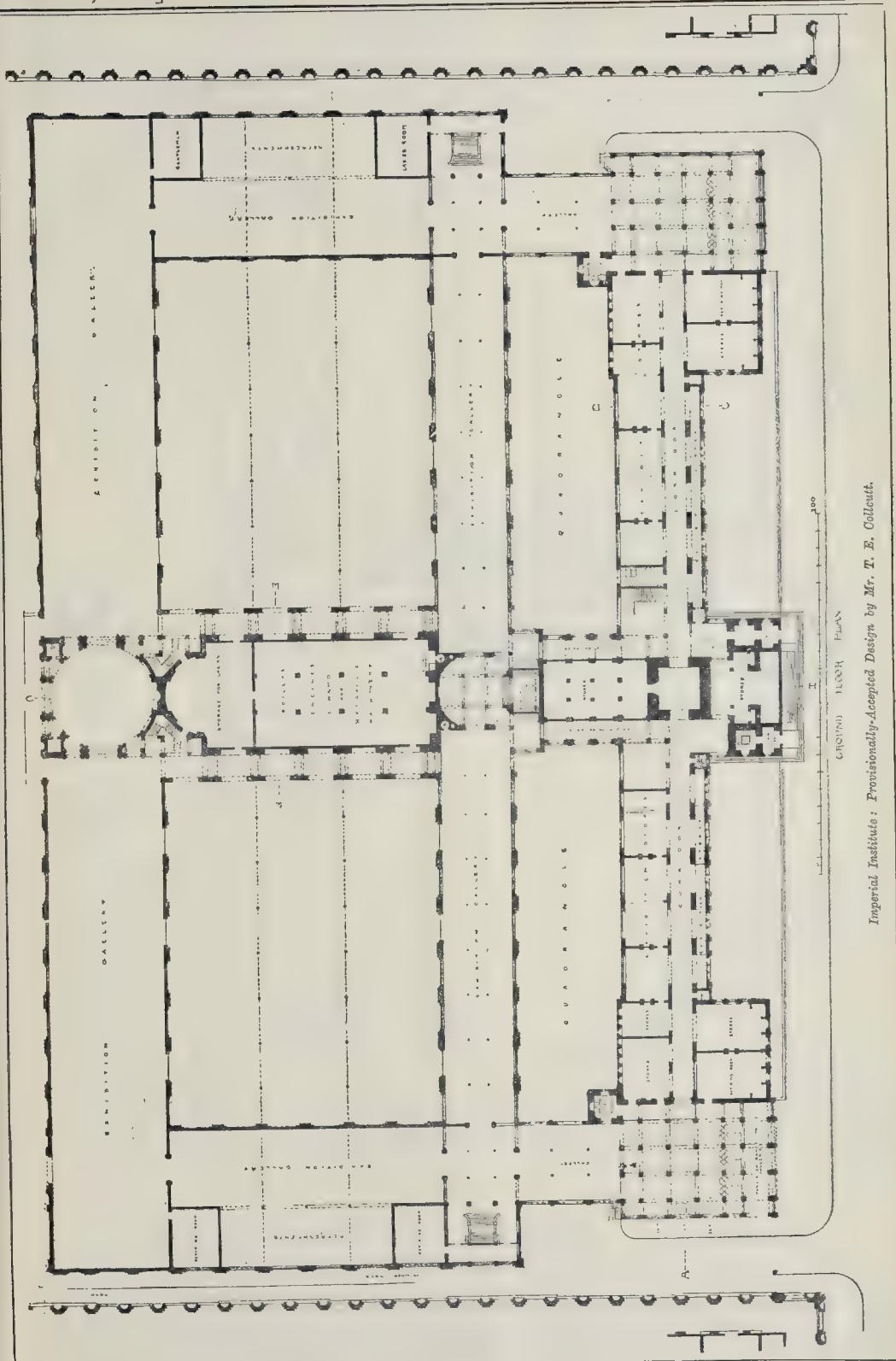
**District Surveyorship of Plumstead and Eltham.**—The Metropolitan Board of Works have appointed Mr. Alfred Conder, F.R.I.B.A., District Surveyor for Woolwich, to act as temporary Surveyor in the above-named District, which is vacant by the decease of the late Mr. G. Barnes Williams.





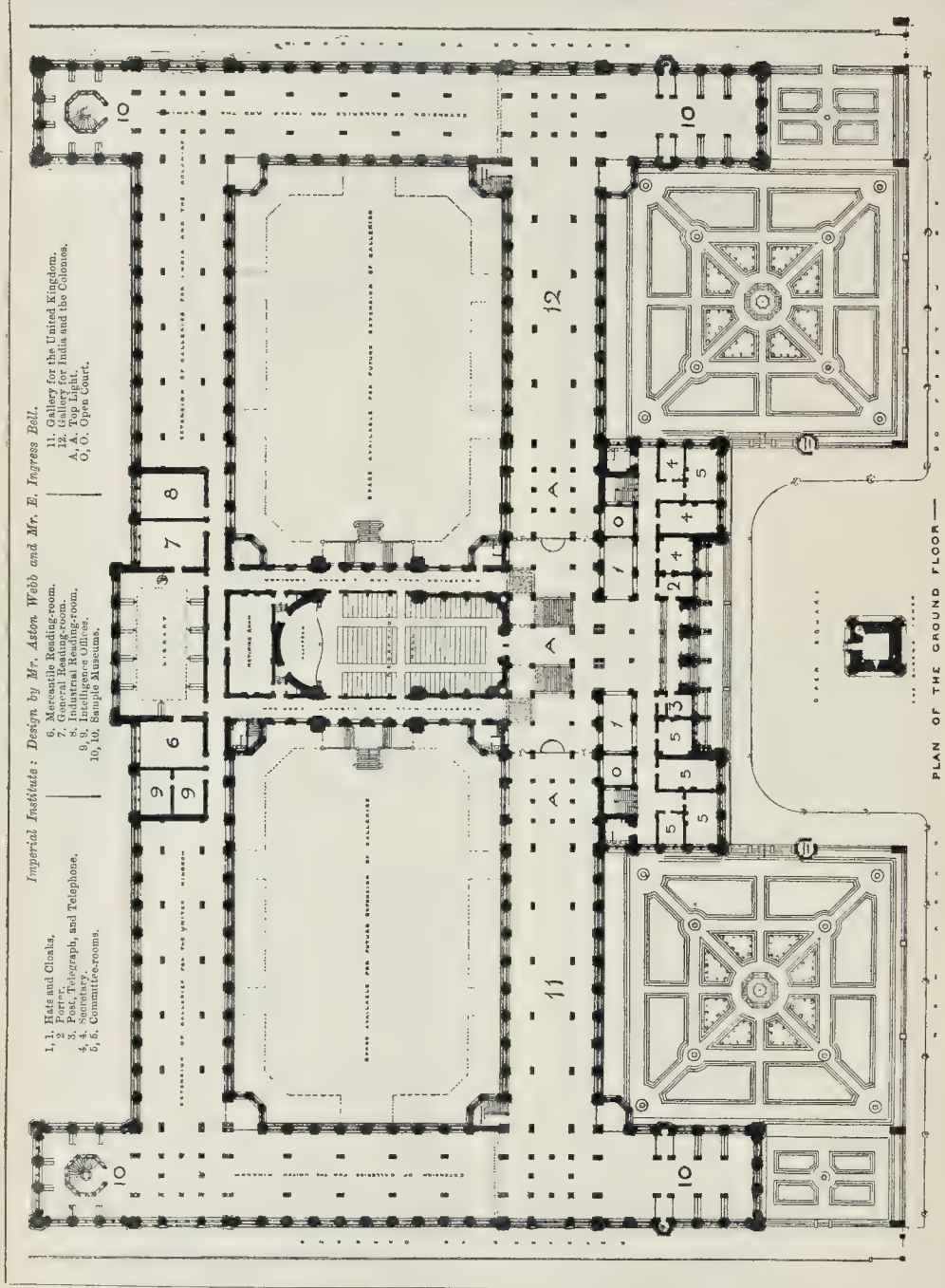
PRINCIPAL FLOOR PLAN

*Imperial Institute: Provisionally-Accepted Design by Mr. T. E. Colcott.*



Imperial Institute : Provisionally-Accepted Design by Mr. T. E. Colcutt.





### Illustrations.

#### DESIGN FOR THE IMPERIAL INSTITUTE.

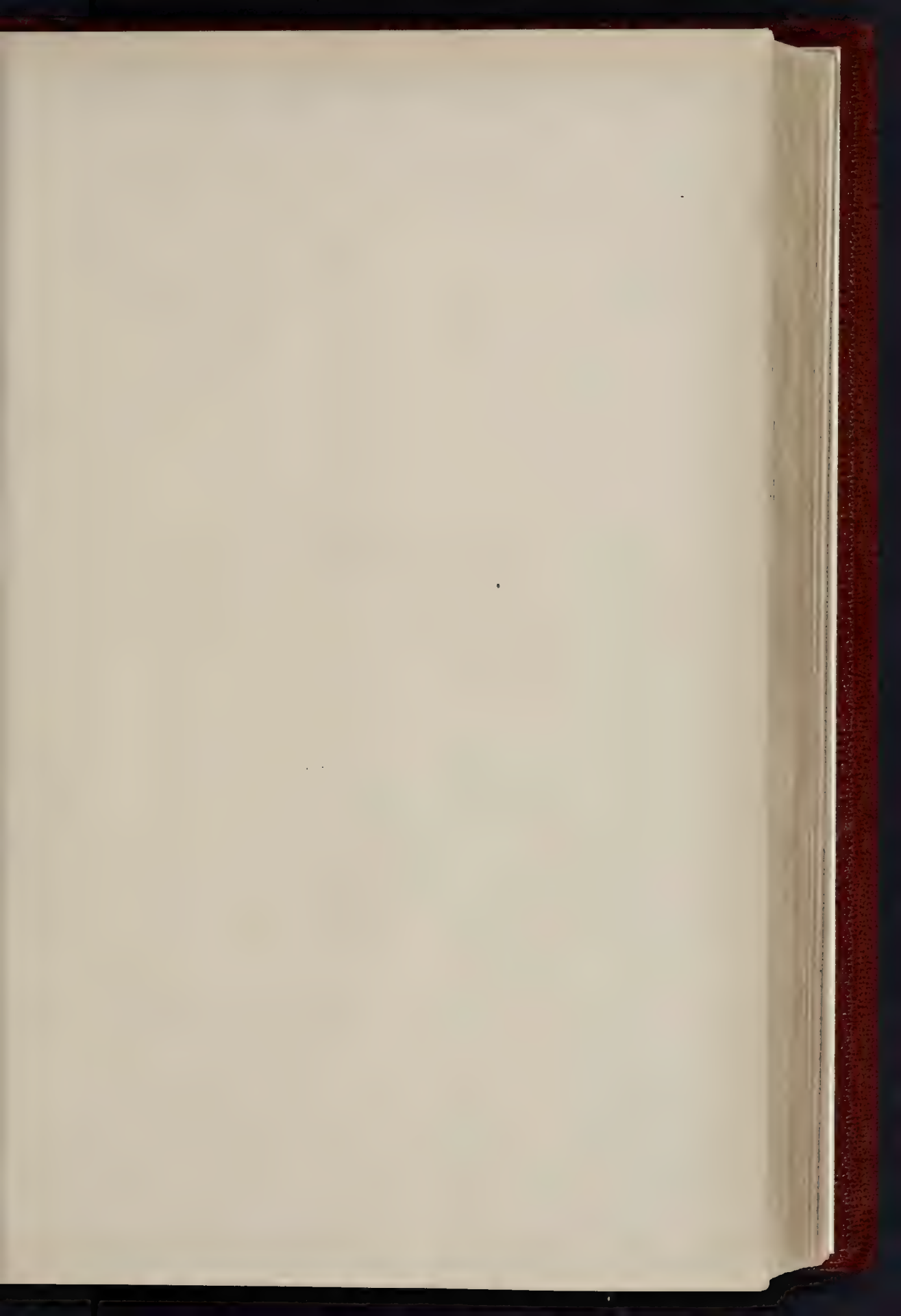
**WE** give this week the detail of Mr. Colcutt's design and two of his plans; and the perspective view, detail, and principal plan of the design by Messrs. Aston Webb and E. Ingress Bell.

The designs had to be photographed *in situ* during the time of their exhibition, and the necessary employment of dry plates, which do not require a dark room, has produced an unsatisfactory result in the case of the perspective of Messrs. Webb and Bell's design, which we regret. The dry plates will only bear a short exposure, and do not succeed in defining the lines sufficiently. Owing to the circumstances, it was, however, a choice between that and indefinite delay.

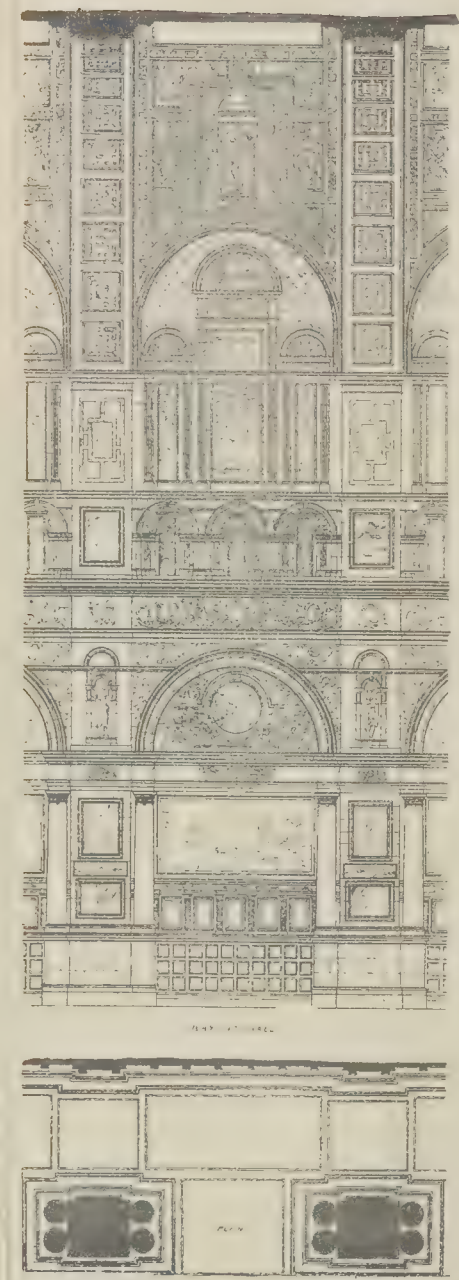
We commented on both the designs in our notice of the competition last week.

#### SCULPTURE AT THE PARIS SALON.

THE two works here illustrated, "La Défense du Foyer" by M. Boisseau, and "Le Courage," by M. Chapu, were among the sculpture exhibits in this year's Salon. Some remarks on them will be found in the article on "Some Sculpture of the Year," in another column.



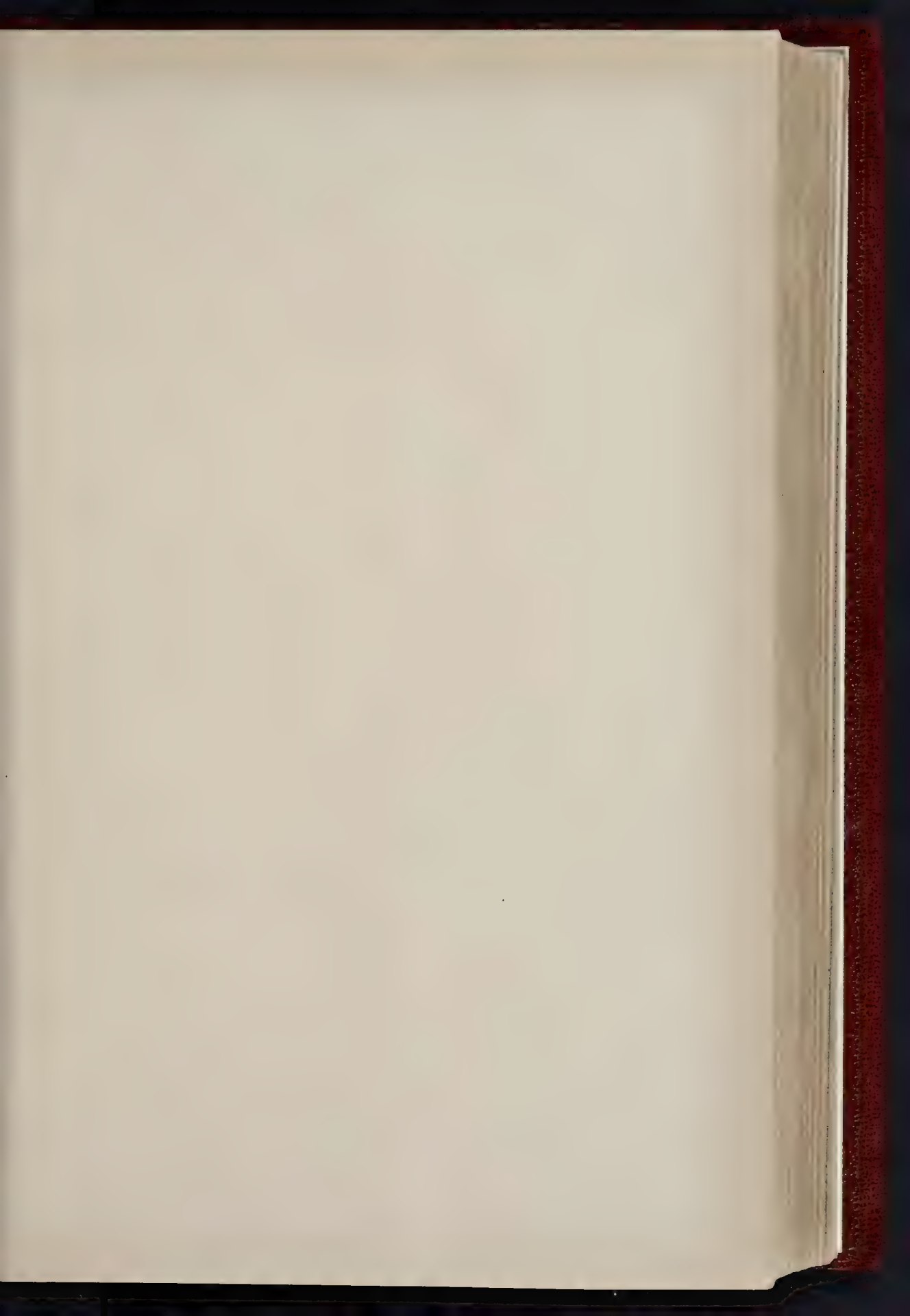
















IMPERIAL INST

DESIGN BY MR. ASTON WEBB, F.R.S.



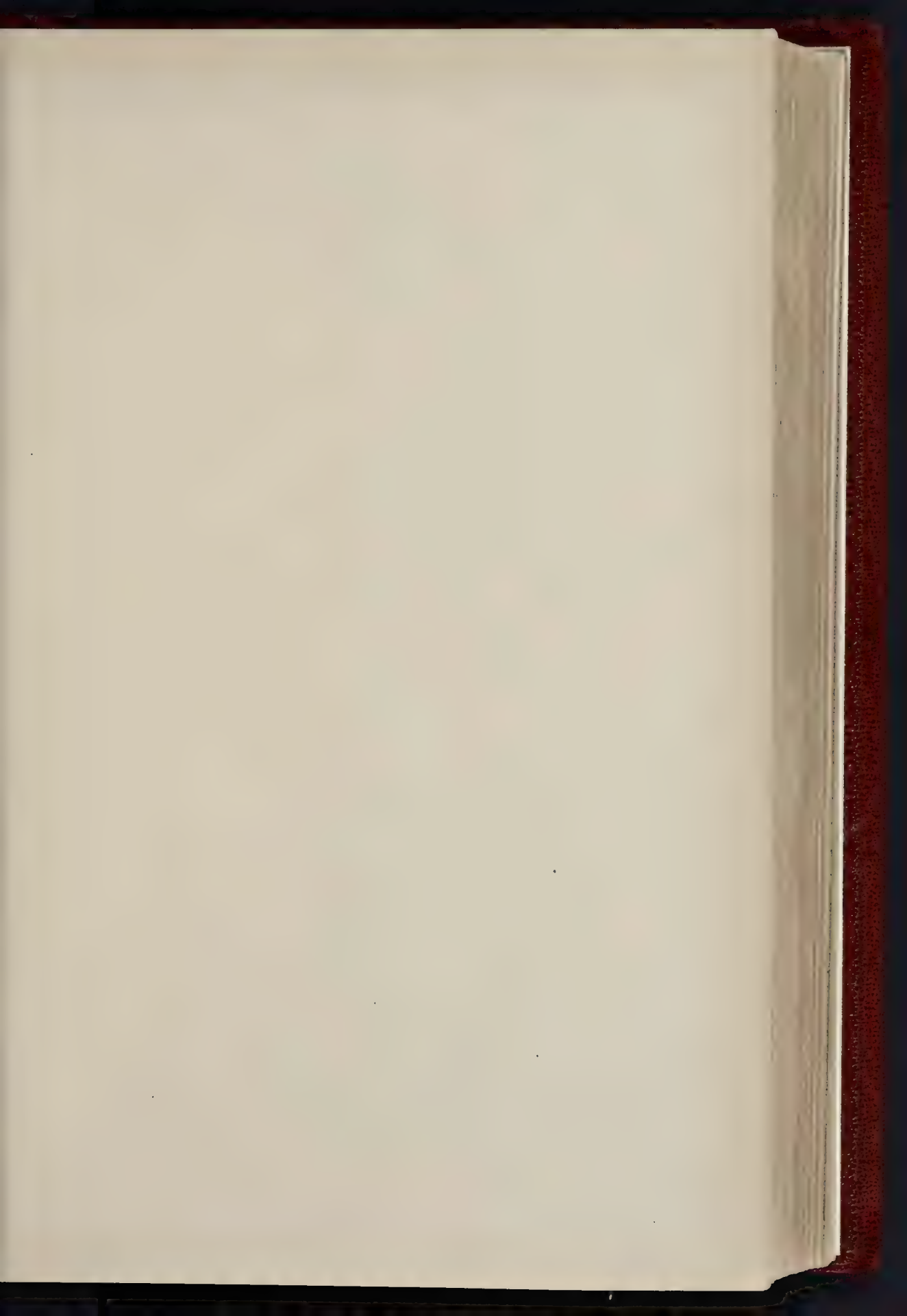
PHOTO L. THO. SPRAGUE & CO. 28, MARTIN LANE, LONDON E.C. 4

COMPETITION.

AND MR. INGRESS BELL, F.R.I.B.A.











SCULPTURE AT THE PARIS SALON

"LA DÉFENSE DU FOYER:" M. BOISSEAU, SCULPTOR.



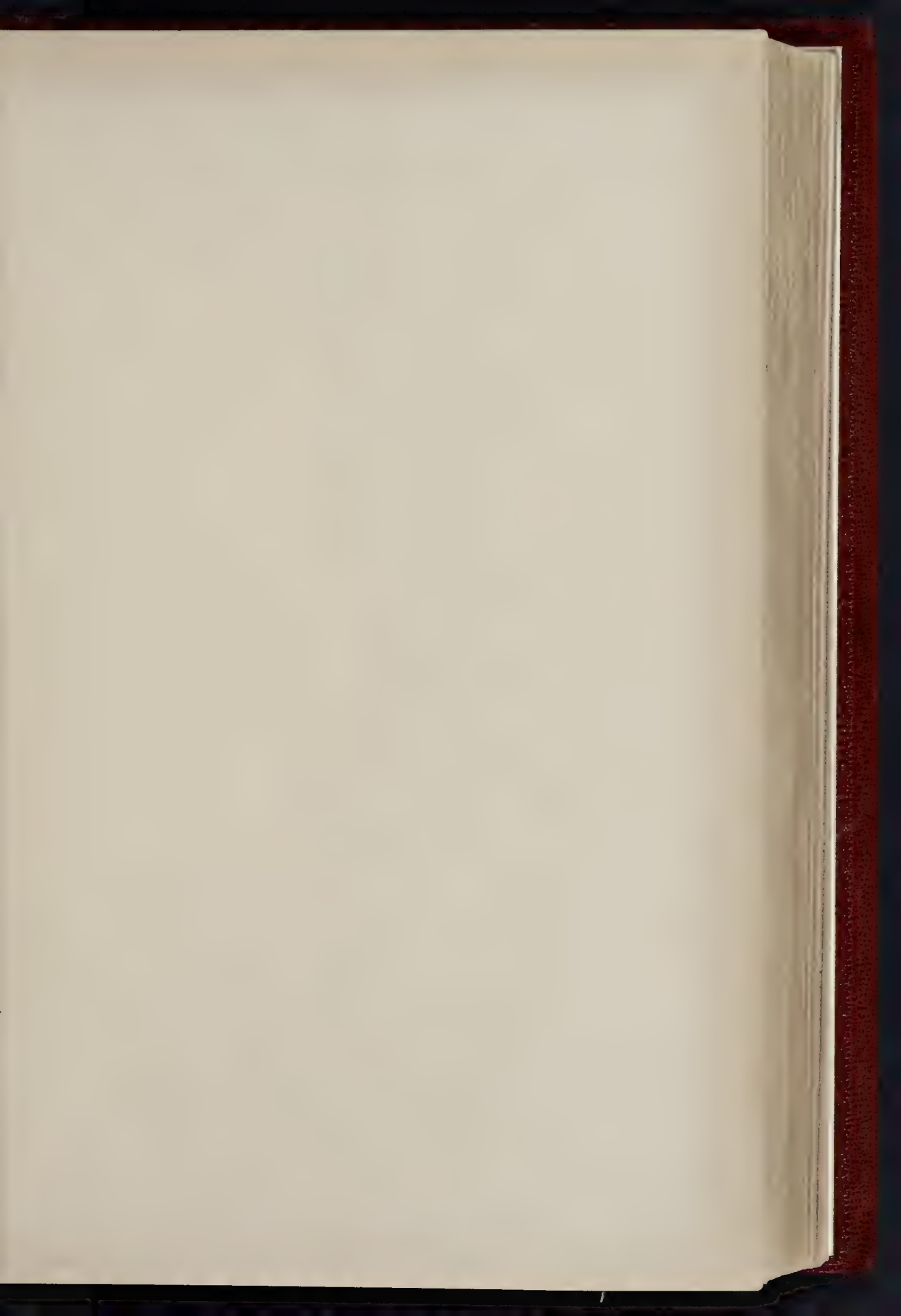
THE BUILDER, JULY 9, 1887. 2 HARTY, AND BRONZE, LONDON.

SCULPTURE AT THE PARIS SALON

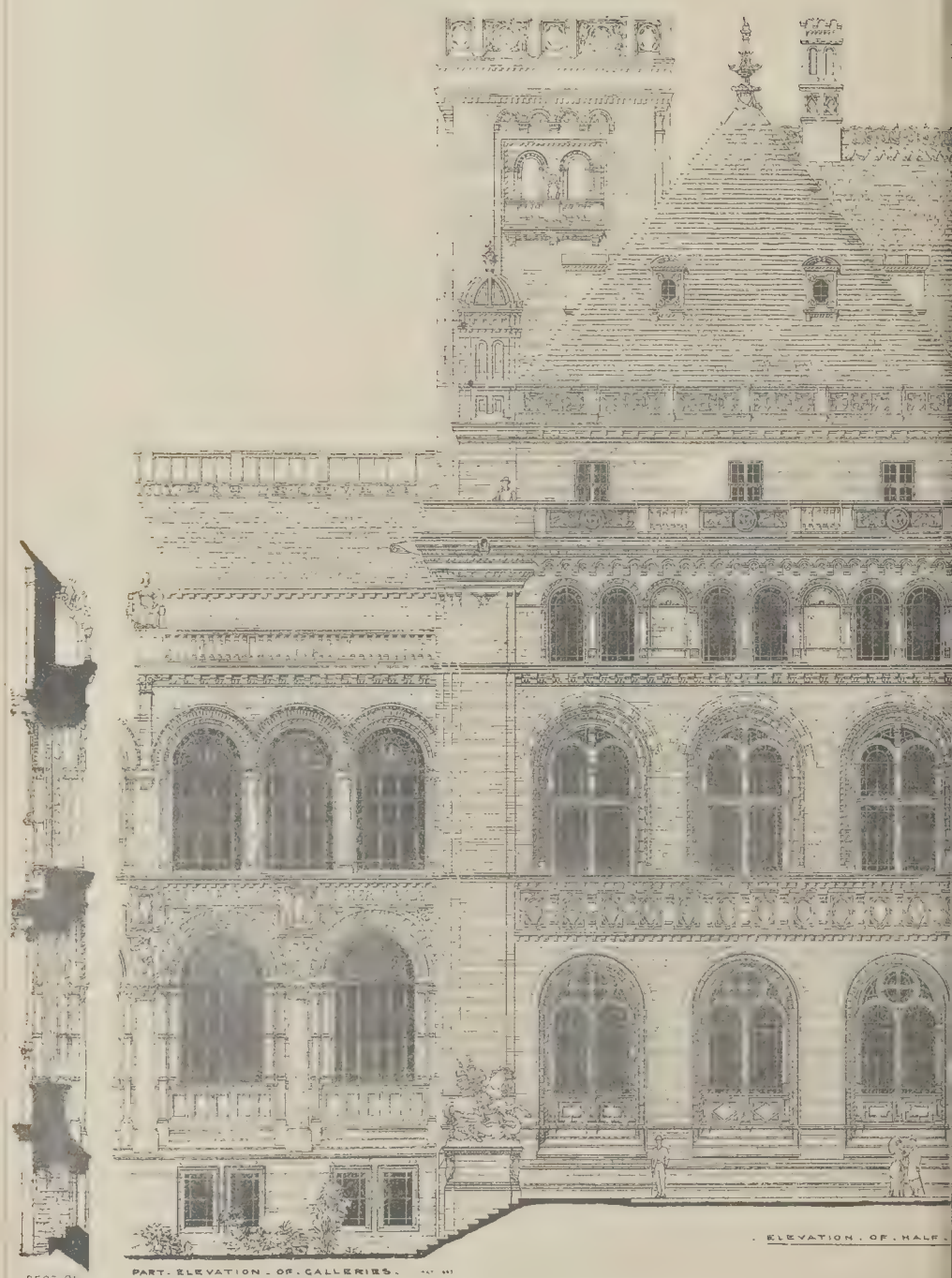
"LE COURAGE:" M. CHAPU, SCULPTOR.











SEC. ON

PART. ELEVATION. OF. GALLERIES.

ELEVATION. OF. HALF.



CENTRAL OR INSTITUTE BLOCK.

CENTRE OF BLOCK.

SECTION THROUGH PORCH.

AND GENERAL CONFERENCE ROOM.

Oct 6/87  
F. H. B.

ARCHT. 1887.

COMPETITION.

J. B. A. AND MR. INGRESS BEIL, F.R.I.B.A.





## A SEWERAGE SCHEME FOR LEICESTER.

MAJOR TULLOCH, R.E., one of the Engineering Inspectors of the Local Government Board, recently held an inquiry at Leicester with regard to an application by the Corporation for sanction to borrow 142,600*l.* for works of sewerage and sewage disposal, viz., 14,800*l.* for main trunk sewers from the borough boundary to the proposed new pumping-station, 80,000*l.* for the pumping-station and works for distributing the sewage over the Beaumont Leys Estate, and 47,800*l.* for two storm-water outfall culverts down to Thurmaston.

Mr. J. Gordon, the Borough Surveyor, said that he had submitted several reports on this question to the Town Council, and the result was that in the long run the Beaumont Leys scheme was selected. He subsequently reported to the Council on the question of the main trunk sewers of the town, having in his first report, impressed upon the Council the necessity of dealing with the sewers at the same time. A scheme of new trunk sewers had since been adopted, and so far as the proposed works lay in the borough it had been approved by the Local Government Board, at an estimated cost of 75,000*l.* There was a little to be done outside the borough, at an estimated cost of 14,800*l.*, and to that there was no opposition. That would complete the trunk sewerage scheme up to the pumping-station. Mr. Gordon then described the works in connexion with the Beaumont Leys scheme, including the position of the pumping-station, the rising mains, and the expenditure in preparing the estate for the reception and treatment of the sewage. The cost of the pumping-station, including buildings, boilers, engines, &c., would be 44,645*l.*, exclusive of the usual ten per cent. for contingencies. The sewage, after passing over the land, would be taken up by the main effluent water culvert, and would ultimately pass from a considerable portion of the estate into the Ansty brook; whilst another portion of it, from about 400 acres, would come back to Leicester, and deliver into the Belgrave pond. The rising mains were estimated to cost 14,047*l.* 10*s.*; there were settling-tanks on top of the hill put at 1,500*l.*, 10,400*l.* for distributing the sewage over the land, 3,400*l.* for land for the pumping station, making altogether, with the contingencies provided for, a sum of 80,000*l.*, which represented the total expenditure to be incurred up to the point of delivering the sewage on the farm. (The Town Clerk here interposed the remark that for the preparation of the estate there would probably be needed an expenditure of 10,000*l.* or 12,000*l.*.) Mr. Gordon then went on to describe the course he intended to pursue in the treatment of the effluent. He believed now that the Corporation had adopted the plan for re-sewering the town that they would reduce the bulk and quantity of the sewage. He did not think that after the whole work was completed they would have to deal with more than five million gallons a day. In fact, he thought it would be within the mark to say that four million gallons only would be passed off through the effluent culverts. Taking 70 per cent. of that as going into the Ansty brook, it would be something less than three million gallons going in that direction. The large area of land taken was with the view of treating the sewage on the principle of broad irrigation, as distinguished from intermittent filtration, on account of the character of the soil. Unless a very large quantity of land was taken it would not purify the effluent to the degree that it ought to be purified. But the Town Council had not only gone as far as he wished them, but much further. He asked for 1,200 acres, and they had secured 1,375, so that they could now pass the sewage over the surface of the land, properly drain it, and finally bring it into the Ansty brook in a condition that he thought would compare well with that of any sewage farm in the country. The sewage could be effectually dealt with on this 1,400 acres of land, without being a nuisance to the adjoining owners. Passing on to the storm outfall sewers, Mr. Gordon explained that their principal object was to relieve cellar flooding in the town. He explained how this would be done, and said these outfalls would not act as a complete safety-valve for the whole of the sewers in the town, and without them, in his opinion, the expenditure of 85,000*l.* for the sewers would be very incomplete, inasmuch as the chief object would be in a great measure, if

not entirely, lost. Having minutely described the course of the culverts, he said they were put down as costing 47,800*l.* It was, no doubt, a large expenditure, but it would be fully justified by the advantages to be gained from them. He looked upon them as a positive necessity in connexion with the trunk sewers of the town.

Considerable evidence was given on the part of adjoining owners in opposition to the scheme.

## WORKMEN'S JUBILEE FÊTE AT PETERBOROUGH.

Just as we go to press this week we have received a copy of the *Peterborough Express* of the 29th ult., which gives a detailed account of a very pleasant day spent by the workmen of Mr. (Alderman) John Thompson, the well-known builder, at Peterborough. Mr. Thompson, with characteristic amiability, felt that he should like his workpeople to appropriately celebrate the Jubilee by a fête to themselves: so he invited them all to spend the day in the meadows attached to his residence, the Lindens, on the Lincoln Road. The grounds were thrown open at ten o'clock, when recreation was provided in the shape of a cricket match, nine-pin alleys, shying for coconuts, jingling matches, &c. At one o'clock a substantial dinner was served in a large marquee, after which the sports were resumed. The Rushden Temperance Prize Band was in attendance and played numerous selections during the day. Between three and four o'clock the wives and sweethearts of the *employés* were admitted, when a number of ladies and gentlemen, specially invited by Mr. Thompson, began to arrive and manifested great interest in the proceedings. About six o'clock, the whole assemblage, numbering about 500, sat down to a sumptuous knife-and-fork tea. The speeches made on the occasion show that the best of relations subsist and have always subsisted between Mr. Thompson and his workmen. Mr. Thompson, in the course of the proceedings, said:—

"During the past fifty years in which I have been more or less working in connexion with building, and in a great part of that time occupied in restoring or building beautiful houses for the worship of the King of kings, it has been my joy and my pleasure to have around me workmen whose hearts have gone with me and whose labours have seconded my every desire and occupation. (Hear, hear.) When I say that in this assembly at the present moment one man has been upon the firm between 50 and 60 years—I don't think he has worked a day for any other person—and when I say that we number here many others who have been with us over 40 and 50 years, and very many others from 20 to 30 years, and not many of much fewer years, it speaks for itself that the expressions which have just been uttered come from a willing and hearty class of workmen. (Cheers.) One thing I must say on behalf of my workmen. Only a short time since—a few weeks—my heart was touched, and it is touched now at the thought of what occurred. One morning, I received from these workmen unexpectedly, a letter sympathizing with me because they thought I was then employing them, and that business was not so good as it had been for the last several months. And what do you think my workmen did? I must say it before they—they offered voluntarily to aid me in any efforts I might use to obtain contracts at a reduced cost, and offered to sacrifice voluntarily that which was their just due. (Cheers.) This little gathering to-day, Mr. Mayor, is but a small expression of my gratitude to them."

Simultaneously with this gathering, another party of Mr. Thompson's workmen, to the number of about one hundred, were celebrating the Jubilee in a similar fashion at Coventry.

Mr. Thompson is evidently as much to be congratulated upon his workmen as they are to be congratulated upon having such an employer.

## PRIZES FOR ART-WORKMEN.

THE Council of the Society of Arts, John-street, Adelphi, have determined, on the recommendation of the Committee of the Applied Art Section, to offer prizes to art workmen under the following conditions:—

"1. Prizes are offered to art workmen in certain classes of a workmanship enumerated below. These prizes will be awarded to workmen only, and the work must have been executed in the United Kingdom or its dependencies.

2. The objects submitted for competition may be the work of one workman, or of several workmen working in combination. They need not necessarily be the property of the workman or workmen sending them in. Manufacturers or employers may exhibit articles on behalf of their workmen. In this case, besides the name of the manufacturer, the names must be given of all the workmen who have executed portions of the work, with a statement of the portion executed by each. If any prizes are awarded they will be given to the workman, and a certificate, enumerating the award or awards, will be given to the manufacturer.

3. The objects in each class may be—(i.) Copies of existing works. (ii.) Modifications of existing works. (iii.) Original works.

4. In awarding the prizes, the judges will take into

account the following points:—1. Originality or beauty of design. 2. Fitness of treatment. 3. Excellence of workmanship.

5. Before the award of prizes is finally made the candidates must be prepared, if called upon, to satisfy the council of their competency.

6. The works will remain the property of the competitor, or of the person from whom he has borrowed them for the competition.

7. Although great care will be taken of articles sent for exhibition, the Council will not be responsible for accident or damage of any kind.

8. Prizes may be attached to articles sent in and sales made, and no charge will be made in respect of any such sales.

9. All the prizes are open to male and female competitors on equal terms.

10. When two or more workmen combine in the production of any article sent in for competition, the names of, and the respective parts taken by, each must be specified when the article is sent in, and the proportions must be stated in which they may have agreed, if successful, to divide any prize which may be awarded.

11. All articles for competition must be sent in to the Society's House on or before Saturday, December 3, 1887, and must be delivered free of all charges. Each work sent in competition for a prize must be marked with the workman's name, or that of the manufacturer, or, if preferred, with a cypher, accompanied with a sealed envelope giving the name and address of the workman or manufacturer. With the articles a description for insertion in the catalogue should be sent. The works will be exhibited at the Society's House, or, if the necessary arrangements can be made, at the South Kensington Museum.

12. The Council reserve the right of withholding any of the specified prizes, or of substituting smaller prizes, or varying in any way their respective amounts. Silver and bronze medals may also be given at the discretion of the judges."

Prizes are offered in the following eight classes for the present year, as follows:—1. Painted Glass, 25*l.*, 15*l.*, 10*l.*; 2. Glass Blowing in the Venetian style, 10*l.*, 5*l.*, 3*l.*; 3. Enamelled Jewellers' Work, 25*l.*, 15*l.*, 10*l.*; 4. Inlays in Wood, with Ivory, Metal, or other Material, with or without engraving, 25*l.*, 15*l.*, 10*l.*; 5. Lacquer, applied to the Decoration of Furniture or Small Objects, 25*l.*, 15*l.*, 10*l.*; 6. Decorative Painting on Wood, Copper, or other material applied to Furniture and Internal Decorations, 25*l.*, 15*l.*, 10*l.*; 7. Hand-tooled Bookbinding, 25*l.*, 15*l.*, 10*l.*; 8. Repoussé and Chased Work in any metal, 25*l.*, 15*l.*, 10*l.*.

## ARCHITECTURAL STUDENTS' PRIZES AT UNIVERSITY COLLEGE.

The following prizes have been awarded in the classes of Professor T. Roger Smith, F.R.I.B.A.:—

FINE ART.—Donaldson Silver Medals, *equal*. E. Hellicar of Bromley, H. S. Wood of Hereford. *Third Prize*. H. R. Appelbae of London. Certificates, 4<sup>th</sup>. H. Hutchinson of London. 5<sup>th</sup>. E. H. Dawson of Lancaster. 6<sup>th</sup>. Horace Helsdon of London. 7<sup>th</sup>. J. Borrowman of Godalming. *Second Class*. W. D. Claridge of London, G. P. G. Hills of London, H. C. Lander of London, T. H. Winny of London. *Third Class*. C. E. Bateman of Birmingham, T. H. Hitchin of Nottingham, A. E. Jackson of Hancney, E. H. Sim of London, B. E. M. Towne of London, F. J. Waller of Greenhithe, W. W. Wilson of Leytonstone.

SCIENCE.—Donaldson Silver Medal. L. Martineau of London. *Second Prize*. E. Hellicar of Bromley. Certificates, 3<sup>rd</sup>. H. Hutchinson of London. 4<sup>th</sup>. E. A. Rintz of London. 5<sup>th</sup>. G. P. G. Hills of London. *Second Class*. W. S. Douthwaite of Sydenham, H. J. Dury of London, W. C. Kerr of Blackheath. *Third Class*. G. Baker of Oakham, C. E. Bateman of Birmingham, E. H. Dawson of Lancaster, R. C. T. Gordon of London, A. Griffin of London, R. S. Maynard of London, G. Roberts of Portmadoc, F. C. Stainton of London, T. H. Winny of London, A. B. Yeates of London.

MODERN PRACTICE.—Prizes, *equal*. R. G. Gordon of London, Alfred Griffin of London. Certificates, 3<sup>rd</sup>. E. A. Rintz of London. *Second Class*. E. J. Slow of London, T. N. Turner of London. *Third Class*. A. B. Clement of London, L. R. Ford of London.

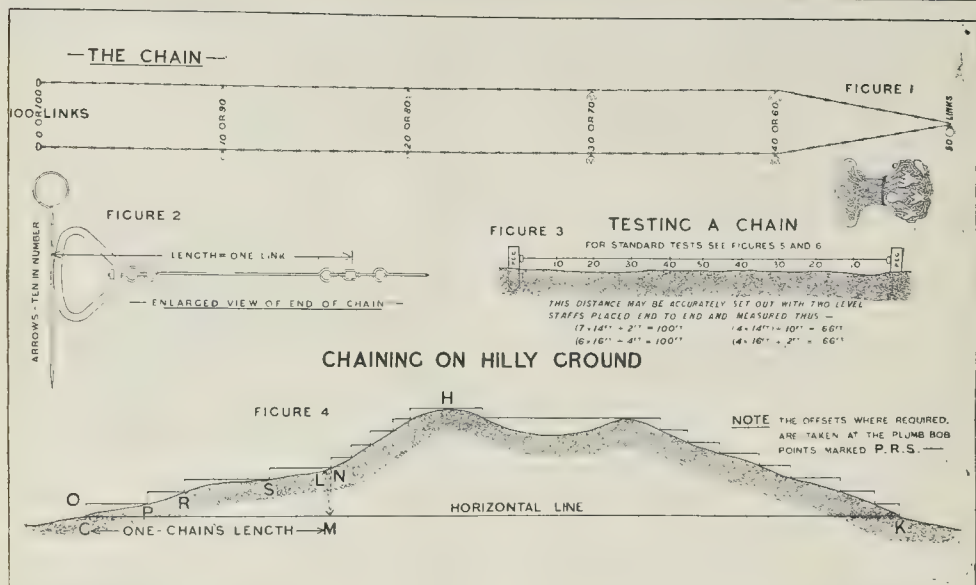
We are requested to state that students can obtain their worked papers of answers on application to the Professor, at No. 10, Lancaster-place, Strand, within the present month (July).

## Projected Works at Bournemouth.

THE Local Government Board have granted their sanction to the loans for the following works, viz.:—9,000*l.* for works connected with a scheme for watering the roads and flushing the sewers with sea-water; 5,500*l.* for the construction of a storm outfall; 1,750*l.* for private street improvement; 320*l.* for additions to stabling; 2,500*l.* for public conveniences. The whole of the works will be carried on under the direction of Mr. G. R. Andrews, the Surveyor to the Bournemouth Commissioners.

\* Obtained the number of marks qualifying for a Prize.





## COMPETITIONS.

**New Schools, Higher Blackley, Manchester.**—In an open competition for designs for new schools at Higher Blackley, Manchester, for the Methodist New Connexion, the drawings submitted by Mr. J. H. Burton, architect, of Ashton-under-Lyne, accepted.

**Proposed High School for Hartlepool.**—An adjourned meeting of the Governors of Henry Smith's Charity, Hartlepool, was held on the 27th ult., the Mayor in the chair, to further consider the correspondence with the Charity Commissioners with respect to the plans for the new schools. The plans conditionally accepted and sent in under the motto "Rover," having failed to fulfil the conditions enjoined by the Charity Commissioners, the Mayorsaid he thought that the proper course would be to call in the services of a first-class architect and tell him exactly what they wanted and ask for an estimate of the cost. Mr. Wood supported this view. Mr. Henry Bolck moved, "That seeing the plans marked 'Rover' had failed to receive the consent of the commissioners, they be not accepted by the Board." Mr. Nielsen seconded, and this was carried. As none of the plans sent in appear to have met the requirements of the case, it was ultimately decided to invite Mr. G. G. Hoskins, of Darlington, to meet a consultative committee relative to plans and specifications for the proposed High School.

**New Park at Bilston.**—Mr. William Hall, of Bilston, has generously presented the town with twenty-two acres of ground within ten minutes' walk of the Bilston Town-hall, as a jubilee gift for a public park. It was decided to offer two prizes of twenty and ten guineas for the best design for laying-out the same, which, owing to the nature of the ground, was a task of unusual difficulty. The first prize has been awarded to Messrs. W. Barron & Son, of Elvaston Nurseries, Borrowash, Derby, and the second to Mr. W. Milne, Crystal Palace School of Landscape Gardening, Sydenham.

## CONCRETE AND IRON BAR.

SIR.—Referring to your issue of the 25th ult., and your notice [p. 694] of the weighted concrete bar at our stand at the Newcastle Exhibition, we beg to inform you the first 3-in. square bar tested had an iron rod  $\frac{1}{2}$  in. square placed in the centre of a concrete bar made with 3 of crushed brick and scoria and 1 of cement. This carried  $7\frac{1}{2}$  cwt. safely on bearings 3 ft. apart.

A rod of the same dimensions bent with 28 lb., and a similar concrete bar broke when the weight exceeded 3 cwt.

We agree with you that it would have added to the value of the exhibit had the iron rod been shown in section.

W. B. WILKINSON & CO.

## WINDOW FITTINGS.

SIR,—May I ask through your widely-circulated columns the best way of fitting windows so as to keep out noise? I have much work to do. I am a new arrival, and find the noise interferes greatly with my work.

The nuisance must be felt by so many, surely there are some fittings adapted successfully to cope with this evil.

D. BENNETT.

\*\*\* A new sash-faster, of which an illustration will appear in our columns next week, may do something towards answering our correspondent's question, by way of keeping sashes tighter. But the only effective manner of lessening the transmission of noise from outside is double glazing, with a space between the two sheets of glass, or double sash-frames. It is through the glass that the noise comes; glass of ordinary thickness allows a great deal of sound to pass.

## THE NUISANCE FROM SEWER VENTILATORS.

SIR,—Another instance of the utter uselessness of stack-pipes as a means of ventilation to sewers came under my notice yesterday, which may interest your readers.

At Tottenham, many of the sewer ventilators being a nuisance, the Board, instead of putting up shafts, decided to make other alterations to abate the evil, and on taking up an offensive grating opposite Green-lanes Station, Wood-green, found that a brick ventilating pipe was already attached, running under the road some 30 ft., and carried up the chimney. According to theory, a current of air should be going up this pipe to relieve the sewer, but, in fact, the air was nearly stagnant,—if anything there was a downward current, but giving the appearance of a pipe choked. On testing, this pipe was found clear, but the portion running under the ground was filled with a sewer gas, heavier and of a lower temperature than that of the grating or atmosphere of the street. This acted like a plug or choke damp, preventing any ventilation taking place in the sewer, except through the grating. After rarefying the sewer gas in the inlet pipe, the smoke ascended the pipe similar to that of any ordinary chimney. Is it not natural that sewer ventilators should prove a nuisance during hot weather, when, by the action of sewer gas passing through these cold pipes, an effectual stoppage of ventilation takes place, and that at a time when good ventilation is most needed? In cold weather, when the air in pipes underground is warmer than that of the street, an uncertain current is set up, but in summer it is quite the reverse.

R. H. REEVES.

Putney, June 30th.

**Hamilton's Brush Manufactory,** 9 and 10, Greek-street, and 8, Rose-street, Soho-square, has just been removed to new premises, specially built for the purpose, at 96, Clerkenwell-road, E.C.

## The Student's Column.

## LAND SURVEYING AND LEVELLING.

## II.—THE CHAIN AND CHAINING.

**A** SURVEYOR has to select one of two kinds of chain which are commonly employed in the measurement of land, each divided into 100 links. The total length of the short chain is 66 ft., and of the long chain 100 ft. The former is called Gunter's chain from its inventor, the Rev. Edmund Gunter (1620 A.D.), and consists of 4 poles, or 23 yards (the usual length of a cricket-pitch), decimally divided into links. Each link, being one-hundredth part of 66 ft., will be equal in length to 7.92 in., but this fact is more interesting than useful, as any portion of a chain is invariably expressed in links. In Edward I.'s reign the statute acre was fixed at 160 square poles or perches. Hence, with the use of Gunter's chain, ten square chains equal one acre. When the 100-ft. chain is employed, the number of square chains has to be divided by  $\frac{1}{100}$ , or multiplied by its reciprocal .2295 to arrive at the acreage. Hence it will be seen that when acreage is required a considerable portion of the arithmetical work is saved with the use of Gunter's measurements. Having arrived at the area in square links, cut off five figures to the right-hand, and the figures to the left-hand will then express acres. To obtain rods and perches of the decimal portion of an acre indicated by the figures upon the right-hand of the decimal point, multiply first by 4 and then by 40.

At every tenth link from each end of a chain a piece of brass with notches or points is fixed to denote the number of the tens, that at ten links having one notch or point, at 20, two; at 30, three; and at 40, four points. At 50, or the centre of the chain, is a round plain piece of brass. The chain being thus marked as shown in figure 1, the links may be easily counted from either end, the tellers at 90, 80, &c., being respectively the same as that at 10, 20, &c., so that it is immaterial which end of the chain is placed at the zero point. Some chains have also a small brass ring midway between each tenth index, to show the fifth link, and thus to facilitate the reading of the unit measurements. Part of the first link at each end is made into a large ring or handle for holding the chain in the hand. This is shown in detail in fig. 2. The best chains have the links connected by three elliptical rings, by which means the chain is rendered very flexible, and the links are not so liable to twist or coil when the chain is folded up.

In folding up a chain the most expeditious plan is to roughly lay it out as in fig. 1; then take the



links nearest the 50 mark in one hand and fold the chain double, until the handles are reached, taking care so to cross the links which come next to one another in folding, that the body of the chain when folded, may be smaller in the middle than at the ends, as shown in the figure representing the chain folded up. A strap is first passed round the middle to bind the links together and is then passed through the handles together with the heads of the arrows and fastened by a buckle. When you wish to unfold the chain, having unstrapped the arrows, take both handles in one hand, and having freed the first two or three links, take the remainder of the chain in the other hand and throw it out from you taking care to keep hold of the handles. When thus thrown out upon the ground you must then straighten and adjust the links where necessary and close any of the connecting rings that may be open at the joints before proceeding to measure the base line.

Every chain is accompanied by ten arrows, each about 1 ft. in length, made of stout iron or steel wire, and pointed at the bottom. These are usually bent in a circular form at the top for convenience of handling, and a piece of red cloth is often attached to the ring of each, in order that they may be easily observed when fixed in the ground. When in use they may be best carried by attaching the buckle end of the strap, which is taken off the chain to the ring, or top of one arrow, and passing the strap through the rings of the remaining nine arrows from which they can be easily removed, one at a time, as required. The use of the arrow with the strap upon it will then indicate that the whole ten arrows have been employed in the measurement of any given base line.

### Books.

*A History of Berkshire.* By LIEUT.-COL. COOPER KING, F.G.S. London: Elliot Stock. 1887.

HIS is by no means the least excellent of an excellent series of "Popular County Histories"; dealing competently and pleasantly with the multitude of subjects which demand a place in a work of this kind, and avoiding in a marked degree the errors and questionable statements which are almost certain to be found where so vast a range of subjects are treated by a single hand. We must, however, repeat our grumble at the absence of a map, which would, at a slight additional expense, have made the reading of the work at once easier and more profitable.

A curious statement *appropos* of Ponghley Abbey, is made at p. 186, to wit, that some fragments of the abbey stained glass now at Prior's Court depict figures in the costume of the fourteenth century, as sitting in an ale-house "smoking." The abbey was dissolved by Wolsey, and either the glass in question was not brought thence, or Sir Walter Raleigh's importation of "the fragrant weed," had been anticipated. It is a point worth looking further into.

The working-man of to-day may, amidst his assumed hardships at the hands of capital, take comfort from the fact that his position is better than was that of his Medieval predecessor, who (p. 227), in the building of Eton College Chapel, was fined 2d. (5s.) for "chiding," for "telling tales," for "playing," and even for "looking about!" Under such laws how much of the modern artificer's wage would be left at the week's end?

Amongst the notable native to the Royal County,—and they are many,—the most notable is King Alfred, who was born at Wantage, and dying, left to his widow, *inter alia*, the Manor of Yattendon, where now another Alfred,—a king, too, in his way,—is lord.

This agreeable and well-written history is presented to the public with the artistic completeness and care which distinguish the work of the publisher, and we can say with a clear conscience that "no (Berkshire) gentleman's library is complete without it."

*The History of Streatham.* By FREDERICK ARNOLD, JUNIOR, F.R. Hist. Soc., F.S. Soc., Lond., &c. London: Elliot Stock. 1886.

THE author claims this to be "the first history of Streatham that has ever been published," although there are certain "historical sketches" of an inferior kind before the public. He has no doubt been diligent in making excerpts from county histories, parish registers, &c., and has

thrown them together into one thin volume. But as a book, in the proper sense of the word, it is "without form and void." What a state must that historian's mind be in who could write thus!—"The usual plan was to put up a rude representation of the deity in stone on some neighbouring hill, or on an artificial mound, which was called Tent's Hill, &c., and therefore my belief is that the mystic rites in connexion with this god Tentates, Tuisto, Thor, Tot, Tent, were probably carried on on some raised mound in our near neighbourhood, or the slight eminence overlooking Tooting, and that the name of Tooting was derived from this. But although this theory is very plausible, I think we must dismiss it as untenable. . . ."

It is said that history repeats itself: this History of Streatham certainly does; for the later chapters constantly serve up again,—sometimes in the same words,—the facts and fictions of the earlier ones. We protest against the familiarity which alludes to Dr. Johnson as "the great immortal Sam," and are not satisfied with such security as "an old writer," and "an old author," for "historical" statements. The illustrations, which are bad enough, are the best part of the book, which few but reviewers ("dreadful trade!") will, we imagine, have the patience to get through.

*Handbook of House Property and Fine Art.* By E. L. TARBUCK. Fourth edition enlarged. London: Crosby Lockwood & Co. 1887.

THE body of this work is too well known to professional readers to require description or recommendation. The new section on fine art,—added by particular request,—is of very questionable value, the views and opinions expressed being those of "a day that is gone." We find ourselves in almost total disagreement with it, and are far from admitting that the "present state of architectural art is extraordinarily retrogressive,"—that "the most skilful modern architects simply commit to memory the details of archaic styles," and repeat them, that they "fear to depart from precedents," rarely "dare to think for themselves," or that their art is reduced to "a mechanical routine." As to which we record our opinion that all this may once have been true, but that it is not true now. The artist was, we believe, never more free in the exercise of his skill than at present, and in the art of architecture we at least see plenty of signs of a vigorous vitality. This new section is a quite useless addition to an otherwise useful work, which was complete and various enough before, and dealt with subjects which could be taught by books. Skill in art cannot be so imparted.

The really competent artist can never say "how it is done," and those who write books to explain the secret fail because they themselves do not possess it.

*Drainage of Lands, Towns, and Buildings.* By G. D. DEMPSEY, C.E. Revised by D. KINNEAR CLARK, M. Inst. C.E. London: Crosby Lockwood & Co. 1887.

MR. CLARK has made some additions to two little volumes originally published by Weale in 1849, one on the drainage of land, the other on that of towns and buildings. These have been combined, and new matter has been contributed by Mr. Clark, amounting to one-half of the present volume. Some of the old sections have been omitted; the new ones embrace the subjects of Under-drainage, as exemplified in the experiments on the Hinxworth Estate; Rainfall and percolation; Reclamation of Hainault Forest; drainage of peat bogs in Ireland; Drainage in the Valley of the Po; Drainage of desert land in the South of France; Fen drainage; the St. Germain's sluice, &c. Also the general principles of the disposal of sewage, the main drainage of London, Brighton, Torquay, Paris, and the valley of the river Wandle; the drainage of Newport, Dundee, Hamburg, Abingdon, and Adelaide, with notices of sewage irrigation at Abingdon, the Wandle Valley, Abergavenny, and Adelaide. These are mostly taken from the Minutes of Proceedings of the Institution of Civil Engineers. It would seem to be somewhat difficult to graft new matter concerning the drainage of towns upon an old stock. With land drainage the case is different, but in towns the practice is not quite the same now as it was when Mr. Dempsey wrote upon it, and hence arise, in the present volume, inconsistencies such as that "a town on a hill top is the most readily and cheaply drained" (p. 182); whereas, p. 247, "so far from its being easy

to sewer such a town, if proper means are not taken to provide for ventilation, the engineer may leave the town worse than he found it." People knew very little about town drainage, whether on a hill or elsewhere, when the first of these remarks was made; the other one became necessary at a later time. With respect to house-drains, by the instruction of pp. 231 to 238 they are to have sufficient declivity and to be perfectly trapped at their upper ends, but nothing is said about their ventilation. The necessity, in fact, had not then been learned. There are some curious references to wells or receptacles for sewage to be placed in various parts of a town,—pp. 191, 207, 208,—apparently about half a mile apart, but more or less according to circumstances. What wells are these? The remarks seem to have no bearing on the subject. We suppose they refer to a plan which was proposed by Mr. Dempsey for the drainage of London, and perhaps of other towns, whereby the sewage would be collected at numerous stations or wells, and raised thence to higher levels; a plan which is similar in principle to Mr. Isaac Shone's, whereby the sewage is raised to higher levels by compressed air. Whether Mr. Dempsey's plan was ever seriously considered by the authorities who had to decide upon a plan for the drainage of London we do not know, but in the book now under notice the key to these remarks about wells, &c., has been withdrawn by omitting all mention of the plan itself, while the allusions to it have been left standing. The extraordinary calculations of the original author contained in pages 203 and 206 are founded upon very exceptional circumstances, and although it may have been of some use to state them forty years ago, it cannot be of any practical use to do so now. The case is very different with the new parts contributed by Mr. Clark, for these consist of descriptions of works designed since, as, for instance, those of London, Brighton, and Torquay by Sir Joseph Bazalgette; of Newport, in Monmouthshire, by Mr. A. Williams; of Dundee, by Mr. J. Fulton; of Hamburg, by Mr. W. Lindley; of the Wandle valley, by Mr. Baldwin Latham; of Abingdon, by Mr. J. Bailey Denton; of Abergavenny, by Messrs. Dudley and De Salis; and of Adelaide, by Mr. Oswald Brown. An extract from the Model By-laws issued by the Local Government Board is given as an appendix, being section IV. on "New Streets and Buildings."

### CHURCH-BUILDING NEWS.

*Birmingham.*—The foundation-stone of a new church for All Saints parish was lately laid by the High Sheriff of Warwickshire. The site is at the junction of Dover-street, Musgrave-street, and Park-road, Soho, and it is planned to accommodate a total of 565 persons. The building will consist of a nave and side aisles, chancel, and sanctuary. In connexion with the chancel on the south side will be the clergy and choir vestries, with a side approach out of Dover-street, and on the north side of the chancel an organ-chamber. The eastern bays of the aisles will be enlarged and projected to form transepts, and the west end of the south aisle will have an octagonal projection for a baptistery. A portion of the west end of the nave is to be screened off to serve as a lobby to the main entrance from Musgrave-street. On the north side, near the western extremity of the aisle, will be a porch giving access from Park-road; the walls of this porch will be planned for continuation upwards as a tower, though the erection of a tower is not, for lack of funds, included in the present undertaking. The building will be erected chiefly of brick, with stone dressings to sills, tracery, copings, columns, corbels, and where else necessary; the external stonework being chiefly from the Codsall quarries, and the stone used internally from Corsham Down, near Bath, Greshill, near Shrewsbury, and Bromsgrove. The internal walling will be faced with pressed buff-coloured bricks, with moulded brick arches and strings. The nave is of six bays, and will be open-timbered, with framed and ribbed principals of Baltic fir, plastered and coloured between the rafters (except to the chancel, which will be boarded), and covered with Bangor Countess slates. The building will be of an early Gothic type of design, and, funds being limited, the architect has, for effect, relied more upon good lines and dignified proportions than upon elaboration of details. The following are engaged upon it:—



Contractor, Mr. Fell, Leamington, the contract amount being 4,707l.; contractor's foreman, Mr. Jenkins; clerk of works, Mr. Amos Jones. The architect from whose drawings and under whose general directions the building is being carried out, is Mr. John Cotton.

**Cwm-dare.**—A few days since the Bishop of Llandaff attended at Cwm-dare for the purpose of opening St. Luke's Church, recently erected there on a site given by Mr. J. P. Wynne-Holford, Buckland. The church, which was designed by Mr. Bruce Vaughan, architect, Cardiff, is in the Early English style, and is built of white bricks, with Bath stone dressings. The whole of the work has been carried out by Mr. Edward Lumley, of Morthyr Tydfil.

**Pembroke.**—The parish church of St. Michael, Pembroke, was re-opened on the 14th ult., after a complete re-casting of the body of the church, which was rebuilt some eighty or ninety years ago and was about 40 ft. wide and covered with a tie-beam roof and flat plastered ceiling. Opportunity has been taken of the walls being opened to create two naves of equal width, the north being a restoration of the fourteenth century one, the foundations of which were discovered in forming those of the arcade piers. A new chancel has been formed of its eastern portion. Two new porches have been built and other improvements effected, the total cost being 1,800l., the contractor being Mr. H. Edwards, of Milford, and the architect Mr. E. H. Lingen Barker, of Hereford.

### RECENT PATENTS.

#### ABSTRACTS OF SPECIFICATIONS.

9,362, Window-sashes. W. S. Simpson.

In order to allow of the top sash being lowered for ventilation, a rack handle is, by this invention, fitted so as to engage either with the top stile of the lower sash, or with projections formed for it. Provision is made for the employment of Young's "Hold-fast fastener" when the top sash is raised or lowered by means of cords.

9,608, Pneumatic Door Checks. G. F. Newman.

The novelty of this invention consists in making one end or the back end of a door-check turn upon a side joint or an arm or pivot working within the side bearing of a bracket lying out of the axial line of the barrel of the appliance.

9,750, Raising and Lowering Windows. J. C. Tait and T. W. Carlton.

This invention has reference to sliding sashes or windows, and the window rests upon a sliding bar or support, which depends upon two spring barrels or drums which are partly enclosed within the garnish rail of the door or window. An inwardly projecting piece or strip serves to exclude the draught and dust from the room or space closed by the window.

10,960, Material for Removing Old Paint. M. Benedictus (Brussels).

The material which is the subject of this invention is laid on to woodwork by a brush or spatula. It is claimed that it has, in the course of an hour or so, such action that the paint can be readily sponged off with water, leaving the surface clean. It is a pasty substance in which caustic soda and caustic potash plays the principal part, and it is claimed that this composition will entirely supersede mechanical scraping or burning off paint.

11,087, Fireplaces and Boilers. W. Smith.

The object of this invention is to construct a fireplace so as to receive a boiler which can readily be removed for repairs without inconveniently interfering with the use of the fireplace. The fireplace back is made of chair-like shape. When the boiler is placed in position, it is enclosed within the space made to receive it by a top front plate, and the circulating pipes are connected to the boiler in the usual way. When repairs are required, or in very frosty weather, the plates are removed, and the boiler uncoupled from the circulating pipes and taken out. The fireplace can then be used without the boiler, while it is being repaired or is out of its place.

8,803, Encaustic Tiles. F. J. Frenkel.

For the better production of artistic patterns, improvements in the successive processes of manufacture are introduced by this invention, which consists in making encaustic tiles in helio-relief by first making a diaphanous intaglio of the design, producing a positive matrix therefrom, pressing the same in the face of the tile so as to produce a relief thereon, coating the tile with a layer of enamel or glaze; and lastly, burning or drying the said tile.

5,723, Building Materials from Glass. G. Falconer (Nyon, Switzerland).

The idea of this invention is to use blocks of blown glass, built up as bricks, for facing walls of bathrooms and other parts of dwellings. The bricks are

made like ordinary bottles, of different shapes and colours. It is claimed that they are light and cheap, and that the layer of air which they contain is a good preservative against either cold or heat.

#### NEW APPLICATIONS FOR PATENTS.

June 24.—8,981, C. Wilson, Unextractible Screws.—9,002, A. Belchambers, Construction of Chandeliers.

June 25.—9,034, R. Whiston, Combined Sash Lift and Automatic Sash Fastener.—9,039, F. Naumann, Faced Bricks.—9,074, W. Cooper, Making, Finishing, and Drying Stoneware Sanitary Pipes, &c.

June 27.—9,034, J. Warburton, Preventing the Escape of Gases from Sewers, Drains, and Water-closets.—9,099, T. Weston, Wood Screw.—9,122, J. Lowe, White Lead.

June 28.—9,140, S. Hazeland, Machinery for Planing Wood.—9,172, L. Sagenord, Machines for Making Metallic Roofing.

June 29.—9,245, H. Dodd, Flushing Apparatus for Sanitary purposes.—9,246, W. Thompson, Apparatus for Ventilation and Air Moistening.

June 30.—9,287, J. Wilson, Spring Hinges.—H. Bash, Combination Lamp and Blow Pipes for Gaslights.

#### PROVISIONAL SPECIFICATIONS ACCEPTED.

12,514, T. Lane, Window-sash Fasteners.—7,252, J. Collings and H. Hicks, "Formers" for Plastic Brick Manufacture.—7,356, J. Armstrong, Glass Glazing.—7,496, E. Olander, Construction of Trough Gutters for Floors of Bridges and other Structures, &c.—8,219, R. Garner, Self-flushing Water-Closet.—8,460, R. Low, Dorelating Machines.

#### COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

8,310, J. Janka, Spray Ventilators.—10,730, E. Brinkmann, Fillets for Decorative Purposes.—10,336, J. Stow, Screw Fasteners for Windows.—10,920, F. Henson, Door-bolts.—11,086, J. Gschottbauer, Portable Buildings.—7,524, H. Lake, Manufacture of Paint.—7,539, A. Smith and Others, Portland Cement.—8,586, J. Price and J. Wayne, Fire-grates.—9,225, J. ParLOUR, "Workman's Daily Food-carrier."—11,220, G. and J. Falter, Levelling Instrument and Cinometer.

### RECENT SALES OF PROPERTY.

#### ESTATE EXCHANGE REPORT.

JUNE 27.

By R. REID.

Pentonville—7, 9, and 21 to 33 odd, Winchester, freehold, and 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391, 393, 395, 397, 399, 401, 403, 405, 407, 409, 411, 413, 415, 417, 419, 421, 423, 425, 427, 429, 431, 433, 435, 437, 439, 441, 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1867, 1869, 1871, 1873, 1875, 1877, 1879, 1881, 1883, 1885, 1887, 1889, 1891, 1893, 1895, 1897, 1899, 1901, 1903, 1905, 1907, 1909, 1911, 1913, 1915, 1917, 1919, 1921, 1923, 1925, 1927, 1929, 1931, 1933, 1935, 1937, 1939, 1941, 1943, 1945, 1947, 1949, 1951, 1953, 1955, 1957, 1959, 1961, 1963, 1965, 1967, 1969, 1971, 1973, 1975, 1977, 1979, 1981, 1983, 1985, 1987, 1989, 1991, 1993, 1995, 1997, 1999, 2001, 2003, 2005, 2007, 2009, 2011, 2013, 2015, 2017, 2019, 2021, 2023, 2025, 2027, 2029, 2031, 2033, 2035, 2037, 2039, 2041, 2043, 2045, 2047, 2049, 2051, 2053, 2055, 2057, 2059, 2061, 2063, 2065, 2067, 2069, 2071, 2073, 2075, 2077, 2079, 2081, 2083, 2085, 2087, 2089, 2091, 2093, 2095, 2097, 2099, 2101, 2103, 2105, 2107, 2109, 2111, 2113, 2115, 2117, 2119, 2121, 2123, 2125, 2127, 2129, 2131, 2133, 2135, 2137, 2139, 2141, 2143, 2145, 2147, 2149, 2151, 2153, 2155, 2157, 2159, 2161, 2163, 2165, 2167, 2169, 2171, 2173, 2175, 2177, 2179, 2181, 2183, 2185, 2187, 2189, 2191, 2193, 2195, 2197, 2199, 2201, 2203, 2205, 2207, 2209, 2211, 2213, 2215, 2217, 2219, 2221, 2223, 2225, 2227, 2229, 2231, 2233, 2235, 2237, 2239, 2241, 2243, 2245, 2247, 2249, 2251, 2253, 2255, 2257, 2259, 2261, 2263, 2265, 2267, 2269, 2271, 2273, 2275, 2277, 2279, 2281, 2283, 2285, 2287, 2289, 2291, 2293, 2295, 2297, 2299, 2301, 2303, 2305, 2307, 2309, 2311, 2313, 2315, 2317, 2319, 2321, 2323, 2325, 2327, 2329, 2331, 2333, 2335, 2337, 2339, 2341, 2343, 2345, 2347, 2349, 2351, 2353, 2355, 2357, 2359, 2361, 2363, 2365, 2367, 2369, 2371, 2373, 2375, 2377, 2379, 2381, 2383, 2385, 2387, 2389, 2391, 2393, 2395, 2397, 2399, 2401, 2403, 2405, 2407, 2409, 2411, 2413, 2415, 2417, 2419, 2421, 2423, 2425, 2427, 2429, 2431, 2433, 2435, 2437, 2439, 2441, 2443, 2445, 2447, 2449, 2451, 2453, 2455, 2457, 2459, 2461, 2463, 2465, 2467, 2469, 2471, 2473, 2475, 2477, 2479, 2481, 2483, 2485, 2487, 2489, 2491, 2493, 2495, 2497, 2499, 2501, 2503, 2505, 2507, 2509, 2511, 2513, 2515, 2517, 2519, 2521, 2523, 2525, 2527, 2529, 2531, 2533, 2535, 2537, 2539, 2541, 2543, 2545, 2547, 2549, 2551, 2553, 2555, 2557, 2559, 2561, 2563, 2565, 2567, 2569, 2571, 2573, 2575, 2577, 2579, 2581, 2583, 2585, 2587, 2589, 2591, 2593, 2595, 2597, 2599, 2601, 2603, 2605, 2607, 2609, 2611, 2613, 2615, 2617, 2619, 2621, 2623, 2625, 2627, 2629, 2631, 2633, 2635, 2637, 2639, 2641, 2643, 2645, 2647, 2649, 2651, 2653, 2655, 2657, 2659, 2661, 2663, 2665, 2667, 2669, 2671, 2673, 2675, 2677, 2679, 2681, 2683, 2685, 2687, 2689, 2691, 2693, 2695, 2697, 2699, 2701, 2703, 2705, 2707, 2709, 2711, 2713, 2715, 2717, 2719, 2721, 2723, 2725, 2727, 2729, 2731, 2733, 2735, 2737, 2739, 2741, 2743, 2745, 2747, 2749, 2751, 2753, 2755, 2757, 2759, 2761, 2763, 2765, 2767, 2769, 2771, 2773, 2775, 2777, 2779, 2781, 2783, 2785, 2787, 2789, 2791, 2793, 2795, 2797, 2799, 2801, 2803, 2805, 2807, 2809, 2811, 2813, 2815, 2817, 2819, 2821, 2823, 2825, 2827, 2829, 2831, 2833, 2835, 2837, 2839, 2841, 2843, 2845, 2847, 2849, 2851, 2853, 2855, 2857, 2859, 2861, 2863, 2865, 2867, 2869, 2871, 2873, 2875, 2877, 2879, 2881, 2883, 2885, 2887, 2889, 2891, 2893, 2895, 2897, 2899, 2901, 2903, 2905, 2907, 2909, 2911, 2913, 2915, 2917, 2919, 2921, 2923, 2925, 2927, 2929, 2931, 2933, 2935, 2937, 2939, 2941, 2943, 2945, 2947, 2949, 2951, 2953, 2955, 2957, 2959, 2961, 2963, 2965, 2967, 2969, 2971, 2973, 2975, 2977, 2979, 2981, 2983, 2985, 2987, 2989, 2991, 2993, 2995, 2997, 2999, 3001, 3003, 3005, 3007, 3009, 3011, 3013, 3015, 3017, 3019, 3021, 3023, 3025, 3027, 3029, 3031, 3033, 3035, 3037, 3039, 3041, 3043, 3045, 3047, 3049, 3051, 3053, 3055, 3057, 3059, 3061, 3063, 3065, 3067, 3069, 3071, 3073, 3075, 3077, 3079, 3081, 3083, 3085, 3087, 3089, 3091, 3093, 3095, 3097, 3099, 3101, 3103, 3105, 3107, 3109, 3111, 3113, 3115, 3117, 3119, 3121, 3123, 3125, 3127, 3129, 3131, 3133, 3135, 3137, 3139, 3141, 3143, 3145, 3147, 3149, 3151, 3153, 3155, 3157, 3159, 3161, 3163, 3165, 3167, 3169, 3171, 3173, 3175, 3177, 3179, 3181, 3183, 3185, 3187, 3189, 3191, 3193, 3195, 3197, 3199, 3201, 3203, 3205, 3207, 3209, 3211, 3213, 3215, 3217, 3219, 3221, 3223, 3225, 3227, 3229, 3231, 3233, 3235, 3237, 3239, 3241, 3243, 3245, 3247, 3249, 3251, 3253, 3255, 3257, 3259, 3261, 3263, 3265, 3267, 3269, 3271



By Messrs. CHADWICK.	
Paddington Green—Nos. 11 and 12, freehold.....	£2,450
8, Woodfield-terrace, 36 years, ground-rent 8s. 13s. ....	470
3 and 4, Highbury-street, 72 years, ground-rent 12s. 10s. ....	800
Notting Hill 15, Richmond-terrace, 70 years, ground-rent 6s. 6s. ....	165
Vauxhall Walk—Nos. 132 to 138 even, copyhold ..	1,010
Wimbledon, Goodenough-street, two plots of land, 94 years, ground-rent 68s. 10s. ....	883
Newton-road—A plot of freehold land.....	400

## JULY 1.

By WYER, FARMER, & ADAMS.	
Mill End—Profit rental of 3s. a year, with short reversion, term 56 years.....	580
2 and 4, Longport-road, 77 years, ground-rent 7s. Kentish Town—47, Rochester-road, 56 years, ground-rent 6s. ....	420
Thames Ditton—6, Admirals-row, freehold.....	120

## By A. SRIAN.

Barking-road—20, Woodstock-street, 74 years, ground-rent 3s. 10s. ....	330
Hackney-road—56, Teasdale-street, 11 years, ground-rent 3s. ....	75

## By G. J. EYREMAN &amp; CO.

Upper Norwood—111, Belvedere-road, long leasehold, ground-rent 6s. ....	270
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## By G. G. FLINT.

St. John's Wood—Ground-rent of 160l., reversion in 34 years.....	2,910
Ground-rent of 20l., reversion in 63 years.....	520
Ground-rent of 2 l., reversion in 63 years.....	510

## HUMBERT, SOY, &amp; FLINT.

Isleworth—The Infirmary, Thorpe House, and 3 acres, freehold.....	3,650
Two enclosures of freehold land, 7a. 0r. 29p. ....	4,000

## By BROAD &amp; WILTSCHKE.

Battersea—Ground-rents of 165l., reversion in 85 years.....	4,330
Ground-rents of 80l., reversion in 77 years.....	2,490
Upper Teddington—Ground-rents of 35l., reversion in 93 years.....	765
Ground-rents of 18l. 18s., reversion in 83 years.....	386
Ground-rents of 14l., reversion in 93 years.....	290

## By NEWSON &amp; HARDING.

Islington—31, Compton-terrace, 29 years, ground-rent 6s. ....	600
Canonbury—39, Clephane-road, 56 years, ground-rent 14s. ....	225
Stamford Hill—2, 3, and 4, Grange Court-road, 88 years, ground-rent 12s. ....	1,000
Stoke Newington—16, Woodlee-road, 86 years, ground-rent 6s. 10s. ....	225
72, 76, 78, and 80, Lordship-road, 66 years, ground-rent 32s. ....	1,110
Highbury—73 and 75, Highbury Quadrant, 62 years, ground-rent 15s. ....	810
Stratford, Main-road—House and shop, 8 years, ground-rent 3s. 10s. ....	51

## By FARRER, ELLIS, &amp; CO.

Peckham—Improved ground-rents of 26l. 15s., term 69 years.....	470
Pimlico—46 and 48, Lupus-street, 40 years, ground-rent 22s. ....	1,500
76 and 78, Lupus-street, 50 years, ground-rent 21s. ....	1,505
17, Luce-gate, 46 years, ground-rent 12s. ....	895
25, 27, and 29, Cambridge-terrace, 46 years, ground-rent 22s. 10s. ....	1,205
65, Cambridge-terrace, 46 years, ground-rent 9s. ....	410
South Belgrave—129, St. George's-road, 44 years, ground-rent 14s. ....	1,100
Knightbridge—An improved rent of 5l. term 10 years.....	21
Teddington—An enclosure of land, 6a. 3r. 3p., freehold.....	2,060
A plot of freehold land.....	200
1, St. Mary's Villa, freehold.....	500
Ground-rent of 18s., reversion in 91 years.....	470

## MEETINGS.

TUESDAY, JULY 12.

Glasgow Architectural Association.—Visit to Govan Church. 5.15 p.m.

THURSDAY, JULY 14.

Sanitary Institute of Great Britain.—Anniversary Meeting at Parkes Museum. Presentation of Prizes by Sir Douglas Galton, F.R.S., and address by Dr. G. V. Poore on "The Shortcomings of Some Modern Methods of Sanitation." 3 p.m. Anniversary Dinner, Holborn Restaurant. Professor W. H. Corfield, M.A., M.D., in the chair. 7 p.m.

Association of Municipal and Sanitary Engineers and Surveyors.—Annual Meeting at Leicester, 11 a.m. Address by the President, and papers by Mr. G. R. Strachan and Mr. C. Jones. Visits.

FRIDAY, JULY 15.

Association of Municipal and Sanitary Engineers and Surveyors.—Annual Meeting at Leicester. (Second day.) Papers by Mr. R. W. Peregrine Birch, Mr. W. Eassie, and Mr. W. Jennings. Visits.

SATURDAY, JULY 16.

Architectural Association.—Visits to Sutton Place, near Guildford, and Looeey Park. (See advertisement on p. 1.)

Association of Municipal and Sanitary Engineers and Surveyors.—Annual Meeting at Leicester. (Third day.) Visits.

## Miscellaneous.

**Surveyorship Appointment.**—On the 14th of last month Mr. Albert D. Grestorox was elected to the appointment of Assistant District Surveyor for the Northern Division of Manchester. Mr. Grestorox was assistant with Mr. John Price, Assoc. M. Inst. C.E., Engineer and Surveyor to the Toxteth Park Local Board, and with whom he served his pupils. There were forty candidates.

## Association of Municipal and Sanitary Engineers and Surveyors.

The annual meeting of this Association is to be held in Leicester, on Thursday, Friday, and Saturday next, July 14th, 15th, and 16th. The business will begin with a council meeting in the committee-room, Town-hall, Leicester, followed by the annual meeting of members and reception by the Mayor. The President will deliver an address, and this will be followed by papers and discussions. The papers will include "Concrete Cement and Asphalt Footways," by Mr. G. R. Strachan, A. Inst. C.E.; and "Refuse Destructors and their Results up to the present time," by Mr. C. Jones, A. Inst. C.E. In the afternoon members will visit various places of interest and works in the town, and the annual dinner will take place at the Masonic Hall, Halford-street, at 6.30 p.m. On Friday the members will again meet in the council-chamber for reading and discussion of the following papers:—"An Examination of the Experiments of Mr. W. F. Dibdin, F.C.S., F.I.C., for the Metropolitan Board of Works on Sewage Treatment." By Mr. R. W. Peregrine Birch, M.I.C.E., F.G.S., &c.; "On Crematories," by Mr. W. Eassie, &c.; "Description of Jennings' and Brewer's Automatic Sewage and Water Gauge," by Mr. W. Jennings. In the afternoon the members will visit various works recently executed and in progress in the borough, such as:—1. New Weir and Flood Basins, Freeman's Meadow, Ayleston-road; 2. New Gas Tanks now in progress, and Chemical Works recently completed, Ayleston-road Gas Works, under Mr. Colson, Gas Engineer and Manager. 3. New Building Estate, Spinney Hill. 4. Spinney Hill Park; 5. New Sewerage Works, Belgrave-road; 6. Abbey Park; 7. Open-air Swimming Bath at St. Margaret's Pasture; 8. Flood Works from North Lock to Branstone Gate. In the evening there will be a garden fête at Ashleigh, Knighton, the residence of His Worship the Mayor, Ald. Hart, J.P. The last day of the meeting, Saturday, July 16th, will be wholly occupied by visits to, among other places, the Victoria Stone Company's Works at Groby, where Mr. Griffiths, the lessee, will receive them; the Bradgate Reservoir and Pumping Station, by way of Bradgate Park and Ruins (by kind permission of Lady Stamford); the Mount Sorrel Granite Quarries; and the Barrow Hydraulic Lime Works of Messrs. John Ellis & Sons.

## Sales of Building Sites at Wanstead, Oxted, and Stevenage.

On Monday evening Messrs. Protheroe & Morris offered for sale at the Cuckfield Arms, High-street, Wanstead, 64 plots of building land, situated respectively in the main High road, Nightingale-lane, Cambridge Park-road, and Addison and Dangan roads. There was a very large number of buyers present, and there was a spirited competition for all the lots offered. Eight of the sites in the main road are intended for shops. They have frontages of 18 ft. by a depth of 100 ft., and were all sold at prices varying from £200 to £205 each, being rather more than £11 per ft. frontage. The plots in Nightingale-lane, intended for private houses, and having frontages of 19 ft. and depths of from 100 ft. to 109 ft., were also sold at from £65 to £70 per plot. The frontages of the plots in Cambridge Park-road, Addison-road, and Dangan-road, varied from 35 ft. to 16 ft., and depths of from 100 ft. to 160 ft., and, with a few exceptions, were all sold at from £48 to £60 each.—On Tuesday, Messrs. Baker & Sons submitted for sale at the Hoskins Arms Hotel, Oxted, 62 plots, being the second portion of the Barrow Green Estate at Oxted. Most of the plots offered have frontages of 18 ft. and 20 ft., and depths of about 120 ft., some larger plots having frontages of 40 and 50 ft., and depths of from 140 to 170 ft. They were all offered for unreserved sale, the smaller plots being sold at from £10 to £15 each, and the larger ones at from £20 to £28 each.—Last week Messrs. Baker also offered for sale 91 plots at Stevenage, near Hitchin, being the second portion of the Stevenage Station Estate. The sale took place in a marquee on the ground, when every plot was rapidly sold at from £9 to £16 each, the frontages varying from 14 ft. to 16 ft. each.

## Technical College, Finsbury.

The third "Students' Conversations" will take place on Friday evening next, when, in addition to concerts, exhibitions, &c., Prof. Ayrton, F.R.S., and Prof. Meldola, F.R.S., will give popular lectures.

## Last Week's Disaster at Walworth.

Mr. Wyatt, the deputy coroner for East Surrey, held an inquiry at Walworth on the bodies of Charles Draper, aged 24, of 97, Orb-street, Walworth, and William Stimpson, of 14, Wood-street, Lambeth Walk, who were killed by the falling of a wall on Thursday morning in last week, at the premises of Mr. Richard Wood, iron and steel merchant, Brandon-street, Walworth. Mr. Wood spoke to hearing on the morning in question a rumbling of iron, and looking up he saw a stack falling, and the other stacks followed. The deceased man, Draper, who was an assistant employed by the firm, the deceased man Stimpson, who was a customer, and an employé named Shewell, were in the "walk." Building operations were going on at a hall adjoining his premises, but he had had no notice of them. He estimated the total weight of the iron that fell at 200 tons. Mr. George Lansdowne, District Surveyor, gave it as his opinion that the wall was knocked down by the iron falling. He did not think that the excavation for the cellar in the adjoining premises had anything to do with the fall of the wall. The jury returned a verdict of "accidental death" in both cases.

## Lectern, Burton-on-Trent.

A brass eagle lectern has just been placed in Holy Trinity Church as a Jubilee gift from the maltsters of Burton. It consists of a very massive base and stem, the lower part of which is richly ornamented with tracery and supported by massive lion feet; the eagle is chased, and has been modelled from nature. The base bears the following inscription:—"For the Honour of the Word of God: presented by the Maltsters of Burton-on-Trent. In the Fiftieth year of the Reign of our Sovereign Lady Queen Victoria." It is from the design of Mr. J. O. Scott, and manufactured by T. Potter & Sons, who made a similar one a few years ago for Frant Church, Sussex.

## Approaching Sales.

A number of freehold properties, lying in a justly-favourite part of Surrey, will be sold at the Mart on the 13th of July current. The several lots are situated in the parishes of St. Mary and Holy Trinity, Guildford; in Godalming, Hascombe, Cranley, Ewhurst, Shalford, and Bramley, comprising an aggregate of more than 1,000 acres. These are divided into certain farms and homesteads, together with plantations and woodlands, in the valleys and along the hills in the neighbourhood of Godalming and Guildford. Some parcels of ground at Shalford, near to the common, will also be sold as building and accommodation lands.

## Wedgesbury.

Brunswick Park, which has just been completed at a cost of 6,000l. from the designs of Messrs. William Barron & Son, Elvaston Nurseries, Borrowash, Derby, has just been formally opened by the Mayor of Wednesbury (Alderman Williams). Messrs. Barron were assisted in their design for the lodge by Mr. W. H. Radford, architect, of Nottingham. The park is about twenty-five acres in extent, and is finely undulated. A commanding mound 50 ft. in height, which was formerly a most unsightly pit-hill, has been very effectively treated. Two lakes have been constructed, and a cricket-ground, tennis-lawns, bowling-greens, band-stands, shelters, &c., provided.

## Sanitary Institute of Great Britain.

The anniversary meeting of this Institute will be held on Thursday next, July 14th, at three p.m., when the chair will be taken by Sir Douglas Galton, K.C.B., D.C.L., F.R.S., who will present the medals and certificates awarded to the exhibitors at the Exhibition held at York. An address will be delivered by Dr. G. V. Poore, entitled "The shortcomings of some modern methods of Sanitation." The annual dinner will be held the same evening at the Holborn Restaurant.

## Regenerative Gas Lamps.

Last week, Mr. Justice Kekewich was occupied for three days in trying an action which the Wenham Lamp Company, Limited, had brought against Messrs. May & Co., the manufacturers of the "Regent regenerative lamp," for an infringement of their patent. Several scientific witnesses were called, and, in the result, his lordship granted the injunction applied for, with damages and costs against the defendants.

## Wanstead Flats.

Mainly by the exertions of Major Mackenzie, a notable alteration is effected in the area known as Wanstead Flats. A large gang of men have been employed in trenching and draining the ground, and in planting a vast number of trees.



**Obituary.**—Mr. Arthur Hayball, of Sheffield, died suddenly on the 27th of June. He was one of the early pupils of the Sheffield School of Design, since known as the "School of Art." Born in 1823, the son of a local builder, at a very early age he showed considerable aptitude in modelling and carving. In 1844 he became a pupil at the School of Design, and in 1851 he exhibited a carved cabinet, Italian in style, in the Great Exhibition in Hyde Park. This cabinet, which gained for the exhibitor a medal, was figured in the *Art Journal's* Illustrated Catalogue of the Exhibition. His works are very numerous, his altars, roodsees, stalls, pulpits, screens, &c., being scattered in churches all over England, Ireland, and Scotland. Mr. Harry Hems, of Exeter, was his first apprentice.

"**Wood Block Flooring.**"—Referring to the paragraph under the above heading, on p. 49 of our last issue, we are asked to say that the "Wood Block Flooring Co.," of which Mr. A. E. Geary is manager, is not a limited liability company, as inadvertently stated.

### PRICES CURRENT OF MATERIALS.

TIMBER.		£. s. d.	£. s. d.
Greenheart, B.G. ....	ton	5 10 0	7 10 0
Teak, B.I. ....	load	8 0 0	12 0 0
Sesquia, U.S. ....	foot cube	0 2 3	0 3 0
Ash, Canada ....	load	3 0 0	4 10 0
Birch ....	load	2 0 0	3 10 0
Elm ....	load	3 10 0	4 10 0
Fir, Danish, &c. ....	load	1 10 0	4 0 0
Oak ....	load	2 10 0	4 10 0
Canada ....	load	3 0 0	6 0 0
Pine, Canada red ....	load	2 0 0	3 10 0
" " yellow ....	load	2 10 0	4 10 0
Lath, Danish ....	ashom	8 0 0	0 0 0
St. Petersburg ....	ashom	4 0 0	5 10 0
Wainscot, Riga ....	log	0 0 0	0 0 0
" Odessa, crown ....	log	8 0 0	13 0 0
Deals, Finland, 2nd and 1st, std. 100	log	7 0 0	8 0 0
" 4th and 3rd ....	log	5 10 0	6 10 0
Riga ....	log	5 10 0	7 0 0
St. Petersburg, 1st white, std. 100	log	8 0 0	13 0 0
" 2nd ....	log	7 0 0	8 0 0
" white ....	log	6 10 0	8 10 0
Swedish ....	log	2 15 0	8 0 0
White Sea ....	log	7 0 0	18 0 0
Canada, Pine, 1st ....	log	18 0 0	24 0 0
" 2nd ....	log	10 0 0	15 0 0
" 3rd, &c. ....	log	6 0 0	9 0 0
" Spruce, 1st ....	log	8 0 0	9 0 0
" 3rd and 2nd ....	log	5 0 0	7 0 0
New Brunswick, &c. ....	log	5 0 0	6 10 0
Battens, all kinds ....	log	4 0 0	10 10 0
Flooring Boards, eq. 1 in., prepared, first ....	log	0 8 0	0 11 0
Second ....	log	0 6 0	0 7 8
Other qualities ....	log	0 0 0	0 0 0
Cedar, Cuba ....	foot	0 0 3	0 0 3
Honduras, &c. ....	foot	0 0 3	0 0 3
Australas ....	foot	0 0 2	0 0 3
Mahogany, Cuba ....	foot	0 0 4	0 0 7
St. Domingo, cargo average ....	foot	0 0 4	0 0 6
Mahogany, Mexican, cargo av. ....	foot	0 0 3	0 0 4
Tobacco ....	foot	0 0 0	0 0 0
Honduras ....	foot	0 0 3	0 0 5
Maple, Bird's-eye ....	foot	0 0 6	0 0 8
Bone, Rio ....	foot	8 0 0	11 0 0
Bahia ....	foot	8 0 0	11 0 0
Box, Turkey ....	foot	6 0 0	12 0 0
Satin, St. Domingo ....	foot	0 0 5	0 0 9
Porto Rico ....	foot	0 0 2	0 0 10
Walnut, Italian ....	foot	0 0 3	0 0 5

### METALS.

IRON—Bar, Welsh, in London, ton	4 7 8	4 15 0
" " in Wales, ton	4 2 8	4 7 8
" Staffordshire, London	5 10 0	6 0 0
Sheets, single, in London	6 15 0	8 10 0
Hope	6 0 0	7 0 0
Nail-roads	6 15 0	8 10 0
COPPER—		
British, cake and ingot, ton	43 0 0	44 0 0
Best selected	45 0 0	45 10 0
Sheets, strong	80 0 0	0 0 0
Chili, bars	39 15 0	40 2 6
YELLOW METAL	0 0 0	0 0 0
LEAD—		
Pig, Spanish, ton	11 18 9	0 0 0
English, common brands, ton	12 7 6	0 0 0
Sheet, English	13 9 3	13 8 9
CRUISE—		
Silesian, special, ton	14 13 6	14 15 0
Ordinary brands, ton	14 10 0	14 12 6
TIN—		
Straits, ton	102 17 6	0 0 0
Australas, ton	103 7 6	0 0 0
English ingots	108 0 0	0 0 0
ZINC—		
English sheet, ton	0 0 0	0 0 0

### OILS.

Linseed, ton	21 15 0	22 0 0
Cocoon, Cochiti, ton	30 0 0	33 0 0
Ceylon, ton	24 5 0	0 0 0
Palm, Lagos, ton	21 10 0	0 0 0
Stapseed, English pale, ton	24 0 0	0 0 0
" brown, ton	22 10 0	0 0 0
Cottonseed, refined, ton	21 15 0	22 10 0
Tallow and Oleine, ton	25 0 0	45 0 0
Lubricating, U.S., ton	5 0 0	8 0 0
" refined, ton	5 0 0	12 0 0
TURPENTINE—		
American, in casks, cwt.	1 7 0	1 7 3
TAR—		
Stockholm, barrel	0 14 0	0 14 8
Archangel, barrel	0 9 6	0 10 0

## COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

### COMPETITIONS.

Nature of Work.	By whom required.	From.	Designs to be delivered.	Page.
Local Board Offices .....	East Grinstead Loc. Bd.	St. Gs. ....	August 1st	i.

### CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Pointing Chimneys and Repairing Roofs .....	Guardians, St. Matthew, Bethnal Green .....	T. & W. Stone .....	July 12th	ii.
Reservoir Works .....	Duxton Local Board .....	J. Hogue .....	do.	ii.
Widening Portions of Green Lanes .....	Tottenham Local Board .....	W. A. H. De Pape .....	do.	ii.
Cleansing, Painting, &c. ....	Chelsea Guardians .....	A. & C. Harston .....	July 13th	ii.
Firewood .....	Hendon Union .....	Official .....	do.	ii.
New Passenger Station, Hampstead .....	L. & N. W. Rail. Co. ....	C. J. Dawson .....	July 14th	ii.
Two small Road Bridges, Sewers, &c. ....	Barking Town Local Bd. ....	R. Bennett .....	do.	ii.
Repairs and Alterations, New Oxford-street .....	do. ....	Official .....	July 16th	ii.
Asphalte Footway Pavement .....	Com. of Sewers .....	do. ....	do.	ii.
Stables, Lambeth .....	do. ....	J. Clever .....	July 18th	ii.
Roads and Sewers, West Ham .....	Nat. Standard Land Co. ....	T. de Courcy Meade .....	do.	ii.
Cast-iron Manhole Covers .....	Hornsey Local Board .....	do. ....	do.	ii.
Sewering and Paving Works, &c. ....	do. ....	do. ....	do.	ii.
Additions to Station .....	L. B. & S. C. Ry. Co. ....	F. D. Banister .....	do.	ii.
Additional Buildings, &c., Homerton .....	Met. Asylums Board .....	A. & C. Harston .....	do.	ii.
Iron Roof, Blackwall .....	do. ....	Official .....	do.	ii.
Paving Carriage-ways .....	Bermondsey Vestry .....	do. ....	do.	ii.
Painters' and Decorators' Work .....	do. ....	do. ....	do.	ii.
Making-up and Paving Roads .....	Wandsworth Bd. of Wks. ....	A. Official .....	July 19th	ii.
Painting and other Works .....	Paddington Guardians .....	A. & C. Harston .....	do.	ii.
Materials for Macadam .....	Brighton Town Council .....	F. C. Lockwood .....	do.	ii.
Granite Curb and Pitchers .....	do. ....	do. ....	do.	ii.
Pavior's Work .....	Vestry of St. Mary, Islington .....	Official .....	do.	ii.
Museum, &c., and Alterations to College .....	Council of Ladies' Coll., Cheltenham .....	Middieton, Frothero, & Philott .....	July 21st	ii.
New Postal Sorting-Office, Finsbury Park .....	Com. of H.M. Works .....	Official .....	July 22nd	ii.
Coast Guard Station .....	Admiralty .....	do. ....	do.	ii.
Repairing Roads .....	Mortlake Highway Bd. ....	J. Medway .....	July 23rd	ii.
Erection of House, &c., Newmarket .....	C. Loates .....	Holland & Son .....	do.	ii.
Main Drainage Works .....	West Bromwich Corpn. ....	J. T. Rayns .....	July 26th	ii.
Widening Bridge .....	Croydon Corpn. ....	T. Walker .....	do.	ii.
Painting, Cleaning, and Repairing Schools .....	Schl. Board for London .....	Official .....	Not stated...	ii.
Parsonage House .....	Rev. J. Parker .....	C. Bell .....	do.	ii.
Congregational Church, &c., Chelmsford .....	do. ....	W. Gubee Scott .....	do.	ii.
Painting, Whitewashing, &c., Taudis .....	War Department .....	Official .....	do.	ii.
Painting, &c., Works, Aldershot .....	do. ....	do. ....	do.	ii.

### PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Road Foreman .....	Vestry of St. Mary, Islington .....	17. 15s. weekly	July 16th	xiv.

### TENDERS

**BLACKBURN.**—For masons' work in boundary walls at the Blackburn and East Lancashire Infirmary, Simpson & Duckworth, architects, Richmond Chambers, Blackburn.—

W. J. Woolf Cronshaw .....	£295 0 0
Gregson & Ferguson .....	332 17 10
Wm. Carr .....	324 15 0
W. & T. Macknight .....	306 10 0
C. Hinde .....	300 0 0
Roland & Williams (accepted) .....	265 17 8
A. Johnson .....	261 17 1

[All of Blackburn.]

### Wrought-iron Paving.

Exors. of J. Baldwin, Blackburn .....	£154 0 0
Wm. Carr .....	162 10 8
Albion Iron Works Company, Regely, Staffordshire .....	144 13 0
T. Ashworth, Vulcan Ironworks, Burnley (accepted) .....	110 0 0

**BURY ST. EDMUNDS.**—For alterations and additions to the Shire Hall, Bury St. Edmunds, for the Magistrates. Mr. F. Whitmore, architect and County Surveyor, Chelmsford.—

J. Robinson, jun., Bury St. Edmunds? £547 0 0

\* Accepted.

**CROYDON.**—For new channel and transept, St. Luke's Church, Woodside, Croydon. Messrs. Mullins, architects, quantities by Messrs. Frazer & Andrews.—

Hider .....	£3 147 0 0
Greenwood .....	3,039 0 0
Knight & Bennett .....	2,835 0 0
Jarrett .....	2,906 0 0
Bowyer .....	2,823 0 0
Smith .....	2,747 0 0
Downs .....	2,746 0 0
Higgs & Hill .....	2,740 0 0
Barton & Son .....	2,650 0 0
Marriage (accepted) .....	2,645 0 0

**CROYDON.**—For additions and alterations at the Homestead, Bedford Park, Croydon, for Mr. Alfred Walton. Mr. Charles Henman, architect, 45, Cannon-street.—

Colls & Sons, London .....	£890 0 0
Maiden & Harper, Croydon .....	695 0 0
J. Garlick, London .....	533 0 0
Gould & Glasscock .....	517 0 0
J. Smith & Sons, Norwood .....	495 0 0

**PINCHLEY.**—For the completion of four cottages and the erection of six cottages in Coleridge-road, North Finchley, for Mr. George Newby. Mr. S. Dorman, jun., architect, 11, High-street, North Finchley:—

Hale & Twitchen .....	£1,550 0 0
T. Crisp .....	1,450 0 0
Wheler & Co. ....	1,400 0 0
E. Spearman .....	1,300 0 0
Bonell & Frusher (accepted) .....	1,250 0 0

**GRAVESEND.**—For Jubilee Memorial Clock-tower, Gravesend, Mr. John Johnson, architect, 9, Queen Victoria-street. Quantities supplied:—

Bath stone facing .....	2,450 0 0
Portland stone facing .....	2,450 0 0
King Bros., South Norwood .....	788 18 1
A. Philbey, Gravesend .....	787 0 0
J. W. Falker, Old Kent-road .....	787 0 0
W. & E. Wallis, Gravesend .....	649 0 0
Multon & Wallis, Gravesend .....	635 0 0
W. H. Archer, Gravesend .....	635 0 0

\* Accepted.

**GREAT GRIMSBY.**—For building church and two bays of nave, St. Paul's Church, West Marsh. Mr. Withers, architect:—

Marrows, Grimsby .....	£2,470 0 0
Leasing, Grimsby .....	2,450 0 0
Grant .....	2,048 0 0
Wilson & Co., London .....	1,890 0 0
Jackson & Son, Hull (accepted) .....	1,750 0 0

**HAGGERSTON.**—For alterations and additions to the Albion, Stonebridge-road, Haggerston. Mr. Edward Brown, architect, 21, Liverpool-street, City:—

John Walker .....	£263 0 0
John Anley .....	820 0 0
S. H. Hawkins .....	795 0 0
S. Salt .....	783 10 0
J. A. Taylor (accepted) .....	749 0 0

**HAMPSTEAD.**—For alterations and additions to the North Star Tavern, Finchley-road, Hampstead, for Mr. Miller. Mr. H. L. Newton, architect, 17, Queen Anne-gate, Westminster:—

Mark .....	£297 0 0
Palmer .....	945 0 0
Burns & Sons .....	875 0 0
Backridge .....	770 0 0
Lamble, Kentish Town (accepted) .....	717 0 0

HANWELL.—For draining, making up, kerbing and channeling, &c., Westminster-road, Hanwell, for the Hanwell Local Board. Mr. E. J. W. Herbert, surveyor:—  
Woodham & Fry, Lion Wharf, Green-  
wich..... £516 0 0  
Lowery & Co., 33, Millmay-chambers,  
Bishopsgate-street..... 508 18 0  
J. G. Marshall, Martin-street, Strat-  
ford..... 500 0 0  
C. F. Kearsley, High-street, Uxbridge..... 472 12 0  
J. Bar, Lavender House, Chiswick..... 409 7 10  
W. E. Constable & Co., 40, King W.  
ham-street, E.C.4..... 445 0 2  
G. Aldrid, Strand-on-the-Green, Chis-  
wick..... 445 0 0  
S. Tucker & Sons, Victoria-street,  
Wharf, Millwall..... 431 14 0  
W. M. Neave & Sons, St. Peter's Park  
Yard, Paddington..... 424 19 7  
W. Seward, 82, Bonfou-road, Han-  
well..... 400 12 3  
G. Bell, Tottenham Wharf, Tottenham  
[Surveyor's estimate, £404 6 7.]

HEREFORD.—For works, Monkmoor Mills, Hereford, for Messrs. G. R. Heron & Son. Mr. W. W. Robinson, architect, 10, King-street, Hereford:—  
J. Rowberry..... £386 10 0  
R. Taylor..... 305 0 0  
W. B. Partington..... 287 0 0  
W. Richardson..... 281 16 0  
J. Hiles..... 275 0 0  
H. Welsh..... 270 0 0  
T. Lewis..... 269 0 0  
W. Howes & Co..... 245 0 0  
J. Davies, Hereford (accepted)..... 218 0 0

HEREFORD.—For mineral water works, for Mr. B. A. Miller. Mr. W. W. Robinson, architect:—  
W. B. Partington..... 915 0 0  
W. Bowers & Co..... 692 0 0  
H. Welsh..... 689 0 0  
J. Hiles..... 680 0 0  
Beavan & Hodgson..... 658 0 0  
J. Davies..... 648 0 0  
T. Lewis, Hereford (accepted)..... 645 0 0

LEICESTER.—For culverting, kerbing, &c., two miles of new streets on the Newfound Pool Estate, belonging to Mr. G. O. O'Connell. [The tenders given are for about one-fifth of the work required. The remainder to be done at the same schedule as this tender.] Messrs. Redfern & Sawley, surveyors:—  
W. Harris, Chamberwell..... £3,385 0 0  
T. Small & Sons, Birmingham..... 2,630 0 0  
Innes & Wood, Birmingham..... 2,600 0 0  
H. Holloway, Wolverhampton..... 2,479 16 11  
B. W. Ward, Whitstone..... 2,468 8 0  
J. Copley, Lincoln..... 2,322 3 0  
T. Smart, Nottingham..... 2,295 10 0  
S. & E. Bentley, Leicester..... 2,270 0 0  
J. Gifford, Leicester..... 2,250 0 0  
J. Hutchinson & Son, Leicester..... 2,205 0 0  
J. D. Gibbins, Leicester..... 2,170 0 0  
W. Gordon, Burton Joyce..... 1,986 0 0  
Eunl. Thunip, Leicester..... 1,930 10 0  
H. Burnham, Lough..... 1,861 7 0 1

LONDON.—For the erection of a school to provide accommodation for 1,000 children, on the site in Balcis-street, St. Luke's (Pinsbury U), for the School Board for London. Mr. T. J. Bailey, architect:—  
W. Goodman..... £14,170 0 0  
Cousell Bros..... 13,463 0 0  
W. Oldrey & Co..... 12,000 0 0  
Kirk & Randall..... 11,920 0 0  
H. Hart..... 11,904 0 0  
C. Cox..... 11,882 0 0  
H. L. Holloway..... 11,840 0 0  
W. Downs..... 11,634 0 0  
Wall Bros..... 11,723 0 0  
J. Holloway..... 11,680 0 0  
S. J. Jerrard..... 11,630 0 0  
W. Johnson..... 11,890 0 0  
C. Wall..... 11,521 0 0  
Stimpson & Co..... 11,400 0 0  
Atherton & Latta..... 11,289 0 0

\* Recommended by the Works Committee for acceptance.

LONDON.—On the 17th of February, 1887, the School Board for London agreed to accept the tender of Messrs. Atherton & Latta, amounting to 5,738*l.*, for the erection of a pupil teachers' school on the site in Summer-road, Peckham (East Lambeth S). The Education Department, however, objected to the designs of the school, and the building has since been re-planned, with increased accommodation. Fresh tenders have now been obtained for the erection of the building as altered, the amounts of which are as follow:—  
F. & H. F. Higgs..... £9,297 0 0  
H. Hart..... 7,724 0 0  
J. Holloway..... 7,657 0 0  
W. Downs..... 7,599 0 0  
Atherton & Latta..... 7,510 0 0  
W. Oldrey & Co..... 7,487 0 0  
Kirk & Randall..... 7,429 0 0  
S. J. Jerrard..... 7,380 0 0  
R. & E. Evans..... 7,365 0 0  
C. Wall..... 7,288 0 0  
W. Johnson..... 7,250 0 0  
Stimpson & Co..... 7,173 0 0  
H. L. Holloway..... 7,143 0 0

\* Recommended by the Works Committee for acceptance.

LONDON.—For the erection of a cookery centre on the Upper Kennedon-lane site (West Lambeth K), for the School Board for London. Mr. T. J. Bailey, architect:—  
W. A. Rhodes..... £460 0 0  
Newton & Idles..... 419 0 0  
J. W. Roy..... 423 10 0  
W. Johnson..... 380 0 0  
F. L. Channon..... 340 0 0  
Stimpson & Co..... 316 0 0

\* Recommended by the Works Committee for acceptance.

LONDON.—For the erection of a pupil teachers' school on the Hackford-road site (West Lambeth V), for the School Board for London. Mr. T. J. Bailey, architect:—  
F. & H. F. Higgs..... £7,380 0 0  
Leslie & Knight..... 6,693 0 0  
W. Downs..... 6,671 0 0  
Stimpson & Co..... 6,570 0 0  
James Holloway..... 6,450 0 0  
C. Wall..... 6,450 0 0  
H. L. Holloway..... 6,390 0 0  
W. Johnson..... 6,350 0 0  
H. Hart..... 6,230 0 0

\* Recommended by the Works Committee for acceptance.

LONDON.—For alterations at Hawley-crescent School (Marylebone S), for the School Board for London. Mr. T. J. Bailey, architect:—  
G. S. & Williams & Son..... £145 0 0  
G. White..... 129 10 0  
T. Cruwys..... 127 0 0  
Stevens Bros..... 114 0 0  
Kirby & Chase..... 89 15 0

\* Recommended by the Works Committee for acceptance.

LONDON.—For alterations at the School Board Offices, Victoria Embankment, for the School Board for London. Mr. T. J. Bailey, architect:—  
W. Johnson..... £185 0 0  
David Bros..... 194 0 0  
G. S. Frichard & Son..... 164 0 0

\* Recommended by the Works Committee for acceptance.

LONDON.—For rebuilding the King's Arms, and two shops, Charing-Cross-road, for Mr. Ernest Tabernacle. Messrs. Wyllson & Long, architects, 21, King William-street, W.C. Quantities by Mr. Arthur W. Saville, 89, Strand:—  
S. J. Jerrard..... £4,490 0 0  
W. Shurmer..... 4,482 0 0  
F. Atman & Fotheringham..... 4,357 0 0  
Spencer & Son..... 4,235 0 0  
W. Oldrey & Co..... 4,201 0 0  
S. Gregory & Co..... 4,175 0 0  
Ward & Lambie (accepted)..... 4,060 0 0  
W. A. Rhodes..... 4,060 0 0  
J. T. Chappell..... 3,872 0 0

LONDON.—For painting, whitewashing, &c., at the St. George's Union Infirmary, Fulham Road. For the Guardians of the Poor of the St. George's Union. Mr. H. Saxon Seal, architect:—  
E. J. Coombe, Old Gravel-lane..... £495 0 0  
W. Bamford, Pentonville..... 480 0 0  
J. Sheerman, Jnn., Fiddington-street..... 427 5 0  
W. G. Lilly, Crown-court, S.W. (accepted)..... 397 0 0

LONDON.—For the erection of a new laundry and married couples' quarters, at the St. Mary's Work-house, Northumberland-street, for the Guardians of the Poor of the Parish of St. Marylebone. Messrs. H. Saxon Seal & Son, architects, London:—

	Married Couples' Quarters.	Laundry both Quarters.	Total
J. & J. Greenwood, Arthur-street West, E.C.1.	£1,768	6,793	8,495
C. Batchelor, Pentonville	1,749	6,781	8,410
Colls & Sons, Moorgate-street, E.C.4.	1,713	6,640	8,239
W. Scrivener & Co, Fitzroy-road, Regent's Park.	1,680	6,581	8,177
J. Mowlem & Co., Millbank	1,650	6,597	8,162
Dover, Adcock, Ladywell.	1,651	6,576	8,130
J. J. Robson, Snarebrook	1,631	6,540	8,163
Wall Bros., Carlton-road, N.W. (accepted)	1,692	6,475	7,975

LONDON.—For alterations and additions to Botolph Wharf, Lower Thames-street, for Messrs. F. J. Bealey & Co. Messrs. Newman & Newman, architects, 19a, Tooley-street, London Bridge:—  
J. & J. Greenwood (accepted)..... £6,500 0 0

[No competition.]

LONDON.—For alterations to Nos. 73 and 75, Finsbury-pavement, for Mr. Robert Morley. Mr. W. Seckham Witherington, architect, 79, Mark-lane:—  
Patman & Fotheringham..... £1,091 0 0  
Larks & Son..... 988 0 0  
Kearley..... 948 0 0  
Elkington..... 878 0 0

LONDON.—For rebuilding the Grapes tavern, Milton Park, N. Messrs. Stokes & Homan, architects, 31, Great Jamaica-street, Bedford-row:—  
Mark..... £2,994 0 0  
Lambie..... 2,965 0 0  
Braid..... 2,774 0 0  
Beale..... 2,630 0 0  
Smith..... 2,586 0 0  
Goddard..... 2,583 0 0  
Burman & Sons..... 2,567 0 0  
Shurmer..... 2,510 0 0  
Jackson & Todd, Hackney (accepted)..... 2,458 0 0

LONDON.—For repairs at "The Acorns," Oakleigh Park, N. Messrs. Stokes & Homan, architects, 31, Great Jamaica-street, Bedford-row:—  
Law..... £183 0 0  
Taylor (accepted)..... 115 0 0  
Marriott Bros..... 94 0 0

LONDON.—For painting and decorating grand staircase, library, council and meeting rooms, &c., for the Geological Society, Burlington House. Messrs. D. Ruddle & Son, architects and surveyors, Montague-chambers, Bedford-street, Strand:—  
McLachlan & Sons, Clapham..... £313 0 0  
Stimpson & Sons, St. Martin's-lane..... 256 0 0  
Marchant, Lady Somerset-road..... 239 0 0

\* Accepted.

LONDON.—For pulling down and rebuilding No. 81, Commercial-road, E. Mr. G. Pearson, architect:—  
Lidstone..... £214 0 0  
Ward & Lambie..... 83 0 0  
Gunning (accepted)..... 680 18 0

LONDON.—For alterations to 39, Buckingham Palace-road, for the Aerated Bread Company. Mr. G. Edwards, architect:—  
C. Wall..... 385 0 0  
Stimpson & Co..... 354 0 0  
Green & Lea..... 350 0 0  
Ward & Lambie (accepted)..... 320 0 0

LONDON.—For alterations and additions to the Grosvenor Hall, Buckingham Palace-road, for the Grosvenor Club. Mr. G. S. Finlay, architect:—  
H. Lee & Son..... £1,374 0 0  
Heath..... 1,362 0 0  
Macey & Sons..... 1,237 0 0  
Coffin..... 1,188 0 0  
Higgs & Hill..... 1,184 0 0  
Williamson..... 1,175 0 0  
Raylock..... 1,153 0 0  
Bywaters..... 1,145 0 0  
Dorrie..... 1,120 0 0  
Frestige & Co..... 1,084 0 0

LONDON.—For decorations, &c., at No. 73, Ports-down-road, Maidstone, for Mr. H. Pearson. Mr. H. I. Newton, architect, 17, Queen Anne's-gate, Westminster:—  
Smith..... £179 0 0  
Goddard..... 175 0 0  
Whelpdale (accepted)..... 167 10 0

NEW SOUTHGATE.—For new sorting-office at New Southgate, for Mr. Alfred Smart:—  
W. Tout, Hendon (accepted)..... £182 10 0

NORWICH.—For jurors' rooms, fireproof record room, and prisoners' detention cells, at the Shire Hall, for the County Magistrate. Mr. T. H. B. Heslop, A.M.I.C.E., County Surveyor:—  
Robert Wegg..... £2,980 0 0  
Horace Lacey..... 2,410 0 0  
Downing & Son (accepted)..... 2,243 0 0

[All of Norwich.]

PRITTELEWELL (Essex).—For alterations and additions to the Spread Eagle Hotel, Prittlewell, near Southend-on-Sea. Mr. F. Whitmore, architect, Chelmsford:—  
J. Carter, Southend (accepted)..... £385 0 0

TOTTENHAM.—For building new vestry and other works at St. John's Presbyterian Church, Tottenham, for the Committee:—  
Woodhouse..... £785 0 0  
W. Pavey..... 549 0 0  
Dabbs..... 549 0 0  
J. Linzell..... 540 0 0  
Randall..... 499 0 0  
Hart..... 488 0 0  
Roffey..... 482 16 0  
Hy. Knight & Son..... 482 0 0  
J. Giles..... 480 0 0  
J. Norris (accepted)..... 445 0 0  
J. Stewart..... 286 6 0

TOTTENHAM.—For proposed alteration and addition at the Seven Sisters Hotel, Pango-green, Tottenham, for Mr. F. Smither. Mr. J. E. Pinder, architect:—  
F. Volter..... £372 0 0  
Sharpe..... 247 0 0  
H. Knight & Son..... 239 0 0  
Jackson & Todd..... 234 0 0

TOTTENHAM.—For alterations and pewing at the Greyhound public-house, Philip's-lane, Tottenham, for Mr. Hopkins. Mr. E. Pinder, architect:—  
Jackson & Todd..... £274 0 0  
F. Volter..... 282 8 11  
H. Knight & Son (accepted)..... 242 0 0

TOTTENHAM.—For building cloak-room and other works at the Boys' National School, Park-lane, Tottenham, for the Committee. Messrs. E. & E. B. Ellis, architect:—  
Aspland..... £150 0 0  
M. A. Humphreys & Son..... 110 0 0  
Porter..... 103 0 0  
H. Knight & Son (accepted)..... 98 0 0

U'PTON (Essex).—For the erection of an infirmary and drill-shed on the playground of the Upton House School, for the School Board for London. Mr. T. J. Bailey, architect:—  
Cousell Bros..... £2,467 0 0  
Stimpson & Co..... 2,275 0 0  
J. Holloway..... 2,247 0 0  
H. L. Holloway..... 2,241 0 0  
C. Cox..... 2,238 0 0  
W. Johnson..... 2,225 0 0  
W. M. Dabbs..... 2,201 0 0  
Atherton & Latta..... 2,110 0 0

\* Recommended by the Works Committee for acceptance.

WAKEFIELD.—Accepted tenders for four almshouses, Thornes, Wakefield, for Major Barker:—  
Erecting, Brick, and Stone..... £414 17 6  
Flower Bros.....  
Plastering.....  
Chas. Driver..... 13 10 0  
Slatting.....  
John Illingworth..... 37 6 9  
Carpenter and Joiner's Work.....  
Chas. Squires..... 131 15 0  
Painting, Glazing, and Ironwork.....  
Francis Stafford..... 48 0 0  
Painting Work.....  
Chas. Turner & Sons..... 12 0 0

[18 tenders received.]



**WANDSWORTH.**—For building new tower and spire, and works connected therewith, to the Church of the Holy Trinity, Mr. George F. P. architect. Quantities supplied by Mr. Clement Dowling:—

Perry & Co., Bow .....	£5,000 0 0
A. J. Hatchelor, Harrow .....	4,900 0 0
C. Ansell, Lambeth .....	4,777 0 0
Robertson & Co., Bloomsbury .....	4,500 0 0
Shillito & Son, Bury St. Edmunds .....	4,090 0 0
J. T. Chappell, Finsbury .....	4,052 0 0
W. Down, Waltham .....	4,005 0 0
Lathey Bros., Battersea .....	3,915 0 0
Priestley & Gurney, Hammer-smith .....	3,894 0 0
H. B. Nightingale, Lambeth .....	3,883 0 0
Gregory & Co., Clapham Junction .....	3,787 0 0
Parmenter, Bristow .....	3,722 0 0
Geo. Dobson, Colchester* .....	3,580 0 0

\* Accepted.

**WEST KENSINGTON.**—For new Methodist Congregation Chapel and Schools, North End-road, West Kensington. Mr. A. H. Goodall, architect:—

Wall .....	£2,631 0 0
Garlick .....	2,500 0 0
Crake .....	2,399 0 0
Prestige & Co. (accepted) .....	2,302 0 0
Buckridge .....	2,100 0 0

**WITHAM.**—For new farm buildings at Witham, Essex. Mr. F. Whitmore, architect, Chelmsford:—

Smith, Chipping Hill .....	£815 0 0
Gossett, Maldon .....	503 0 0
Moss, Chelmsford .....	475 0 0
Diss, Colchester .....	450 0 0
Ward, Great Totham .....	425 0 0

\* Accepted, after allowing for oak on farm.

**WOOD GREEN.**—For repairs to two houses, Pallat-grove, Wood-green, for Mr. H. Friend:—

Peering & Sons .....	£121 15 0
Coombes & Son .....	119 0 0
Ward & Lambie (accepted) .....	105 0 0

Alterations at 82, Strand.—Mr. Dovey's explanation in regard to the note in our last, is that he planned and designed the building, and that Mr. Fletcher was engaged as superintending architect afterwards. We give his explanation; but we have the contract at this office, which speaks of Mr. Banister Fletcher as the architect of the work, and is signed by "H. Grimaldi" and "Frederick A. Dovey" as contractors.

\* SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than 12 Noon on THURSDAYS.

#### TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

C. T. L.—H. H.—G. H. (comes rather out of date now).—W. H. R.—"A Subscriber" (we cannot undertake to give receipts. Apply to some one in the trade).—R. H. R. (too late for this week).—J. W. R. (tenders, without amounts being given, are inadmissible).—R. H. P. (names of readers should always accompany lists).—A. & H. (next week).—R. H. B. (too late).—E. W. P. (list returned too late for this week).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline pointing out books and giving addresses.

Note.—The responsibility of signed articles and papers read public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications beyond mere news-items which have been duplicated for others, are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

#### TERMS OF SUBSCRIPTION.

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#### PUBLISHER'S NOTICES.

Registered Telegraphic Address, "THE BUILDER, LONDON."

THE INDEX and TITLE PAGE for Volume LII. (Jan. to June, 1887), is given as a Supplement with the present Number.

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Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY.

#### SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS OR ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY morning.

The Publisher cannot be responsible for DRAWINGS TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter OFFICE ONLY should be accepted.

PERSONS Advertising in "The Builder," may have Replies addressed to the Office, 46, Catherine-street, Strand, W.C. Free of charge. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamp to cover the postage.

AN EDITION Printed on THIN PAPER, for FOREIGN CIRCULATION, is issued every week.

MAP OF LONDON, showing Boundaries of Surveyors which the Map is divided into Districts. The four Sheets, into January 1st, 18th, 15th, and 22nd, if sent to the Office direct, or through any of our Agents, can be MOUNTED on the following Terms, viz.:

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\* Omissions discovered since publication will be corrected before mounting.

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### Tanagra Terra Cottas.

#### THE SABOUROFF COLLECTION.\*



THE monumental work by Dr. Furtwängler on the great Sabouroff collection is at last complete. We say "at last," not with any idea of the slightest reflection on the energy and zeal of either editor or publisher,

the terra cottas. These photographs were sent to Paris to be reproduced by the heliographic process of M. Dujardin. For the reproduction of all the vases and such of the terra cottas as did not come out satisfactorily by photography, recourse was had to the coloured facsimiles of M. Eichher, whose drawings, by their wonderful fidelity, have gained him such a great reputation with the German Archaeological Institute. Dr. Furtwängler frankly owns in his preface that the process of lithography by which these plates have been reproduced has, in some cases, impaired their beauty.

The plates were already complete, and a portion of the text had appeared, when M. Sabouroff had to leave Berlin, and decided to sell his collection. The result of the sale we noted at the time. It was highly characteristic. To St. Petersburg went what may be called the show portion of the collection,—the unrivalled terra cottas, with their delicate shapes, brilliant colouring, and world-wide prestige. At Berlin remained the more sober, but to the archaeological mind far more precious, portion of the collection, *i.e.*, the early grave reliefs, votive slabs, vases, fragments of sculpture, bronzes, &c. At the Hermitage last autumn we saw the terra cottas set out with all the pomp and circumstance of imperial plate-glass and velvet, and we are bound to say with excellent artistic effect, but with no catalogue by which the unlearned might get further than the delight of the eye. At Berlin, three weeks before, we saw the marbles, bronzes, vases, &c., each standing orderly in its own place, each already entered in the catalogue of the section to which it belongs, and in which it is fully described and approximately dated. Of the collection itself, as a collection, Dr. Furtwängler's book is now the sole surviving testimony. Never, perhaps, had a collection such good fortune: fortunate in the circumstance of its formation, it has not suffered dispersion into private hands, but has found shelter in two of the finest museums of Europe, while its unity is still preserved in a book which takes rank at once as a standard treatise. The plan of this book we must briefly summarise.

It consists of two volumes. The first volume contains the Berlin portion of the collection, *i.e.*, the sculptures and vases, and numbers seventy-five plates, each with accompanying text. The second is the St. Petersburg portion (with one exception, plate seventy-six), *i.e.*, the terra cottas. Now, it is obvious that if the book consisted of simply plates and commentary it would be difficult, if not impossible, satisfactorily to review it in detail; we could but note for agreement or controversy a scattered opinion here and there; but a book conceived after such a plan, excellent though

it might be, would not give expression to the peculiar bent of Dr. Furtwängler's genius: he is by nature quite incapable of remaining in the catalogue-commentary stage; he must take a general view, and summarise the results. Accordingly, he has taken the bold step of prefacing each section with an introductory essay, in which he boldly expounds his own view on some of the most hotly-controverted points in all the domain of archaeology. How bold, how almost premature, this proceeding is he is the first to own. He says (we quote from the French book,—"Dans les introductions je me suis efforcé de traiter dans leur ensemble quelques questions particulièrement importantes qui se rattachent aux monuments de la Grèce en général. J'ai le sentiment d'avoir fait là un travail dont le moment n'était pas très heureusement choisi. La grande publication des stèles funéraires antiques, actuellement en préparation, permettra, je l'espère, sous peu de se prononcer, avec beaucoup plus de précision et de justesse sur plus d'un des points que j'ai touchés. De même après l'achèvement de la collection des terres cuites commencée par l'Institut Archéologique il sera possible plus tard de répondre plus complètement et mieux que je n'ai pu le faire aux questions que j'ai examinées. Je n'ai cependant pas cru devoir renoncer à publier ces études: en effet j'ai la conviction qu'il vaut mieux que chacun travaille dans la mesure où il peut s'en rendre maître, plutôt que d'attendre le moment où tous les matériaux seront soigneusement réunis au grand complet. Car puisque nous sommes encore à l'heureux âge des découvertes, il faut croire qu'à ce moment-là nous ne serons plus de ce monde. D'ailleurs tout travail fait sur les matériaux bruts qui s'accumulent facilité pour l'avenir la tâche des chercheurs. Le sort de tout essai est d'être remplacé par un autre essai: et plus les travaux se remplacent, rapidement, mieux cela vaut, quand même nous devrions ne jamais atteindre à la perfection, car tout travail scientifique n'est jamais qu'un essai." Dr. Furtwängler is clearly not the sort of scholar to be stifled under the accumulations of his own learning. It is easy to see that the toil of detailed individual description of each particular slab and terra cotta has been lightened by the gradual dawn of new light, fresh generalisation of the whole. With these growing convictions we must not, he says, demand that every portion of a work extending over four years should be rigidly consistent, "Il m'était d'ailleurs impossible de demeurer parfaitement identique à moi pendant ces quatre années." Dr. Furtwängler is not of the order of preachers who can with comfort, and even pride, preach the sermons of twenty years ago. It is, therefore, not to the description of any individual monument

\* La Collection Sabouroff Monuments de l'Art Grec publiés par Adolphe Furtwängler. Deux volumes. Berlin Librairie: A. Asher & Cie. 1883-1887.



that we shall turn, but to the general conspectus of each section, and the new theories set forth.

We take the terra cottas first, as having the strongest hold on popular interest, though in the book they occupy the second volume.

The terra cottas come, as we have noted before, mainly from Tanagra. A few scattered instances were gleaned from Corinth, Hermione, Thisbe, Megara; fewer still,—just sufficient to point the contrast of certain differences of style,—from Asia Minor. Before we come to the interesting and much-disputed point as to the purpose of these Tanagra terra cottas, we must note that Dr. Furtwängler agrees with the majority of commentators in thinking that the bulk of the specimens are post-Alexandrian. A few there are of distinctly archaic work, a few also of the fifth and early fourth century, but the vast majority bear all the notes of the so-called Hellenistic style. This style is specially shown by its *restless* method of treating figures at rest. Even Praxiteles kept enough of the ancient manner about him to make his figures really stand still, *i.e.*, support the weight of the body on one leg and let the other fall behind, additional support being often imparted by the trunk of a tree or some such object. But about the time of Alexander the standing figures all begin to walk, and it is largely this that makes us feel, with so many of the Tanagra terra cottas, that they lack repose and dignity. Of course, many of them are lolling about in every law variation of attitude, but those that are simply upright are all more or less on the march. Another Hellenistic note is the arrangement of the drapery. Everybody has noticed the unpleasantly tapered effect of many of the Tanagra figures,—the folds are thin and scant about the breast, girt very high, with no overhanging folds, and becoming ample and abundant as they flow downwards; in fact, the figures tend to the extinguisher shape, like a modern lady with a small old-fashioned crinoline. It is this also that pleases the modern eye, which, from long usage, prefers a woman to have the shape of a cone with a curve in the middle. It is this also which makes the eye, trained to the idealised reality of the Phidian drapery, shrink from the Tanagra schemes as not far removed from the tricks of modern mechanism. We ought to say that Dr. Furtwängler, with characteristic reserve, notes the Alexandrian manner, without commenting on its vulgarity. A third note of time is the shape of the fan held by so many of the Tanagra ladies. It is leaf-shaped, and quite other than the fan which appears on vases, even of the early fourth century B.C., whereas it is precisely identical with that which appears on Pompeian paintings; further, the pointed hat, so fashionable with the maidens of Tanagra, never appears on vases. Lastly, as regards style, the manner in which Eros is conceived is thorough post-Praxitelean; he is throughout the series the mischievous boy of Alexandria.

Coming to external evidence, we have the important fact that painted vases are never found with this class of terra cottas: we may, therefore, safely conclude that the fashion of making these vases had ceased before this peculiar kind of terra cottas had set in. Finally, we have the evidence of the recently-discovered Myrina terra cottas. These are known to date from the third to the first century B.C. Among them are several types obviously copied from Tanagra fashions; we may, therefore, presume that the Tanagra terra cottas preceded those of Myrina, but by no very long interval. Next, the question arises, whence did the Tanagra figure-makers (*κορπυλασται*) draw their inspiration? Are we to look to their works for echoes of the great creations of sculpture or of painting? Not of sculpture, Dr. Furtwängler says emphatically. The *κορπυλασται* of Asia Minor loved to reproduce statues in miniature, and we have only to look at the Myrina specimens now on view in the Campana Gallery of the Louvre to see instances enough; but at Tanagra it was otherwise. We have no single instance of the reproduction of the motive of any known statue. The reason does not seem far to seek: the

age of Alexander was conspicuously an age of painters rather than of sculptors, it was by painting rather than sculpture that the minor arts of Boeotia were naturally influenced. This theory is borne out by the fact that in the paintings of Pompeii, which are echoes of the Alexandrian manner, we recognise abundant analogies to the pose, drapery, gestures of the terra cottas. With the terra cottas of Asia Minor it is just as naturally quite the reverse. After Alexander had come the great renaissance of sculpture in the Pergamene and Rhodian schools, when painting was comparatively in abeyance. This theory of Dr. Furtwängler's at all events tends to assist us to a juster appreciation of Tanagra excellences, an appreciation which to some of us, whatever their wide popularity, is uphill work. Their brilliancy, their restlessness, their vivacity, all unpardonable from the plastic point of view, become at least explicable when they are regarded as the outcome of strong pictorial influence. It has been usual to point to these terra cottas as helping us to realise the painted sculpture of the time of Praxiteles. Dr. Furtwängler thinks, as we do, that this is a grave error: the colouring is laid on in a way essentially pictorial, and gives no idea of its plastic purport. Finally, he points out, and we think here all will agree with him, the marked contrasts between the Tanagra figures and the later specimens of Asia Minor, contrasts which well bear out his theory of the different influences to which they were subjected. Tanagra bears the palm in finish of form, in delicacy of facial expression, in brilliancy of colouring. In these respects Asia Minor terra cottas look by their side coarse and unfinished, but when it comes to variety of subject, to sculpturesque largeness of manner, to diversity and directness of movement, Asia Minor is easily first. Students can readily make the comparison for themselves if they consult side by side Dr. Furtwängler's present book and the work on the Myrina terra cottas which we recently reviewed.

We come to the vexed question of the purpose of these terra cottas, and we have now to pass beyond the limits of æsthetic criticism to the large field of human faith and sentiment, as expressed in funeral customs. And we may say at the outset that we think Dr. Furtwängler has spoken a "clear dispositive word" on a most tangled and intricate subject,—a word the more satisfying because it takes up and embodies so much of past theories, is so constructed out of well-worn material, that its novelty is rather in disposition than invention. It would be hard to lay one's finger on a single sentence and say this is absolutely novel, and yet the whole weary mass of tedious opinion, scattered conjecture, has shaped itself into a live conviction never felt before,—a conviction stamped with the impress of a cogent personality.

The question of the precise signification of Tanagra and other terra cottas would have been less difficult of solution had we possessed full and exact information into the circumstances of their discovery. Such information is unhappily in many cases lacking just where it is most essential, for terra cottas far more than vases bear the impress of local workmanship and local cults. Happily, of this much we are sure; independent terra-cotta statuettes,—*i.e.*, as opposed to those which were merely plastic ornaments of vases,—are found exclusively in either tombs or sanctuaries. At Pompeii, they are, indeed, placed merely as ornaments in niches in private houses, but this was when they had become *articles de luxe*, and we have no evidence whatever that this was at any time a Greek custom. The only purpose served by terra cottas in daily domestic life was that of *toys for children*. The industry of doll-making was, we know, of considerable importance among the Greeks; from it all statuette-makers took their name of *κορπυλασται*; these *κορπυλασται* had their regular shops in the Agora, and there they themselves disposed to children of the dolls they had made. Later, when the little girls married, they offered their dolls as *anathemata* in the shrines of goddesses, notably of

Artemis and the nymphs. Dolls were also very naturally placed in the graves of children, for their use in the world below. So far all is clear and simple, but terra-cotta statuettes are found also in the graves of adults, and in these cases we must seek another explanation. Some archaeologists have thought that as the child had her dolls, so the grown-up person had his statuettes, in which he took æsthetic delight, and which as *objets d'art* were buried for his delectation in his tomb. This is a plausible view, and one likely to find acceptance with those who have a superficial acquaintance with the Greek mind, and a general notion that they were a people of artists sunk in æsthetic contemplation. No custom could be really more unlike them, more wholly un-Greek, more opposed to the wholly practical,—we might almost say utilitarian,—nature of their funeral customs. They buried in their tombs whatever could be of use to the dead man: his arms, his clothes, his toilette utensils, his jewellery, it is true, but only because he could wear it; never, so far as we know, a single thing that could serve only for his contemplation. If objects of mere art had been wanted, why not stone statuettes, bronzes, pictures? Yet none of these appear.

It is otherwise as regards the gods. A large and less utilitarian view was taken of their needs and desires: an object of art, as such, could be offered to a god, though it was withheld from the tomb of a mortal; hence we must distinguish between the signification of terra cottas placed in sanctuaries and those in graves. In order to get at the meaning of these last, *i.e.*, of statuettes in the graves of adults which cannot be regarded as dolls, we must go back to the earliest instances, and trace the custom in its historical sequence. The secret of their purpose is sure to be found, if anywhere, in the earlier instances before the meaning became obscured by long tradition. Passing by Mycenæ, where the instances are so rare as to forbid generalisation, we turn to the tombs of Cyprus; there in large numbers are found rough figures curiously worked almost like small boards representing a nude female goddess, no doubt the protectress of the dead. These tombs are probably anterior to Greek influence. In archaic Greek tombs we find also a female divinity, but heavily draped, and with sometimes a child either in the arms or on the shoulder. Sometimes she holds a flower or fruit in the hand, sometimes wears a high head-dress. She is the mother goddess in the simplest form, the emblem of fertility of life, and, by antithesis, of death,—a conception common to many mythologies. She was a sort of general conception of the goddess feminine, whom by giving her various attitudes it was easy to transform later into a Demeter, a Cybele, an Athene. Another category of statuettes coming from archaic Greek tombs are representations of human figures occupied in doing some work pleasing or useful to the dead man,—a man baking or grinding corn, obviously for the dead man's sustenance. One Tanagra figure represents the operation of hair-cutting; others are of slightly less utilitarian cast,—a woman with the crotala or tympanon, a woman lamenting; a hydrophoros, *i.e.*, a woman carrying the funeral water-jar; figures of maidens carrying funeral offerings of cakes and fruit, youths carrying cocks,—in fact, personifications either of offerings to the dead, or, of what is scarcely distinguishable, the cult of the infernal deities. Figures of horsemen and chariots represent the funeral procession; the figure of a man reposing, holding the cup and the lyre, is the image of the dead man who receives the offerings. Lastly comes a class of objects, curious to our notions, the burlesques and grotesques. Their purpose is obvious: the dead man must not only eat and drink, he must laugh. The sorrowing Demeter, angry and averse, was made propitious by the fooling of a servant; in like manner it was wise to keep the dead man, now a potent hero, in good humour,—hence the figures of comic monkeys and Sileni.

In the next period, that of transitional and early fine art, we find a tendency to specialisa-



tion. The mother goddess becomes individualised in various ways: with veil and talathus she becomes obviously Demeter, with agis Athens; a group of two goddesses who clasp each other's shoulders represents the divine mother and daughter, Demeter and Proserpine; but still many of the old traditional types maintain themselves side by side with the new. In the next period, that of late fine art, a marked difference is observable; the mother goddess with the attribute child is no longer a mere emblem of fertility, she is an actual mother with an actual child. Demeter and Proserpine have become two friendly maidens with scarcely a trace of the divine; the goddess with the pomegranate is a girl holding a flower, the youth bringing offerings to the tomb is a mere chancephobos from the palestra. In a word, the artist is busy with artistic motive, with pose and gesture, with sacred meaning; by chance he adheres sometimes, indeed often, to the traditional type, but he is already forgetting what prompted these types. Such figures of everyday life are the large majority of the Tanagra terra cottas; and it seems at one time as though all trace of sacred intent must disappear, and the motives of terra-cottas degenerate into mere genre; but just at the critical moment, a reaction sets in. We find in the post-Alexandrian terra cottas a marked return to mythology; maidens begin to turn into Muses and nymphs and Bacchantes, youths into Eros, Aphrodite begins to reign supreme, Eros and Psyche appear. The fact of this reaction, Dr. Furtwängler has noted and most ingeniously explained. It is a revival of the old cult of the dead, but with a difference, of the dead man not haunting his tomb and requiring food and drink and an occasional coarse joke, but of the dead man in Elysium,—the dead man who chants in the chorus of the initiated, the beatified soul of a later faith to whom the Muses and Dionysos and the Love-gods must minister,—of such a faith we have abundant literary evidence, from Pindar and Aristophanes onwards. Thus from beginning to end we have a continuous tradition. Terra cottas buried in graves to satisfy the dead man's material need, and to consecrate his resting-place; later the same custom continued, but the artist, half forgetting his purpose in the human beauty of his work,—“Il n'y a nullement rupture complète avec l'ancienne tradition; celle-ci perçait, au contraire, encore sur beaucoup de points, elle est seulement transformée en ce sens que partout ont triomphé les exigences purement artistiques qui ne réclament que la beauté et plus encore l'élégance”; and lastly, a return to the unreal, to the old presentation of the unseen, to the presentation of the life and function of the beatified.

Whatever added interest of detailed interpretation future investigation may add, we feel sure that Dr. Furtwängler has given us the right clue, and with this in our hand, we can wander among the motley throng of gods and goddesses, Sileni and Satyrs, Menads and Muses, high-hatted fan-bearing maidens and matrons, feasting heroes, and hair-tearing Sirens, no longer, as before, puzzled and confused, but marvelling only at the genius of those who could people their tombs with a crowd of fancies so diverse and so gracious.

## NOTES.

**T**HE question of St. Martin's Church has drawn three letters in the *Times*, from Mr. Butterfield, Mr. Beresford Hope, and the Rev. E. C. Hawkins, the Rector of St. Bride's, Fleet-street. Mr. Butterfield totally condemns the proposal shown in the Board of Works' model, referred to last week, for inserting flights of steps between the columns, and leaving them each on a separate pedestal; but he proposes instead, as what he fears is inevitable, the removal of the front rank of columns from the portico, thus throwing it and the steps back by one intercolumniation, and saving 12 ft. of road. In the opinion that the Board of Works' expedient will spoil the building we quite concur, as already observed; but that it should

be regarded as a lesser injury to the design to remove a whole colonnade and deprive the portico of half its depth and shadow, seems to us one of the oddest of paradoxes to come from an architect. Mr. Beresford Hope's letter is simply a warm protest, without any consideration of the logic of the case. Mr. Hawkins, who protests, adds, however, a reason,—to wit, that from his own frequent and special observation there is no block at the bottom of St. Martin's-lane, that the roadway is wide enough for the traffic, and the grievance is an imaginary one. Our observation coincides with that of Mr. Hawkins. We cannot remember to have observed any block or delay of the traffic there. What there may be some day is another question, of course. But for the present the Board of Works' desire to tamper with the façade of St. Martin's seems to us to have no better justification than that blind and superstitious reverence for a straight road by which official minds have been of late years so carried captive, that they would probably be ready to pull down St. Paul's if they could thereby shorten any street route by five minutes.

**MR. MUNDELLA'S** views as to the course it is desirable to adopt in the House of Commons with regard to the Railway and Canal Traffic Bill appear to be quite in accord with those of the Railway and Canal Traders' Association. The following resolution was unanimously adopted by the Council of the Association on the 6th inst.:—“That the Council strongly object to the proposed reference of the Railway and Canal Traffic Bill to a Select Committee, and they trust that the Government, by reasonable concessions to the views expressed on behalf of traders and agriculturists on the subjects of undue preference to foreign produce and the proposed allowance of station terminals, will provide for a discussion of the Bill in Committee of the whole House.” When reviewing the prospects of the session last week, Mr. Smith said that it was impossible that the Government could give time for protracted debate on the second reading of this Bill, but that opportunity might be found towards the close of the session for discussing it in Committee. Mr. Mundella again took the opportunity of protesting against the Bill being sent to a Select Committee, and expressed a hope that the Government would give speedy facilities for its consideration in Committee of the whole House; whereupon Mr. Smith stated that this was one of the measures they desired to pass if there should be time for the adequate discussion of the different points arising in connexion with the subject. Several members have given notice of amendments bearing on the points alluded to in the resolution just quoted, and every effort will be made to render the measure practical and beneficial.

**MR. JOHN FIELD** has sent us the eighteenth annual number of his *Analysis of Metropolitan, Suburban, and Provincial Gas Accounts*,\* being that for the year 1886. Like its predecessors, this number is a model of clearness of arrangement and beauty of printing; the bird's-eye view which it gives of the working of thirty-four distinct gas enterprises is both instructive and satisfactory. The consumer gets his gas cheaper and cheaper, while the dividends on capital are not impaired, the growth of the business affording its proper increment of profit. The receipts for the sale of residuals continue to fall off, but, on the other hand, the price of coals is generally lower than in 1885. One of the comparisons that catch the eye in Mr. Field's tables shows how much more brilliantly the metropolis is lighted than are the great country towns. The three metropolitan gas companies have 2,766 miles of main, while nine great corporations have an aggregate of 2,633 miles. But, while the former undertakings have 104 consumers to the mile against 136 per mile for the latter, the former sell eight million cubic feet per mile, the latter little more than half that quantity.

\* London: Eden Fisher & Co., 59, Lombard-street.

Despite the greater brilliancy of the shops, the streets of the metropolis have twenty-five public lamps per mile of gas main, those of the provincial capitals only twenty.

**THE** French papers announce that the Directors of the Panama Canal have resolved on inviting a fresh loan, which is put at 500,000 obligations at 440, or 56 per cent. discount. The successive liabilities already incurred by the Company are as follow:—

1881 Estimated cost of Canal complete	£24,000,000
1881 Marob. Company organised with constituted capital	12,000,000
1882 Loan at 5 per cent.	5,000,000
1883 Loan at 3 per cent.	12,000,000
1884 Loan at 4 per cent.	7,747,747
1886 Loan at 3 per cent.	18,352,080

Total responsibility ..... £55,099,820

The produce of the above securities, less 5½ per cent. commission, has been:—

Stock	£12,000,000
First loan	4,375,000
Second loan	6,840,000
Third loan	5,160,000
Fourth loan	5,059,499

Cash received... £36,434,499,

showing a rebate of 43¼ per cent. on the loans. By the close of the present month we may expect to learn what proportion of the work of the canal has been executed for the money spent.

**F**ROM time to time rumours have been prevalent as to laxity of administration, not to say the existence of jobbery, in some departments at the head-quarters of the Metropolitan Board of Works in Spring-gardens. One of these rumours had reference to the circumstances under which the land upon which now stands the London Pavilion Music Hall was let. The matter, it seems, has been under the consideration of the Board for some time past, and at the meeting to be held this Friday, the 15th inst., the Works and General Purposes Committee of the Board will present a report,—

“Submitting, in pursuance of the resolution of the Board of the 3rd of December, 1886, a statement of the facts connected with the letting of the land at Piccadilly-circus:—

Reporting the result of an investigation which the Committee has made into matters arising out of the above reference:—

And stating that, in the opinion of the Committee, Mr. Robertson, of the Architect's Department, has been injudicious in allowing relatives to become tenants of the Board without informing the Board; but that the Committee does not find that there has been anything worthy of more severe censure.”

We quote these sentences from the Board's agenda, but we trust the full report of the Committee will be published, and that the whole subject will be fully sifted at the meeting of the Board. The public interests, no less than the interests connected with building, demand that the proceedings of the Board and its officers should be beyond suspicion. We notice that some members of the Board are not inclined to take so lenient a view of Mr. Robertson's conduct as the Committee is disposed to do. Mr. Mossop has given notice that on the motion to agree with the report of the Committee he will move, as an amendment:—

“That, in view of the circumstances disclosed in the statement submitted by the Committee, the Board regrets to be unable to come to any other conclusion than that it is inexpedient that Mr. T. J. Robertson should remain in the Board's service; and that he be dismissed accordingly.”

Mr. Price has also given notice of the following amendment:—

“That, in the opinion of the Board, the conduct of Mr. Robertson, as detailed in the report of the Works and General Purposes Committee, has been such as to render it undesirable that he should remain in the service of the Board.”

**MR. FREDERIC HARRISON'S** paper on “The Sacredness of Ancient Buildings,” read at the annual meeting of the Society for the Protection of Ancient Buildings, and now published in the current number of the *Contemporary Review*, is an eloquent and ably-written appeal on the conservative and reverential side of the question, as Mr. Harrison knows so well how to write. As



a statement of one side of the question nothing could be better, and Mr. Harrison even shows some glimmering of perception that there is another side, in his reference to the fact that the clergy regard a church as the place where their official work is done, and may, therefore, naturally be expected to wish to keep it in repair and even to make additions to it when necessary. Mr. Harrison, it is true, stigmatises this feeling as false and dangerous, "a dreadful temptation"; it is something, however, that a lecturer at the "Anti-Scrape Society" can even recognise the fact that it is a not unnatural feeling. It is odd, however, that a student of history like Mr. Harrison should appear quite blind to the fact that this worship of ancient buildings is entirely a recent development of feeling; that when architecture was a living interest, people would not scruple to remove any old building to put up one that suited them better; and that the blind worship of ancient buildings is really an indication of a country having lost confidence in its future, and clinging despairingly to the records of its past. We have read many passages in the article, however, with pleasure and sympathy; among others the following:—

"Statues and paintings are the creations of single Masters. Buildings are the collective growth of Ages. But for this very reason, what buildings lose in personal interest they gain in human interest, in social significance, in historical value. The multiplicity of parts in a great edifice, the vast range of its power over an infinite series of human souls, the sacrifices, the endurance, the concentration of efforts by which it was built up, and the countless generations of men who have contributed to its beauty or have been touched by its majesty, give it a collective human glory, which no statue or picture ever had,—a glory which is exceeded only by the great poems of the world. . . . A great national building is the product of a nation, and is the school of a nation. And for this reason it should stand next in reverence and love to the great poems of a nation. Next to the 'Iliad' and the 'Trilogy' comes the Parthenon. Next to the 'Divine Comedy' the Duomo of Florence and its adjuncts. Next to Shakspeare and Milton, the Abbey."

IT is a pity that "A Sanitary Engineer" who wrote a letter to the *Times* on Saturday last on "the effects of continued drought on water supplies," should have thought it necessary to wind up an otherwise very useful and sensible letter by a sneer at a what he termed the "waste of water in foolish fountains." He referred especially to the fountains in Trafalgar-square, and there is no doubt they are poor concerns enough; but it was obvious that the "Sanitary Engineer's" complaint against them was not that they were poor fountains, but that they were fountains at all, and that in such an object as a fountain the sanitary engineering mind sees nothing but a waste of water. This is only one instance out of many of the manner in which, doubtless for some wise purpose, sanitary authorities and professors seem created usually without any sense of the beautiful. If the use of water in a fountain is foolish waste, the use of any material to produce mere beauty is foolish waste also. The fact is that a finely-designed and liberally-supplied fountain is one of the most beautiful additions that can be made to a public square or place; not only a beautiful object, but with the additional beauty of change and movement; as Browning has so finely described it in his allusion to the fountains before St. Peter's:—

"How these fountains play  
Growing up eternally,  
Each to a musical water-tree."

We should be very glad to see the fountains in Trafalgar-square removed to give place to better ones; but for any one to talk of fountains as a foolish waste of water is only a proof of his own insensibility to beautiful things. There is no more refreshing and cheering object in a crowded and heated city than the sight and sound of a fountain, and we only wish there were more and better ones in London than there are.

A NEW patent, taken out by Mr. T. C. T. Walrod, Associate Inst. C.E., for facilitating the connexion of house-drains with

sewers, deserves notice. The object is to simplify the making of connexions between house-drains and street-sewers by the use of a special junction-pipe or block, the mouth of which points upwards. When the sewer is being made pipes are carried up vertically in the sewer trench without any extra excavation from the junctions to within a foot or two of the surface of the road. All deep digging when the house connexions are laid in is thus avoided. The junctions may be made to act as junctions and traps in one. Of course, in some situations the difficulty of practically rendering this contrivance available would be that it would not always be possible to foresee where future junctions would be required. But in the case of a street or a building estate already laid out in lots, the points where connexion will be required can be pretty well localised, and under such circumstances the improvement seems calculated to be a very practical and useful one.

IN a pathetic article entitled the Disembowelling of Venice, headed with the text from Isaiah, "Who hath taken this counsel against Tyre, the crowning city, whose merchants are princes, whose traffickers are the honourable of the earth?" (xxiii. 3), Signor Giacomo Boni laments the vulgarisation of his native city at the hands of the municipality and bric-à-brac hunters. The palaces on the Grand Canal, he says, have been reduced to skeletons; the balconies, the window-openings, are lined with hotel signs or the placards of furnished apartments, or of dealers in antiquities, who, "after stripping our sumptuous palaces of their ceilings and cornices, and even the architraves of the doors, are replacing them with modern imitations. The South Kensington Museum has already some two or three hundred pieces of marvellous Venetian sculpture, among the rest the marble tops of our wells. Byzantine, Gothic, and Renaissance, adorned with ornaments and symbols, representing the art of eight centuries; the emblematical bas-reliefs which once adorned our ancient houses and the homes of Mediaeval art guilds; balconies, and complete windows with their dressings. In a short time the very skeletons of these palaces will have been carried off piecemeal and rebuilt in some English park, or perhaps between a coal-yard and a tannery in Chicago; the Grand Canal will be filled up and the palaces replaced by five-storied houses with iron roofs, cement cornices, cast-iron balconies, pale yellow plaster, and red railings. The apse of the church of the Frari will be rebuilt, and an inscription upon it will record that the bricks were made on purpose, and are of the same size as those used in the fourteenth century." This forecast is, perhaps, not in all respects so improbable as it at first appears, and the Venetians will do well to consider that in divesting their beautiful city of all that makes it interesting they are in truth killing the goose with the golden eggs.

DURING this summer the old seat of the Fane family at Fulbeck, Lincolnshire, will be sold at auction. The land lies in Loveden Wapentake, ten miles distant from Grantham and Lincoln, and includes a portion of the well-known Heath sheep range. The manor, together with its six farms of arable and grazing land, extends over 1,500 acres. The Fanes settled here in the early years of the seventeenth century. The parish stands on Cliff-row, an acclivity close to the ancient Ermine Way. Also to be sold is Wrotham Hill Park, an estate of, say, 800 acres, on the high chalk hills between Sevenoaks and Maidstone, near to Weobley Station. Wrotham is of considerable antiquity, many remains having been dug up here which point to British and Roman settlements. Some ruins of the archbishop's palace may be found adjacent to St. George's parish church. Built in the Early English and later styles, the church was founded by William of Wrotham, a governor of Dover Castle temp. Henry II. His supposed tomb and coffin were discovered at the restoration of the fabric thirty years ago.

THE final service at the French Protestant Church, St. Martin's-le-Grand, was held on Sunday, May 29th last. Pending the building of another place of worship, the congregation will meet for a while in the Athenæum Hall, Tottenham Court-road. The demolition of the church, and of some of the neighbouring property, is now in progress, by way of clearing a site for the enlargement of the General Post Office. The Great Northern Railway Depot is removed from the Bull and Mouth to new premises in Bread-street, Cheapside; and Bull and Mouth-street will be eventually built over. The cost of the new departmental building is calculated at 125,000*l.*, exclusive of the ground and compensation awards. In the Parliamentary estimates now before the House of Commons an aggregate of 388,000*l.* is scheduled in respect of various post-office buildings throughout the country.

THE long-continued sunshine of this summer has naturally called the attention of householders to outside or sun blinds. Those who are well off can afford to go to the expense of putting them up, but even in well-appointed houses they are confined to a few rooms. In small houses ineffectual attempts are made to shut out the heat by drawing down Venetian or other inside blinds. But they have next to none of the effect of an outside covering. In fact, Venetian blinds inside a window are some of the foolish things of the modern builder; if they are placed outside they are in their proper place. The most effectual of all shields against the sun and heat are outside wooden shutters, which ought to be affixed to every country-house, as they keep out the cold in winter and the heat in summer. Those, however, whether being in town or country, who cannot afford regular outside blinds, can do much to keep out the sun and heat by hanging a piece of canvas or sacking over the windows from the outside. It can be hung to a couple of nails above the window, and kept in its place by a bit of cord tied to a nail below it.

THE large Agricultural Hall at Islington, not to be outdone by its larger rival at Kensington with its "Olympia," has been opened under the title of "Arcadia," but though an abundance of flags and streamers, plenty of flowers and shrubs, with Chinese lanterns and coloured gas-lamps by the thousand, have done much to brighten the interior aspect of the hall, it is the Agricultural Hall still. In various parts of the Hall are erected certain wooden platforms, approached by devious inclines as well as by steps. These platforms are in some instances faced or backed by some scene-painter's architecture, à la "Old London." As a matter concerning the public safety, we should like to know whether the erection of the platforms and steps referred to has been supervised by any responsible architect or surveyor? The handrails when we visited the hall on Monday last were (some of them) very shaky, while the steps (particularly those at the back of the arches at the Islington Green end of the hall) struck us as being very slight in construction, and quite inadequate to bear the "live loads" that may come upon them on crowded days. It will be well, we think, to look to this before next Bank Holiday, August 1, when no doubt there will be a very large number of visitors to "Arcadia." We cannot say much for the entertainment. What we saw of it was of the ordinary music-hall "variety" type, with a great deal of dangerous gymnastics and profitless contortion of the human body. A feature of the place is the large water-fall at the Liverpool-road end of the hall, immediately under the clock. This has been built by Mr. Dick Radcliffe at a cost, it is stated, of 600*l.* The water for the "fall" is pumped into two large tanks, one on the gallery floor and one above it just below the level of the clock. The effect is very good.

THE Summer Exhibition of water-colours and sketches at the Dudley Gallery is not very much to speak of, but contains some pretty



things. Mr. Arthur Severn has one of his brilliant experiments in colour, "Misty Morning at Sea" (49), with a red sunrise and golden reflections on the waves, represented with a brilliancy which is startling at first sight, but which improves on acquaintance. Architectural subjects are rather numerous. Mr. Harry Goodwin contributes a good study of Boston Tower and Lichfield, and Mr. Medlicott takes Rouen Cathedral and Westminster; in the latter, however (147), the proportions of the Victoria Tower are too broad and stunted. Mr. Newton Bennett's Thames scenes (64, 71), are very delicate and refined, if a little wanting in force, and Mr. R. A. K. Marshall, whose name we do not remember, has shown some charming work, minute in detail without losing atmospheric effect, in "Cottages near Chirk" (164) and "The Valley of the Test" (205). Mr. Waterford's "Our Lord among the Doctors in the Temple" (28) would be well suited for a decorative work in mosaic or fresco, for which it is, perhaps, intended. Among other drawings worth picking out are a still-life subject, a study of old books (22), by Mr. Block; "The Edge of the Common" (37), by Mr. P. Ghent, a landscape of much beauty; Mr. Howard Gaye's "Stokesay Castle" (113), a good architectural subject; "The Last Gleam of Sunlight" (137), by Mr. Hiscox, rather stagy, but powerful; "The Sand-pit" (220), by Mr. Claude Hayes, an unusual drawing in tone and treatment, certainly fine, but looking rather like an attempt to imitate an old water-colour of the pre-chromatic period; Mr. Danford's "A Field Pool" (246), a study of twilight effect; Mr. Franz's "Twilight on the Tiber" (200); Mr. Arthur Severn's "Fir Island, Coniston" (194); and Mr. Dixey's "An East Coast Village" (77), seen dark against the sky from flat marshy land behind it. Mr. J. Knight's large drawing, "The Rock above Lake Idwal" (177), is a grandly-drawn subject, but wholly unreal in colour; the artist's own inventions in colour have run away with him.

**P**ASSING through the Inner Temple the other day, we were moved to turn aside for a few yards to look upon Goldsmith's tomb, which, as many of our readers know, is just to the north of the eastern end of the Temple Church, but outside the churchyard railings, in the midst of a somewhat neglected space or court at present partly used as a stone-yard. The tomb consists of a simple coped stone, inscribed on one side with the words "Here lies Oliver Goldsmith," and on the other with the dates of his birth and death. The coped slab is quite unprotected, and the inscriptions are fast becoming obliterated,—partly by the action of the weather, but partly also (judging from certain scratches on the stone) by the feet of light-hearted juveniles, who perhaps find the tomb a convenient coign of vantage for playing at "I'm the King of the Castle." We wonder that something has not long since been done to protect and keep in decent order the grave of the author of "The Vicar of Wakefield."

**A**T Messrs. Bellman & Ivey's Gallery in Piccadilly is a small but interesting collection of sculpture, including a bronze reduction of the very fine statue of "Diana," by M. Falguère, which was in this year's *Salon*,—one of the most spirited ideals of the goddess of the chase that has been seen. A full-size bronze of the bust is also there; the head is of very original type. Among other interesting works are M. La Vingtre's terra-cotta statuette, "At the Fountain," and some spirited little clay sketches by Mr. Alfred Drury.

**T**HE *Times* has not yet, after the lapse of a week, discovered its blunder about "Mr. Butterworth," in spite of having had a letter with the right name in its own columns in the interim. On Wednesday it printed a letter from Mr. Butterfield, signed with his name, but on Thursday the reporter of the case of the Louth Chapel, in replying to a letter of Mr. Freeman's, thinks better of it, and goes back to "Mr. Butterworth" again. Mr. Freeman, in writing on the subject, said, "he could

not find Mr. Butterworth's evidence" in the records of the Fitzalan Chantry case. No wonder.

#### A VISIT TO THE FORTH BRIDGE.

In the *Builder* for January 2, 1886, we gave a good many constructional details of the Forth Bridge, as well as a small view of it as it would appear when complete, and an account of the works up to that date. More recently we have published (*Builder*, April 23, 1887) the very full and technical account of the work on the foundations, furnished by Mr. Middleton, the contractor's engineer during that period of the works, to the Civil and Mechanical Engineers' Society. At a future stage of the work we shall probably be able to give further technical details. But these, though of the most value to practical men, do little to give an idea of the real scale of the work which is being carried on at the Firth of Forth, and of the bold nature of the undertaking. Mr. Baker's lecture at the Royal Institution a few weeks back, to which we referred, did something, aided by the fine series of photographs shown by the lantern, to convey an idea of the scale of the bridge to those who have not seen it; but only a visit to the work itself can enable any one to realise the actual bigness of it. Mr. Baker's photographs, however,

work, after being first drawn to scale on paper, being set out on this floor full-size; and very complicated work some of this detailing must be, considering the number of steel plates of which each portion is built and the accurate fitting required at junctions. The moulding-loft contained, at the time of our visit, an "architectural" model also, of the arch which is to crown the last stone pier before the steel portion of the bridge commences, and through which the railway is to run. This arch, which has to come on the top of the last stone pier shown in our first sketch, is a little larger than the Marble Arch; not, it must be admitted, equal to that in design, but more suitable to the situation. The other sheds are filled with machines for dealing with mild steel in various ways; planing and trimming machines, crawling slowly backwards and forwards along the edge of a plate; circular saws, moving with what seems very slow revolution, but which has been found to be the most effectual in shearing through soft steel; hydraulic presses for giving the requisite curve to the plates, which are placed on a concave bed of the required curve, a convex "squeezer" of the same curve coming down on the plate and settling the job in a moment. Everything is slung and moved by hydraulic cranes; there is no lifting of heavy weights by manual labour. Outside the sheds a travelling drilling machine



Fig. 1.—Approach to the Bridge from the Queensferry Side.

stimulated the imagination so far as to lead us to the conclusion that life was not worth living without seeing the Forth Bridge, and accordingly we found ourselves not very long afterwards disembarking at the mean-looking little roadside station of Dalmeny, about fifty minutes by rail from Edinburgh and twenty minutes' walk from the head of the bridge works. A few notes of impressions on the spot may assist others who have not been there to understand the real nature of the work, which is unquestionably the boldest engineering undertaking of which we have any record.

Walking from the station, we come first to the workshops for preparing the various portions of the structure; for everything is set out and made on shore, the plates being afterwards numbered, taken to pieces, to be put together again *in situ*. These work-yards extend for a considerable distance along the southern bank of the Firth, near to, but not close on, the shore, except at the point where the bridge head is reached. At the entrance to the work-yard is the house for the resident staff, and for the accommodation of the chief engineers on their frequent visits. The illusion in regard to scale which meets one throughout the work, and is only gradually dispelled, begins in the work-yards, for the extent of these is so great and the constructions dealt with generally are so large, that it is difficult to realise at first that the portion of one of the large angle tubes for the main piers, which is lying along after being built up, is really 12 ft. in diameter. The upper story of one of the sheds is laid out as an immense drawing loft, all the details of the iron

is working on the plates of a portion of one of the tubes, holes being drilled by hard steel drills working under a jet of water directed on the point; these cut out the mild steel in long thin spiral ribands which strew the ground beneath. In other places the operation of riveting up by a hydraulic riveter was going on; "pretty," as Pepys would have said, to see the red-hot nut of the bolt, at one stroke of the riveter, crushed, cooled, and polished into a smooth semicircular boss, giving a remarkably neat finish to the portion of the riveting which has been thus worked. Hydraulic riveting, however, cannot be applied in all situations.

Going down on to the road skirting the shore, we proceed towards the first, or Queensferry pier, along the temporary bridge and road which have been formed by the side of the stone piers carrying the shore ends of the viaduct. The appearance of things from this point of view is indicated in the first of the sketches appended. On the left are the lofty granite piers carrying the viaduct, and which in themselves constitute what would once have been thought a great engineering work, but which is completely dwarfed by the magnitude of the cantilever portion of the bridge. This dwarfing, however, is not apparent from this point of view. The steel pier does not show its real size any more in the reality than in our sketch; there is nothing to give scale to it, and in perspective it appears close to the last of the stone piers. It is difficult to realise from this point that the structure beyond, now wanting only the top member or crosshead, is 350 ft. high, and that each of the tubes shown is 12 ft.



diameter. (The tubes are a little too thick in proportion in the sketch.) The cylindrical excrescences clinging round the top of each tube are the cages invented by Mr. Arrol, the contractor, for the safety of the men. They are built with vertical bars, with the spaces between filled in with wire netting. The men work inside this, building up the plates, and as the tubular structure progresses, the cage is pushed up in advance of it; so that the tube forms to a great extent its own scaffolding.

Proceeding till we get under the pier, we at last realise the size of the thing we have come to look at. The space included within the four angle piers is quite a large area, crammed, of course, with all the debris of builders' operations, while here and there a red flag warns people off places which are dangerous, owing to the chance of falling bodies from work going on above. The angle tubes go up like leaning towers into the air. Above there is a complicated mass of wind-braces, scaffolding, and tackle, which obstructs the view to the top, and

this sketch are seen two of Mr. Arrol's "cages" clinging round the tubes. Arrived at the top, we find ourselves on a broad scaffolding covering nearly all the space included between the members of the pier; from this there is a glorious view over the Firth and the adjoining country; and, which is more to the purpose, from this point we can realise better than anywhere else the nature of the undertaking. Let the visitor bear in mind that he is here 350 ft. above sea level, on the top of a construction of immense proportions and enormous weight; let him look out at the next pier, the Inchgarvie pier, a third of a mile off; and let him reflect that from the erection he stands on, a construction equally massive and heavy in its parts, and nearly twice as long, is to be built out horizontally into mid-air over the sea, without any possibility of scaffolding, by men working in squirrel cages stuck on to the end of the tubes, and pushed on as the tubes are built, and he will probably agree with us that this is an engineering project calling not only

complete and stable in itself, and the next section can be proceeded with in the same manner. The temporary supports for the lower members are in themselves of a tolerably permanent kind, and at the time of our visit temporary "temporary" slings were being adjusted for this purpose, which, it may be mentioned, were formed from some of the links of Old Hammersmith Bridge, which have come in very usefully, and seem to be in very good condition.

We asked one question at headquarters which we thought a crucial one, and the answer to which we promised to keep a secret if desired, viz., how long do the engineers, in their inner conscience, believe that an enormous iron structure like that, with such an outer and inner area of plate surface, will last? Mr. Baker, however, has every faith in it from that point of view; he is of opinion that, properly looked after, there is no reason why it should not stand for 500 years. Provision has been made for getting at every part of it; there are

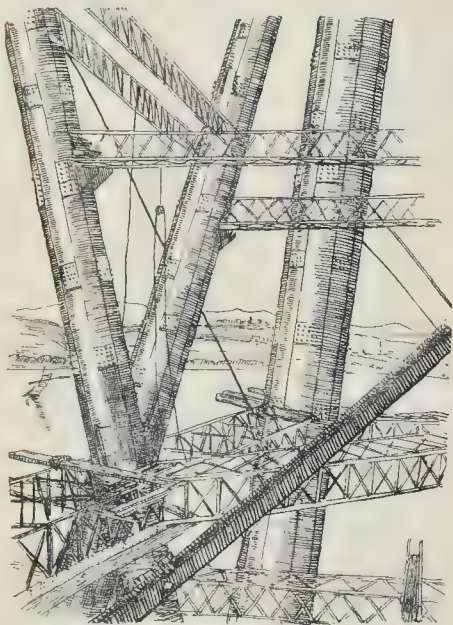


Fig. 2.—Half-way up the Queensferry Pier, showing Main Angle Tube and Cross Braces.

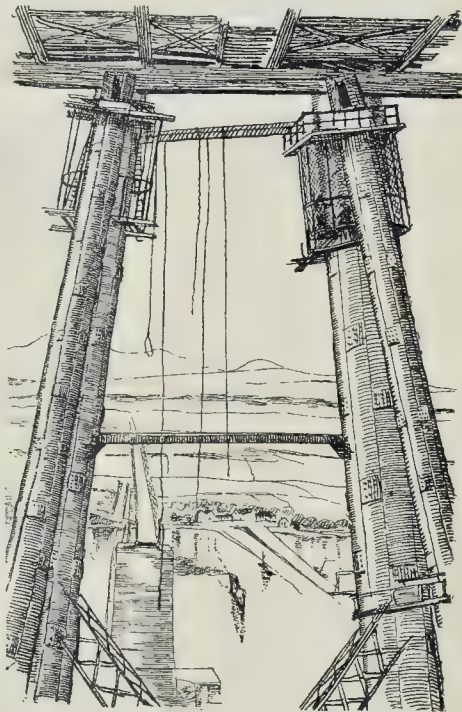


Fig. 3.—Near the Top of the Queensferry Pier, looking down on Masonry Pier and Viaduct.

prevents one taking in the whole. We can go up very expeditiously, however, in one of the two travelling-cages which work with guides on a couple of steel ropes stretched till they are rigid; the cage being drawn up a rope wound by a steam-engine below, and fitted with a patent clip warranted to hold on the guide-ropes if the suspender breaks. The ascent between these vast bones, so to speak, of the structure, is curious and picturesque in effect. In sketches 2 and 3 we give reminiscences of the effect of the structure as seen from two points on the temporary ladders fixed on the wind bracing. They are both looking towards the Queensferry side of the Firth, and will perhaps give some idea of the look of things up here, and the appearance of these great tubular girders soaring up into the air. No. 2 is taken just at the half-way point, where the great cross-braces at the side intersect; No. 3 is about 60 ft. or 70 ft. perhaps from the top, and in this is shown the masonry pier before mentioned, far below, and reduced to very secondary position. At the upper part of

for scientific knowledge and experience, but for no little courage, on the part both of engineer and artisans. A vivid idea is given of the nature of this part of the work by the appearance of the portions of lower members of the cantilevers already finished, as shown in sketch 4, taken from the top of one of the four circular granite piers which form the base of the steel pier. Here the portion of the cantilever tube which is completed is shown projecting out into mid-air like the bowsprit of a huge ship, with the workmen's cage at the end of it; and in that way and by that means it is to be carried on. (At the time of the sketch being taken the cage was not being used, and the netting had been removed, leaving only the frame-work.) The cantilevers at opposite sides of the main pier are, of course, carried on simultaneously, in order to balance each other, and the plan is to commence with the lower member of the cantilever; then to sling it up temporarily and execute an equal length of the top member and the cross braces which connect the two; this section of the cantilever will then be

manholes in every tube and in the diaphragms throughout them, and steel ladders formed in the interior of the tubes. It is to be hoped air inlets have been provided also; it would be rather a stupid kind of death to be stifled at the top or bottom of a long tube.

The cantilevers are only just commenced; and there is no doubt this is the most difficult and anxious part of the work; but we anticipate its successful accomplishment.

It will, no doubt, be objected by some that the bridge is a very ugly erection; that was our own impression the first time we saw a sketch of the design. But the fact is that you do not feel this after seeing the work itself. It is so immense that it fascinates by its very size, and so difficult an undertaking that one feels that decorative considerations would be out of place; the problem is to do it at all. Every architect who is in the way of doing so should see this extraordinary work. He may not think it beautiful, but he will probably come away with the conviction that Gothic vaults were not such very big things after all.



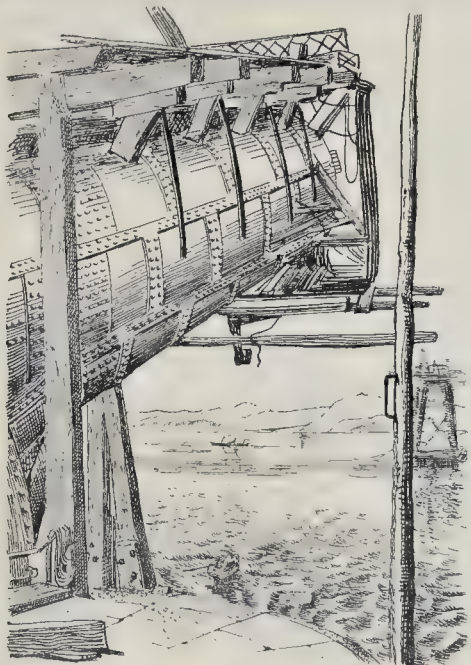


Fig. 4.—The lower member of the Cantilever starting on its journey; Inchgarvie Pier in the distance.

#### NOTES FROM DURHAM AND AUCKLAND CASTLE.

BISHOP HATFIELD'S magnificent hall at Durham Castle, now the Dining-hall of the University, has recently received the much-needed addition of an oak screen and gallery at the lower end, from the designs of Mr. C. Hodgson Fowler. The rich Renaissance screen erected by Bishop Cosin, during his magnificent tenure of the See (1680-1674), was ruthlessly swept away in 1849, under the iconoclastic rule of Dean Wadlington and Archdeacon Thorp, together with the sumptuous mantelpieces and panelling which hid the bareness of the walls. The whole was a gorgeous specimen of its style, with Ionic terms, broken pediments, arabesque escutcheons, and swags of foliage, on every account deserving preservation. Mr. Fowler has, very wisely, not attempted to reproduce Cosin's work, but has formed his design in accordance with the best examples of mediæval hall-screens, the traditional arrangements of which he has carefully followed. The centre is solid, with a sideboard below, and a square projection rising from a curved soffit in the gallery above, and a wide two-leaved door on either side. The front of the gallery and the centre and flanks of the screen are covered with well-designed Perpendicular panelling, in which a little greater depth of moulding and vigour of outline would have given more effectiveness to an excellent work.

The picturesque Ionic porch with which Cosin masked Bishop Hatfield's fourteenth-century arched doorway, from the friable nature of the stone, has gradually fallen into a state of almost dangerous decay. All the four columns are much weather-worn, and one is reduced to such exceeding tenuity that it reminds one of a stick of barley-sugar which a child has vigorously sucked. It is to be hoped that when the needed restoration takes place the old mischievous principle of restoring away Renaissance work, because it is not Gothic, which has swept away so many beautiful and interesting features in the Castle as well as in the Cathedral, will not be revived, but that though Cosin's wood-work is gone, probably burnt, Cosin's porch will be allowed still to bear witness to the princely liberality of that great "prince palatine," and that the repair may be done by some sympathetic hand.

The windows of Bishop Tunstall's late but

charming little chapel in the Castle cry out loudly for stained glass. The modern panelled desk-fronts assert but poorly, either in colour or design, with the gorgeously rich bench-ends with heavy poppy-heads in black oak bearing Bishop Ruthall's arms (1509-1523), brought from Auckland Castle, or with Cosin's screen and gallery. The walls of the sanctuary are lined with some good examples of "intarsia" panelling representing Apostles and Evangelists brought from the cathedral, or some other sacred building.

The original three-aisled Norman chapel of Bishop Walcher (1081-1096), with its tall cylindrical pillars bearing up its vaulted roof, its herring-bone pavement, and raised platform for the three altars, one at the end of each aisle, still serves as the thoroughfare to Salvin's Keep. It is to be wished that so interesting a building were better cared for, and treated with greater reverence.

The newly-erected Lecture-rooms and Examination-halls on the Palace green, both without and within, powerfully recall a second-rate Board school. A more bald uninteresting work we have seldom seen. With such excellent architectural skill at their doors the University authorities have little excuse for giving an illustration of the old saying, "Go further and fare worse." The cold blue slates are so offensive to the eye, and render the lecture-rooms so intolerably hot, that it has been resolved to exchange them for grey Stonesfield slates.

The Chapel of Auckland Castle is receiving a costly process of adornment, at the expense of the present Bishop, whose munificence is as remarkable as his learning, under the general superintendence of Mr. Hodgson Fowler. The total cost will not be much under 4,000l. The truth of the tale that this chapel was originally the hall of the Episcopal palace, and was converted to its present use by Bishop Cosin, the former chapels,—there were originally two, one over the other,—having been pulled down by Sir Arthur Haselrigg to erect his mansion, which in its turn was demolished by Cosin, indignant at the sacrilege, which had been doubted by some, on the ground of the ecclesiastical character of the building, and its proper orientation, has been fully substantiated during the progress of the repairs. On lowering the ground at the east end the three archways opening respectively to the buttery, kitchen,

and pantry, which are so certain a mark of a Mediæval hall, were discovered built up in the wall, as well as the putlog-holes of the gallery floor, traces of the outside staircase to which, and the door leading to it, are to be seen in the south wall. Though Cosin is accredited with having built the chapel, he did no more than restore a half-ruined building, putting in new windows, and erecting a lofty clearstory and panelled ceiling. The stalls and other furniture, of great richness, are also his work. The arcade of four bays, the arches supported by the "divers pillars of black marble," described by Leland, in "the great haulte" (the same Frosterley marble which gives its character to the chapel of Nine Altars in Durham Cathedral) is of Early English date, but not all of one period, the westernmost piers having the square abacus of the Transitional style. The wall-shafts of the original roof at a lower level, rendered purposeless by the erection of Cosin's lofty clearstory, have had meaning given to them by being made to support angels, with expanded wings, carved in oak.

The chief new feature in the chapel is the lofty panelled oak reredos, in three compartments and two tiers, designed by Mr. Fowler, containing very well executed groups and figures in alto-relievo, the work of Belgian artists. The principal subject is the Crucifixion, occupying the central panel in the upper tier. The other panels contain statues of apostles, martyrs, and local Northumbrian saints,—St. Oswald, St. Hilda, St. Cuthbert, &c. The whole finishes with a projecting concave cornice. Below the reredos, the retablo of the altar is formed by a long panel of polished brass, set in Frosterley marble, exhibiting in ten arched compartments the various instruments of the Passion in coloured enamel. The wings of the altar are of hangings of rich stuffs of subdued hues. The three eastern windows contain excellent glass of very pleasing, calm hues, the work of Messrs. Burlison & Grylls, who are also responsible for some other parts of the decoration. The whole of the work of the chapel displays an exquisite feeling for colour, which we have so often to feel the want of in more gorgeous and pretentious works. At each angle of the sacrum stands a tall brass candlestick on a circular Frosterley marble base. A portion of a black marble altar-slab, retaining two of its five crosses, rescued from base uses in the kitchen, has been appropriately converted into a credence-table. In addition to the ordinary choir-stalls, Cosin erected a range of elbowed stalls along the aisle wall on either side, below the windows, quite up to the east end. The bare space above these has been relieved by a dull-green dado, bearing the arms of the bishops in their proper tinctures. The aisle windows, three on each side, which are now disfigured by a travestie of Cosin's "fret" in cold blue or white glass (the tinctures being really "or on azure"), are to be filled with new glass illustrative of the history of the see of Durham by the same artists who have so successfully executed the east windows. A new canopied stall for the Bishop in the return at the west end shows how fully Mr. Fowler has entered into the feeling of Cosin's Renaissance work. Nothing has as yet been done to the ceiling, which is flat and of panelled wood. It would be improved by being relieved with some gilding and a little colour. The good taste which has ruled the whole work is a guarantee against any of the gaudiness which so often offends us in modern attempts at polychrome.

At Durham Cathedral nothing has been done calling for remark since the restoration of the choir by the late Sir Gilbert Scott, beyond the addition of some stained-glass windows, reflecting great credit on Messrs. Clayton & Bell, by whom the whole series has been executed. Few cathedrals, if any, have been equally fortunate in having all their principal windows filled with glass by the same artists, and on one plan. All the windows are good, but the "Te Deum" window on the south transept and the "Joseph" window in the Chapel of Nine Altars deserve special commendation.

It is to be regretted that the niches of the unique tabernacled Neville-screen behind the altar still remain vacant. Some little while since there was a proposition to restore the statues which augured well, but though energetically advocated in influential quarters, the decided opposition of some and the lukewarm support of others have, though we hope only for a brief period, suspended the work.



The altar itself has received an appropriate ornament in the shape of a gilt metal altar-cross, designed by Mr. J. B. Clayton, of the firm of Clayton & Bell, and executed by Messrs. Barkentin & Krall. It is the offering of Mrs. Lake, the wife of the present dean, and nine other ladies of the diocese. It is a costly and elaborate work of art, on which the designer has evidently spent thought and pains. But owing to the effect of a full-sized model not having been previously tried, it fails to fill its place adequately. Nothing, we may say, is more deceptive than the dimensions of a large building, and it is impossible for the most accurate eye so to carry away its proportions as to be sure that any new piece of furniture will be in harmony with its surroundings unless an actual experiment is first made. As it is, the Durham cross looks dwarfish, though not so painfully diminutive as the still more costly altar-cross at Ely, and for want of being an inch or two higher, the horizontal bar falls in the same line with a string-course of the reredos, and loses distinctness. Common sense so plainly dictates that the effect of such a design should be proved before it is executed that we are surprised that this preliminary step is not more often taken. A bit of planking, or even a piece of mill-board, cut to shape, would be enough to prevent an irremediable error. Mr. Clayton, in his design, has evidently desired to avoid the commonplace, and to make a new departure in altar-crosses. His wish is commendable, but the way he has carried it out is hardly happy. Instead of the usual circular or polygonal base of equal sides, his cross rises from an elongated octagonal podium supporting a little bit of brass panel work pierced with four trafoired windows, and terminating in as many pinnacles. The ordinary treatment is to us more pleasing. The lower part of the stem is formed of a cluster of shafts supporting a bold projecting cornice, from which the cross proper rises, connected with the cornice by bold spiral sprays of foliage. The arms, which are not equal, the lower being the longer, end in square medallions set round with "bobs" of rock crystal, which might be well spared, and containing the evangelistic symbols on white metal. The centre is formed by a large rock crystal surrounded with red carnelians. The stem is crocketed, giving it an unhappy resemblance to a fish's backbone, or a sword-fish's snout. The cross would have been more effective if the design had been simpler and its proportions more harmonious. The execution is good. Bishop Cosin's stately Renaissance silver candlesticks are to be brought into keeping with the cross by gilding. The ends of the retable now showing bare bits of deal require concealing by an extension of the hangings.

### Illustrations.

#### COMPETITIVE DESIGNS FOR THE IMPERIAL INSTITUTE.

**S**INCE last week we have obtained, after a great deal more delay and difficulty than there ought to have been about so simple a matter, the loan of the principal drawings from among the Imperial Institute designs, in order to have them photographed under more favourable conditions. We therefore give the perspective of the fine design by Messrs. Aston Webb and Ingress Bell over again, to a larger size and as an extra illustration, in order to do better justice to it. We also here subjoin the following remarks by the authors on their design, which were sent by them too late for publication in our last:

"In preparing this design it was considered of first importance to impart as far as possible a monumental character to the building, and by displaying the museum galleries, with a central block for the Institute offices, some expression would be given to the various uses of the building; and in order to prominently connect it with the Queen's reign the main tower was detached and devoted entirely as a personal memorial of the sovereign, in the same way as the Albert Memorial is in Hyde Park.

A round-arch style was selected as giving increased dignity to the buildings, and delicacy and preciousness of enrichment were aimed at by the engraving on it of Renaissance detail. The building was set back 100 ft. from the road, with a central square for the detached tower, and sunk gardens on either side required by the levels of the ground; the whole being

laid out with architectural surroundings and sculpture.

The central entrance leads to a hall with a group of offices on either side for the societies and others, with a staircase to each block; beyond were the public entrance to the museums and the grand staircase, and also the entrance to the great reception-hall; towards the gardens in the quiet were placed the libraries and reading-rooms, centrally situated for both the museum blocks.

Access to the museums for the delivery and removal of exhibits was obtained at either side on the basement level."

We give also a perspective view and plan of the graceful design submitted by Mr. T. G. Jackson. The following extract from his report explains his views in regard to the design:—

"In its general arrangement, the plan falls naturally into two parts,—1st, the Institute proper, and 2nd, the Museum, with its galleries. These two parts, it seems to me, should be distinct, though placed in direct communication with one another; for, while the officials of the Institute would require ready access to the Museum, the Museum and Exhibition galleries would be resorted to by the general public, who would have no business inside the Institute. In my plan, the Institute forms a compact quadrangular block facing the new road, with the Museum behind it, and communicating with it at two points on each floor. To insure ready communication between the various departments of the Institute, I have grouped them in four wings round a central space.

Beyond the entrance-hall is a spacious crush-room, with two large staircases, each 10 ft. wide, leading to the great hall.

The great hall and great conference-room are placed together in continuation of one another, and form a magnificent suite of rooms stretching along the whole north side of the interior quadrangle. These rooms would be handsomely finished with ceilings of ornamental plaster and oak panelling part of the way up the walls, and the vestibule would be decorated with marble columns and door-cases, mosaic floors, and moulded plaster ceilings.

The library occupies the first floor in the right-hand part of the front, and the various reading-rooms are placed in contiguity with it.

The rooms for the Royal Colonial Institute and Royal Asiatic Society look to the front, and occupy the first and second floors in the left-hand wing.

The sample rooms occupy the ground-floor under the great hall, and are lighted by large windows with a north aspect.

The museum and exhibition galleries are arranged round a series of courts on the northern side of the site behind the institute proper. In the centre is a great quadrangle, of which the back of the institute forms one side, and in the buildings forming the other three sides I should propose to place the museum of permanent exhibits.

*Architectural Design.*—It has been somewhat difficult to decide how to design a building standing about half-way between objects so diverse as the huge mass of the Albert Hall on one hand, and the group of Mr. Waterhouse's lofty towers on the other. The main building cannot conveniently be very lofty, and certainly cannot be made to bear comparison with the huge bulk of the Albert Hall. I therefore thought it best to interpose my great quadrangle and museums, which, though they might not entirely hide the Albert Hall, would have the effect of dividing the two buildings distinctly from one another.

The best way, in my opinion, of giving proper dignity to the Institute is to crown it with a lofty tower, which is of itself a monumental and appropriate feature. I have therefore made the central feature of my design a great tower, 43 ft. square at the base, which rises to the height of 300 ft. The upper part would contain a clock, and might be furnished with a carillon of bells.

The building is designed to be of red brick with dressings of Portland stone. The style is that of the Early Renaissance of the beginning of the seventeenth century.

Estimating the main building at 1s. per cubic foot, the tower at 1s. 6d., and the museum surrounding the great quadrangle at 9d., the Institute, exclusive of the additional exhibitions, would cost under 250,000*l.*, the sum to which the competing architects were limited."

We give also this week the perspective view, section, and plan of the design by Messrs. Deane & Son, of which we have already spoken as in its main idea the most suitable and monumental of all. Messrs. Deane & Son write:—

"In preparing our design we have had principally before our minds the greatness of the occasion, and we consider that cost in reason should be no hindrance to the carrying out of such a work, which is to be for ever a monument of the greatness of England and her Colonies, and a worthy memorial also of the Jubilee of Queen Victoria; and we were encouraged in the belief (that the cost would not be a hindrance), by the instructions given by the committee, which stated that at present the cost

should not exceed 250,000*l.*, but that architects were to show how much of the design they submitted could be done for that amount.

In consequence, we made our design (which included far more accommodation than we were asked for), hoping that we should have an opportunity of giving an explanation, and pointing out where we could modify our design,—or rather what portions, for the present, we should propose to omit if it was found to exceed 250,000*l.*

We have had an estimate given to us by Messrs. J. & W. Beckett, of Dublin, who are the contractors for our Science and Art Museum and National Library, a copy of which we enclose.

This gives a total estimated cost of 347,127*l.*, equal to 9d. per foot cube all round, including steps, landings, and portico, and it will be seen that although it exceeds the amount, yet it would be perfectly easy to bring it within the cost, without permanently mutilating the design or reducing the accommodation below the present requirements.

We think, however, as we did from the first, that our design falls short of what is due to the occasion, and we should like to have seen it a work of such a character as the Romans would have done under the circumstances, with open courts for statuary and fountains, and with detached buildings, each with a distinct object; but it was utterly impossible to do this, and we were too much tied down by the instructions (sketchy as they were), and the site, but in a small way we thought we had conceived something of the right sort in our amphitheatre.

Nobody, however, seems to have understood it or our feeling about it or the necessity of such a place. It would have been perfectly splendid surrounded with marble statues, and from a utilitarian point of view easily convertible into a huge hall for exhibitions such as periodically occur. We appear to have been the only architects in the competition who completed the whole scheme, showing sections and back elevations of future extension (part of which was the amphitheatre), and we fear we were supposed, therefore, to have included all the work we showed in our estimate, whereas we left all future work in outline as directed."

#### SELECTED DESIGN FOR EDINBURGH PUBLIC LIBRARY.

THE site upon which this building is about to be erected is a peculiar one, in respect that the two streets which form its east and south boundaries are at different levels, and, as its name implies, George IV. Bridge crosses the Cowgate, at a height of 45 feet above the level of that street. The adjoining buildings to the north are of great height, and the difficulty had to be overcome of covering up the rough natural gable, and at the same time leaving an area for access and light next the bridge. This has been done by projecting the principal staircase forward to the building line of the adjoining tenement, while keeping the main part of the building 10 feet back from the parapet of the bridge.

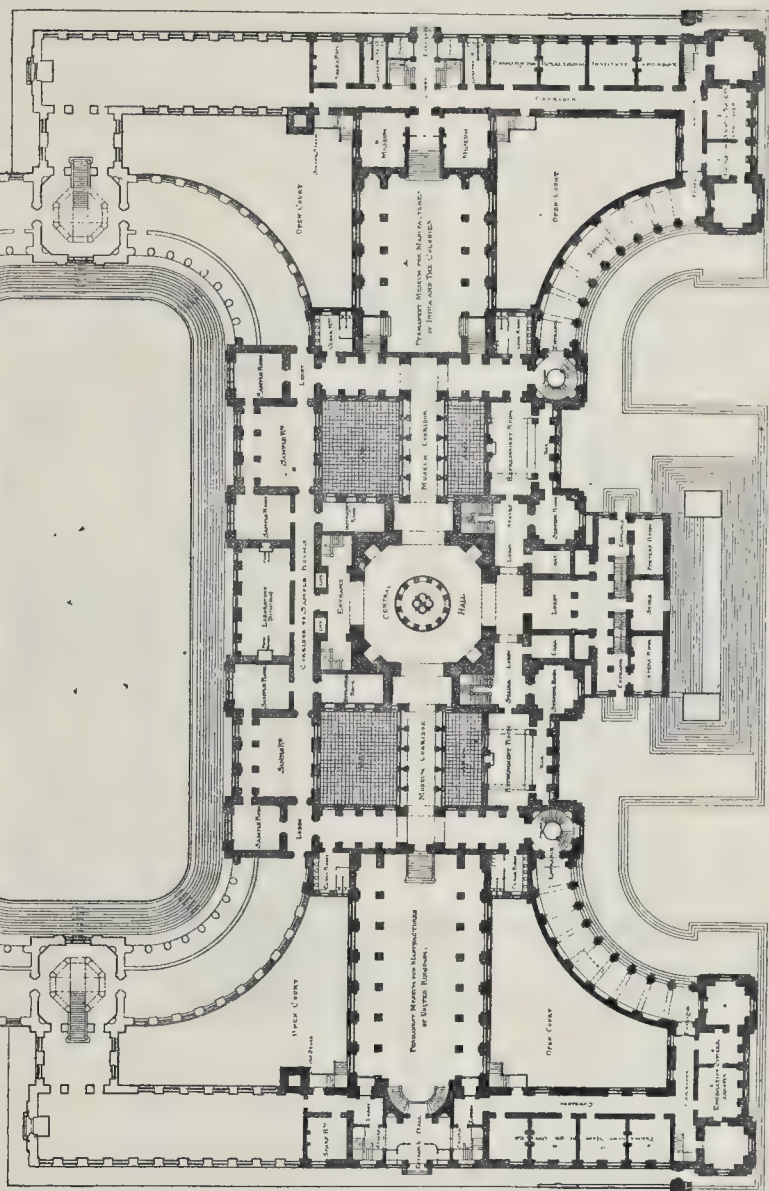
The motif of the design of the building is to secure abundance of light equally on all four sides of the three large rooms—the general reading room, the lending library, and the reference library. This has been attained by the adoption of the cruciform plan. The arms are short in length, and the whole end of each arm is occupied with large windows, so that ample light in every direction is obtained. The four angles which fill up the space between the cross form and the square outline of the site are occupied respectively with the public staircase from the Cowgate to the libraries, service stair, and rooms for staff, book stores, and grand staircase to reference library.

The principal entrance is on the level of George IV. Bridge, giving access to a colonnaded vestibule, at one end of which is the stair up to the reference room, and at the other the stair down to the general reading room. In the centre of the vestibule and directly opposite the main entrance are the doors to the lending library, which is disposed in much the same way as the telling room of a bank, the work to be performed being much the same in both cases. The centre area formed by the intersection of the arms of the cross is given up to the public, and is surrounded by the service counter, over which the books will pass between the public and the attendants. The book-shelves will be principally at right angles to the windows, for good lighting, and are so arranged that every book can be reached without the aid of steps or ladders, and are within a pace or two of the attendants' place at the counter. To the right and left of the doorway

\* This was quite obvious in the drawings.—Ed.

IMPERIAL INSTITUTE

DESIGN FOR



FLOOR

PLAN OF

Plan of Design by Messrs. T. N. Deane &amp; Son.

are the catalogues, while indicators placed at each section will inform readers whether the books they wish are in or not. The shelving in this room and the adjacent book store will accommodate 53,450 volumes, calculated at 10 volumes to each square foot of vertical shelf elevation.

The reference library upon the first floor above George IV. Bridge will have shelving to contain within itself 72,651 volumes, and the adjoining book store—which will be constructed upon the well system, with glass roof and spars iron floors at 8 feet heights—will contain 35,253 volumes, giving a total for the

reference department of 107,904 volumes, calculated at 8 vols. to each square foot of vertical shelf elevation. It will be capable of accommodating 160 male readers, and 36 female readers in the wing or arm of the cross, set apart and screened off for the use of ladies.

The newspaper and general reading room occupies the first floor below George IV. Bridge, and is reached both from that street and from the Cowgate by straight flights of steps 6 feet broad. This room is of the same size and shape as the reference room, and has in connexion with it a separate room for juveniles, and one for the higher-class magazines. The walls upon

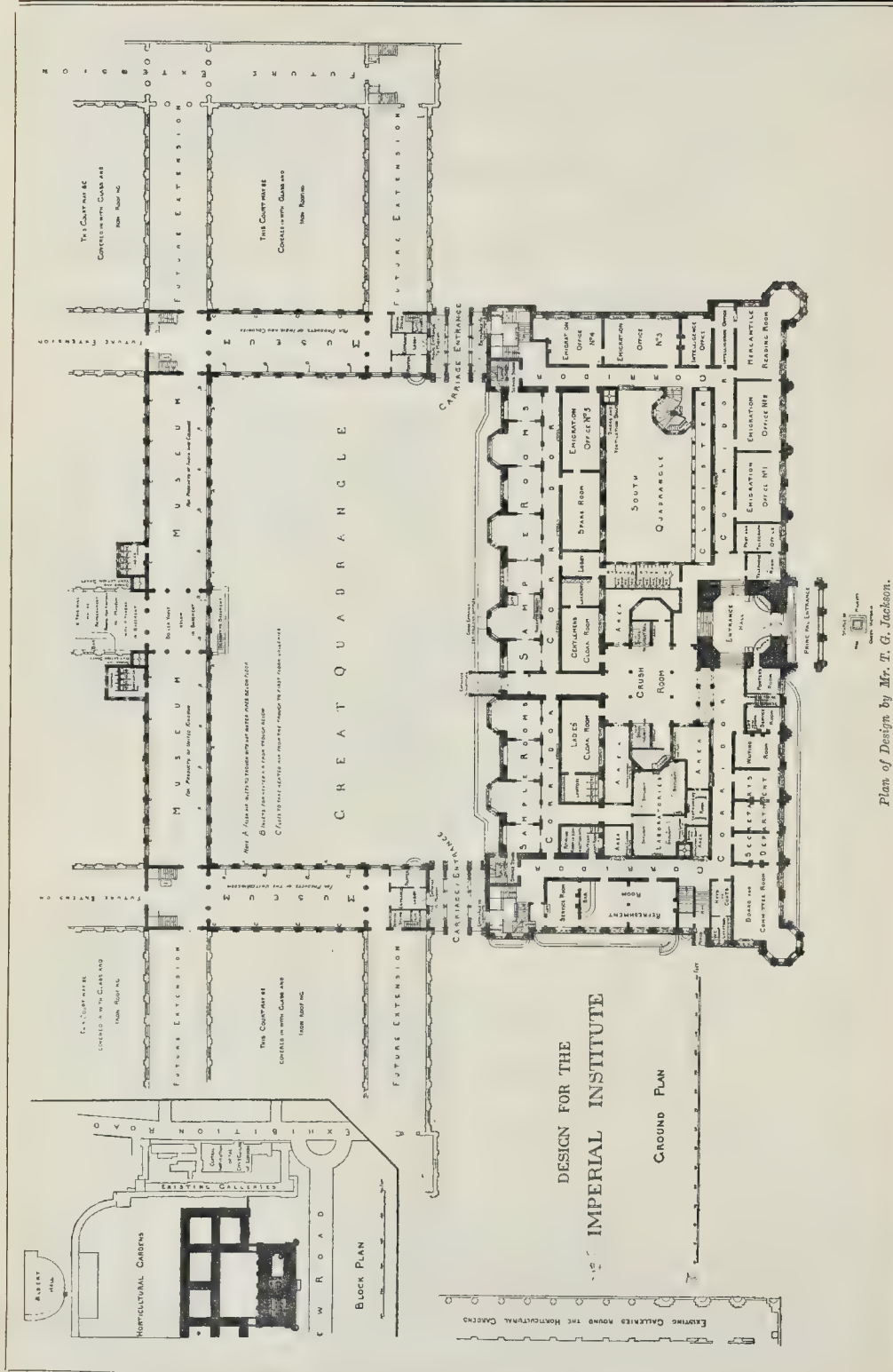
this floor will be tiled to a height of 12 feet above the floor.

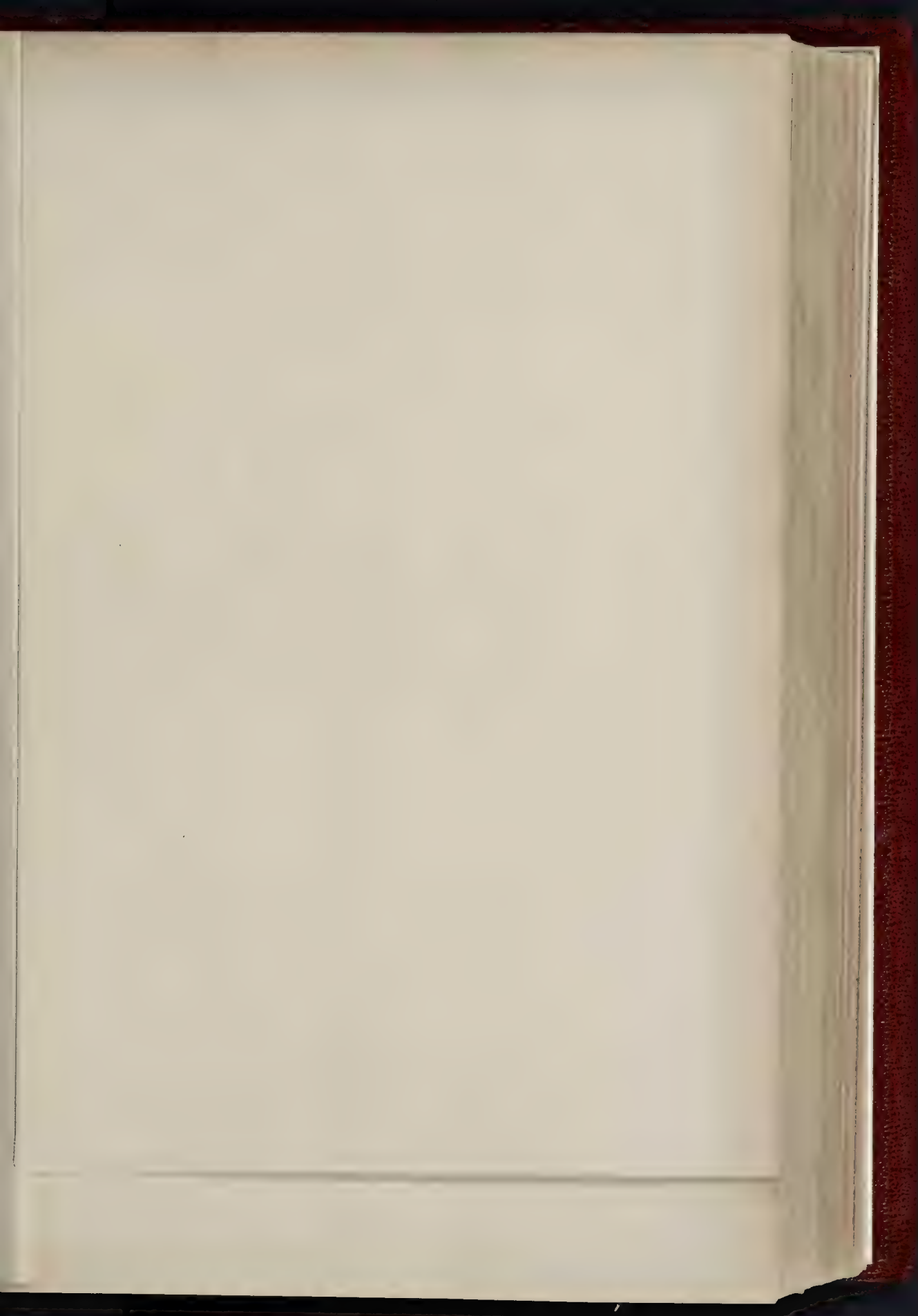
The work-rooms for the staff are placed on the floor below, and the machinery for heating, ventilating, and electric lighting upon the ground floor or Cowgate level.

The building will be of fire-proof construction; the external face of the walls to George IV. Bridge, and the Cowgate will be of Stirlingshire or Northumberland stone, finely scabbled on face, the steps of stairs of cement concrete, and the walls lined with well-glazed tiles. The estimated cost is 30,000l.

The architect is Mr. G. Washington Browne.













DESIGN BY MR. ASTON WEBB, F.R.I.B.A., AND MR. E. INGRESS BELL, F.R.I.B.A.

PERSPECTIVE VIEW (REPUBLISHED.)

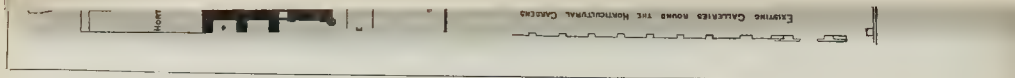


DESIGN BY MR. T. G. JACKSON

PERSPECTIVE VIEW.

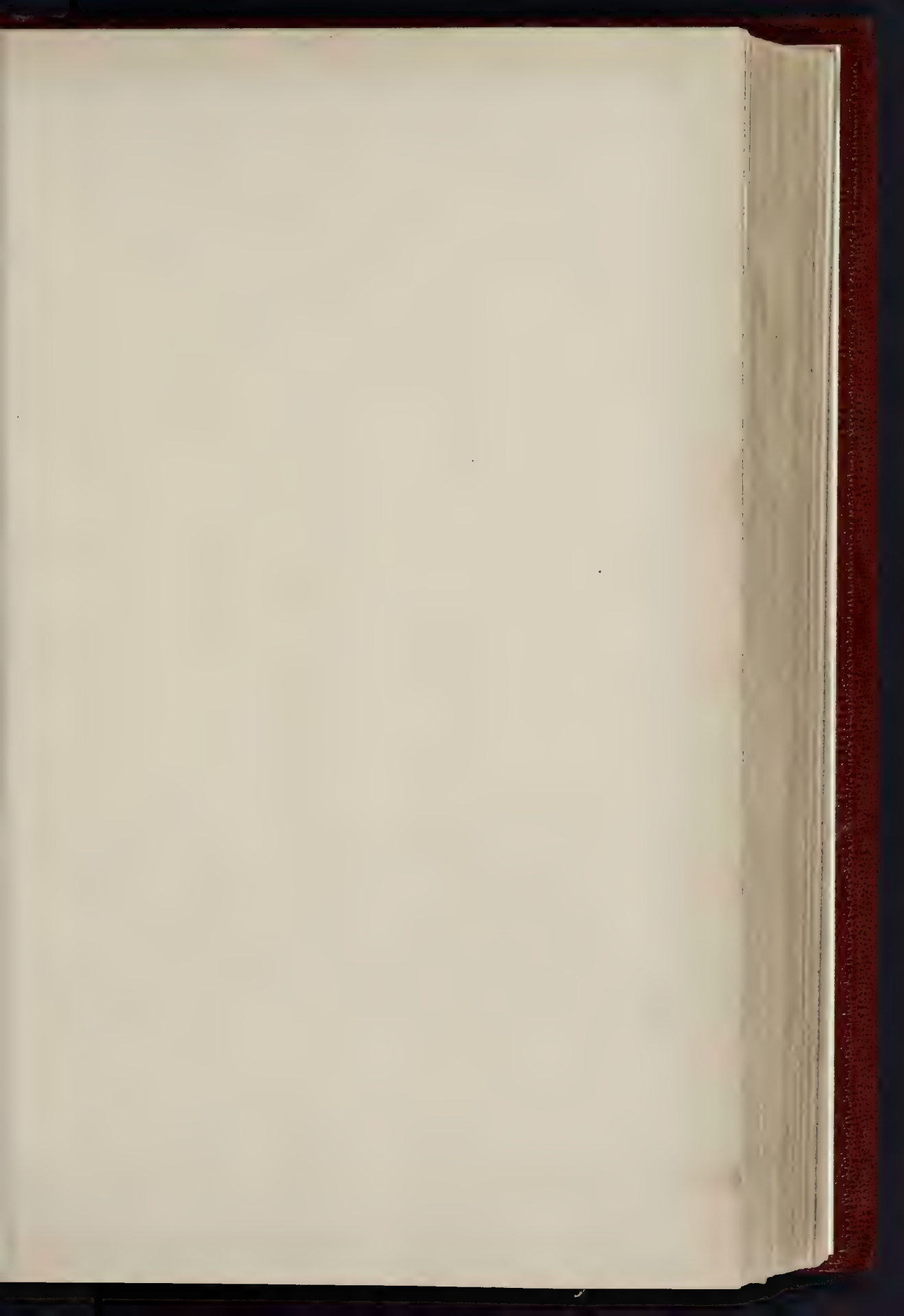
COMPETITIVE DESIGNS FOR THE IMPERIAL INSTITUTE.



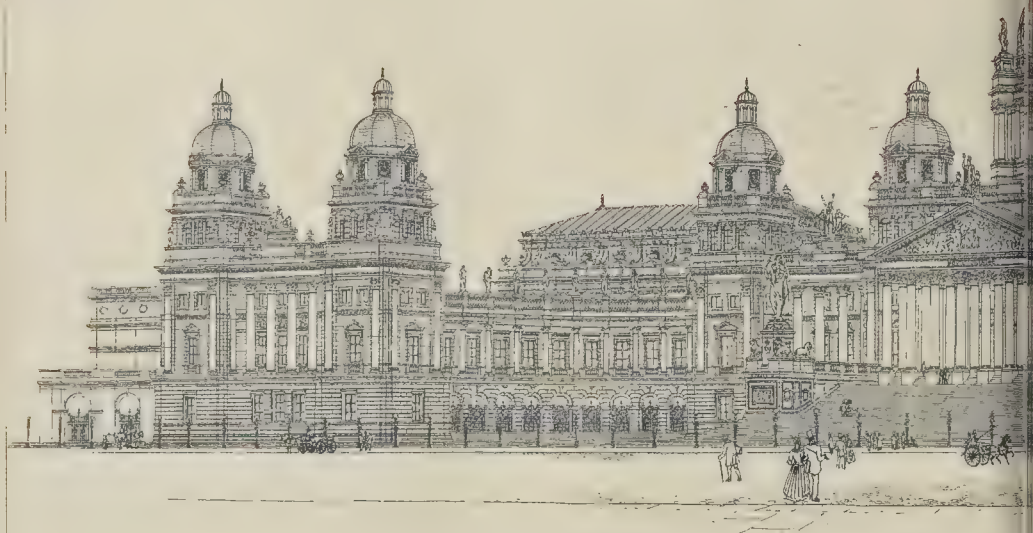


EXISTING GALLERIES AROUND THE MONTICELLO GARDENS

1800







COMPETITIVE DESIGNS I

DESIGN BY MES

PERS



Mrs. Hamilton Deane R.H.A.  
 Mrs. Dromley Deane B.A.  
 Dublin May 1887

PHOTO LITHO. FRASER & CO. 22, MARTIN LANE, LONDON, E.C.

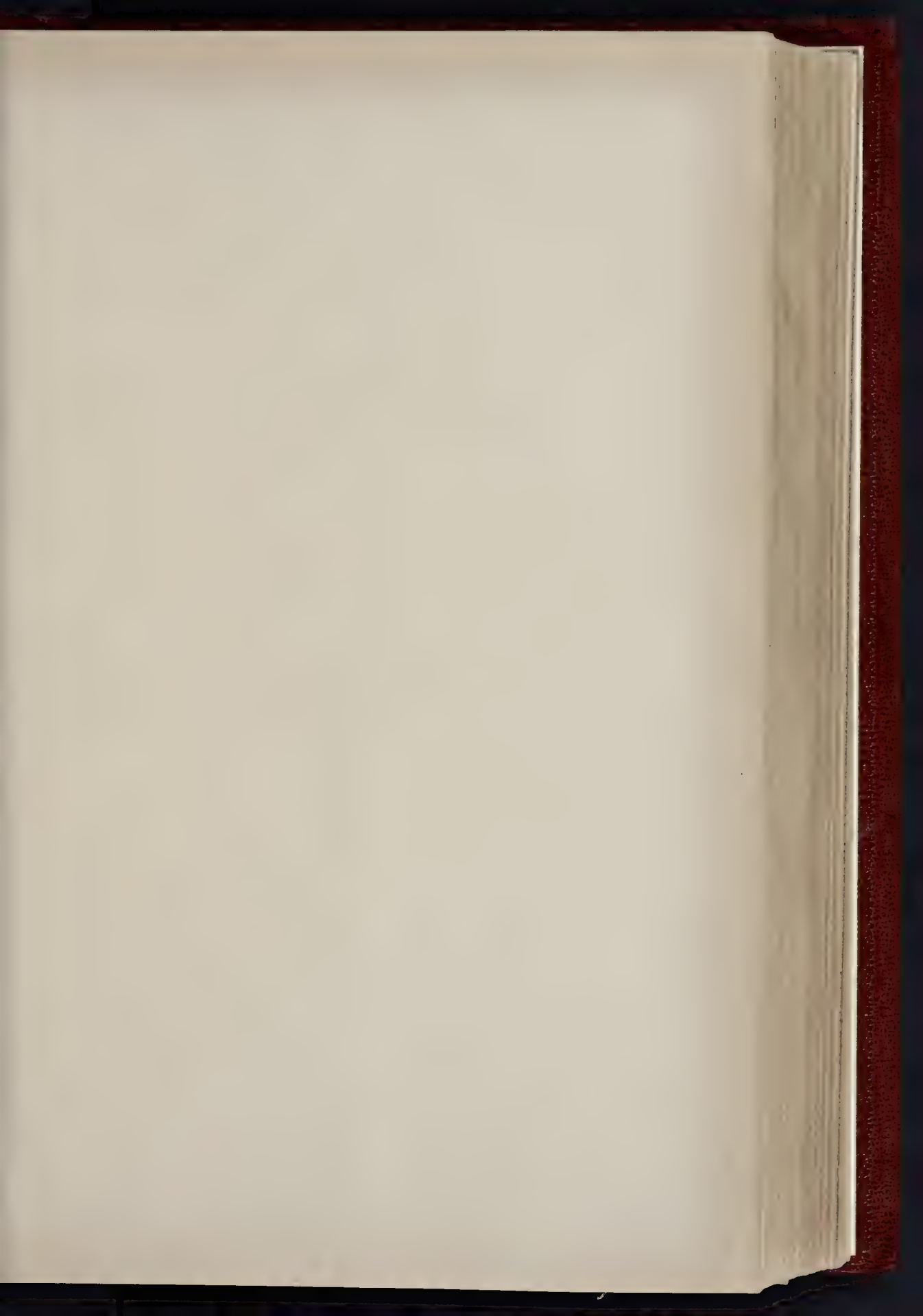
THE IMPERIAL INSTITUTE.

DEANE & SON.

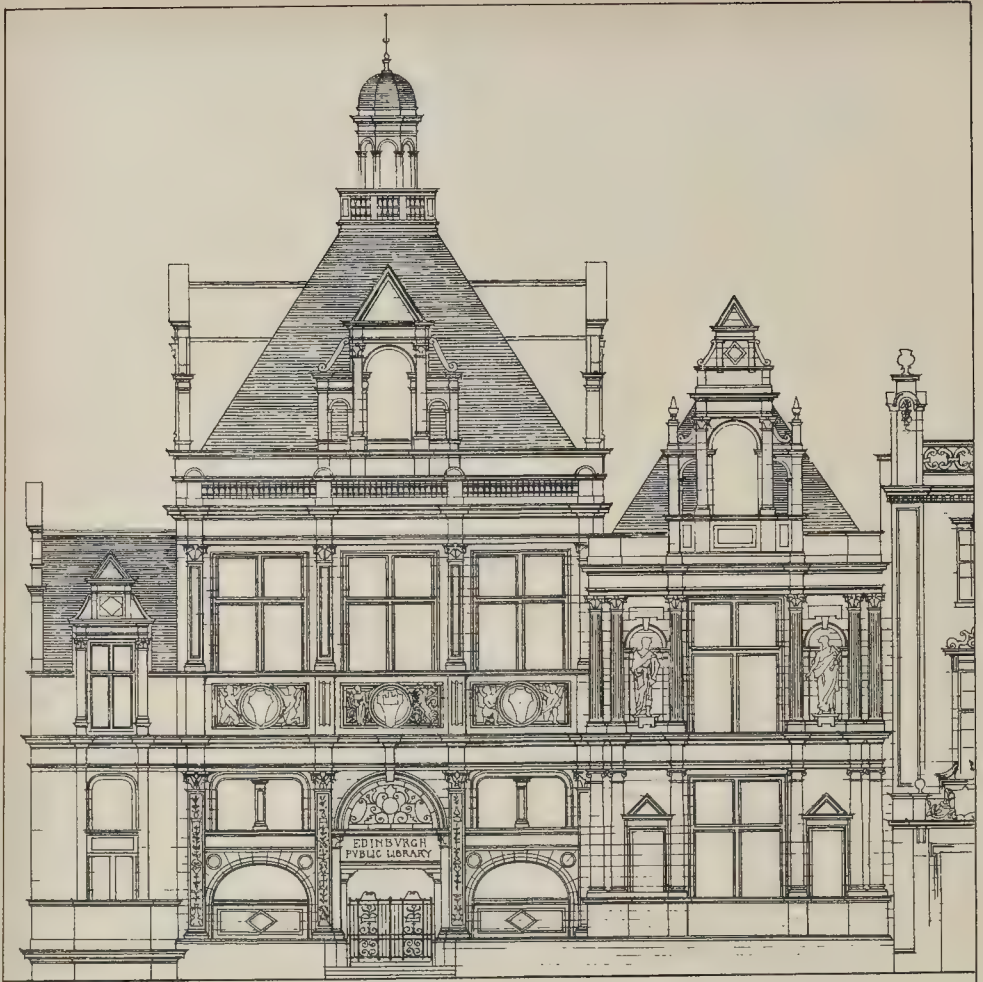
VIEW.



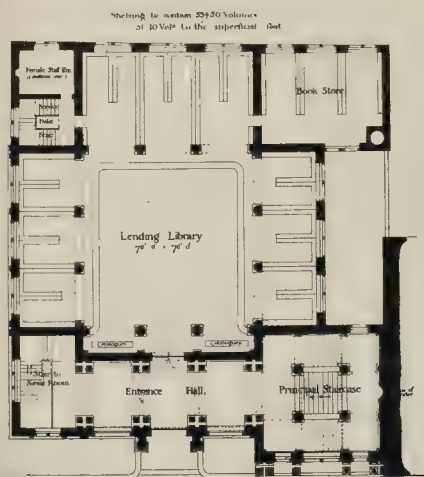




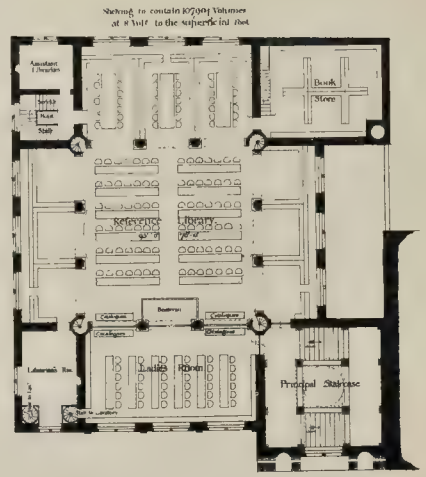




Elevation to George IV Bridge.



Plan of Third Floor.

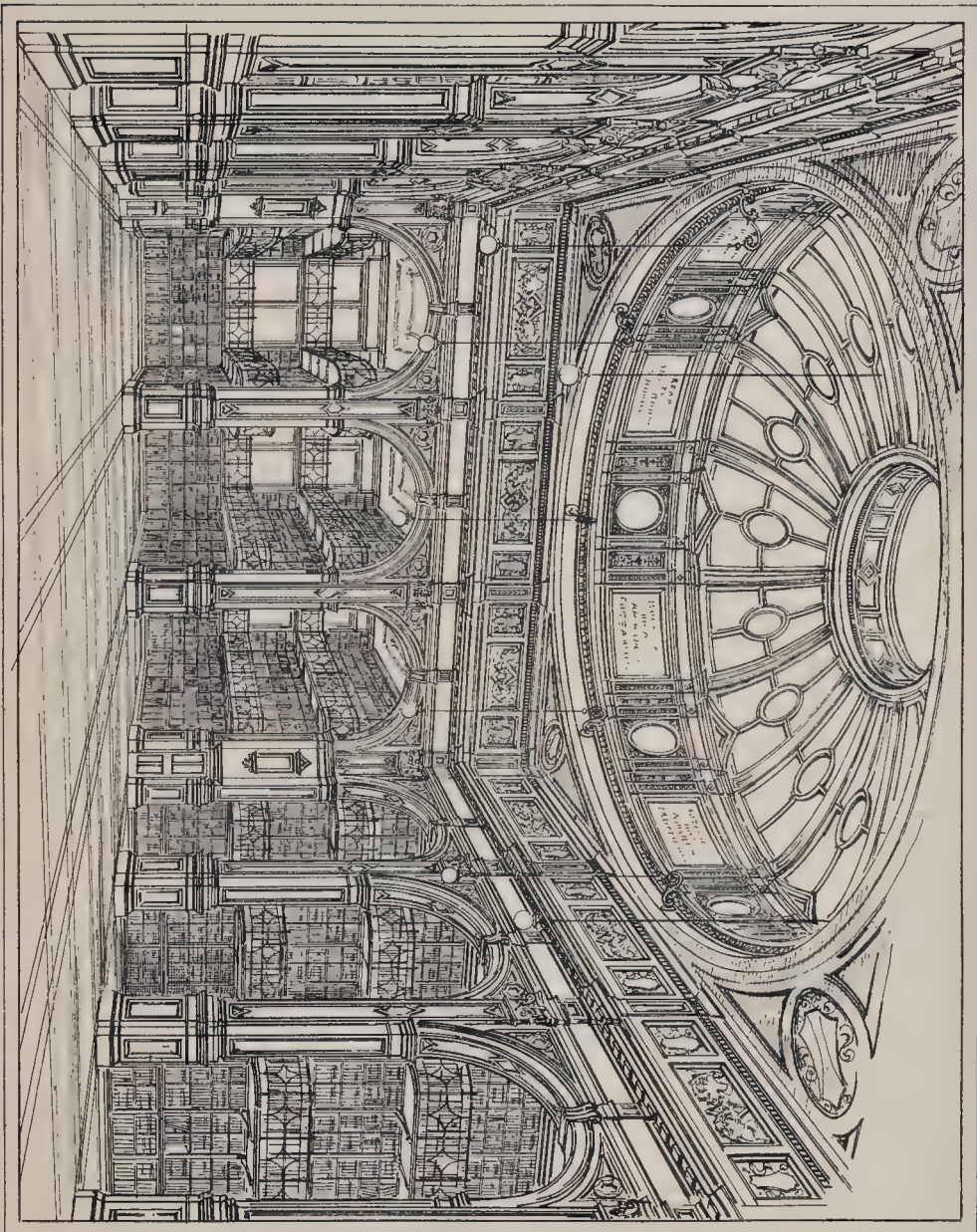


Plan of Fourth Floor.

C. F. Kell Photo-Lith & Printer, 6, Furnival St., Holborn, London, E.C.

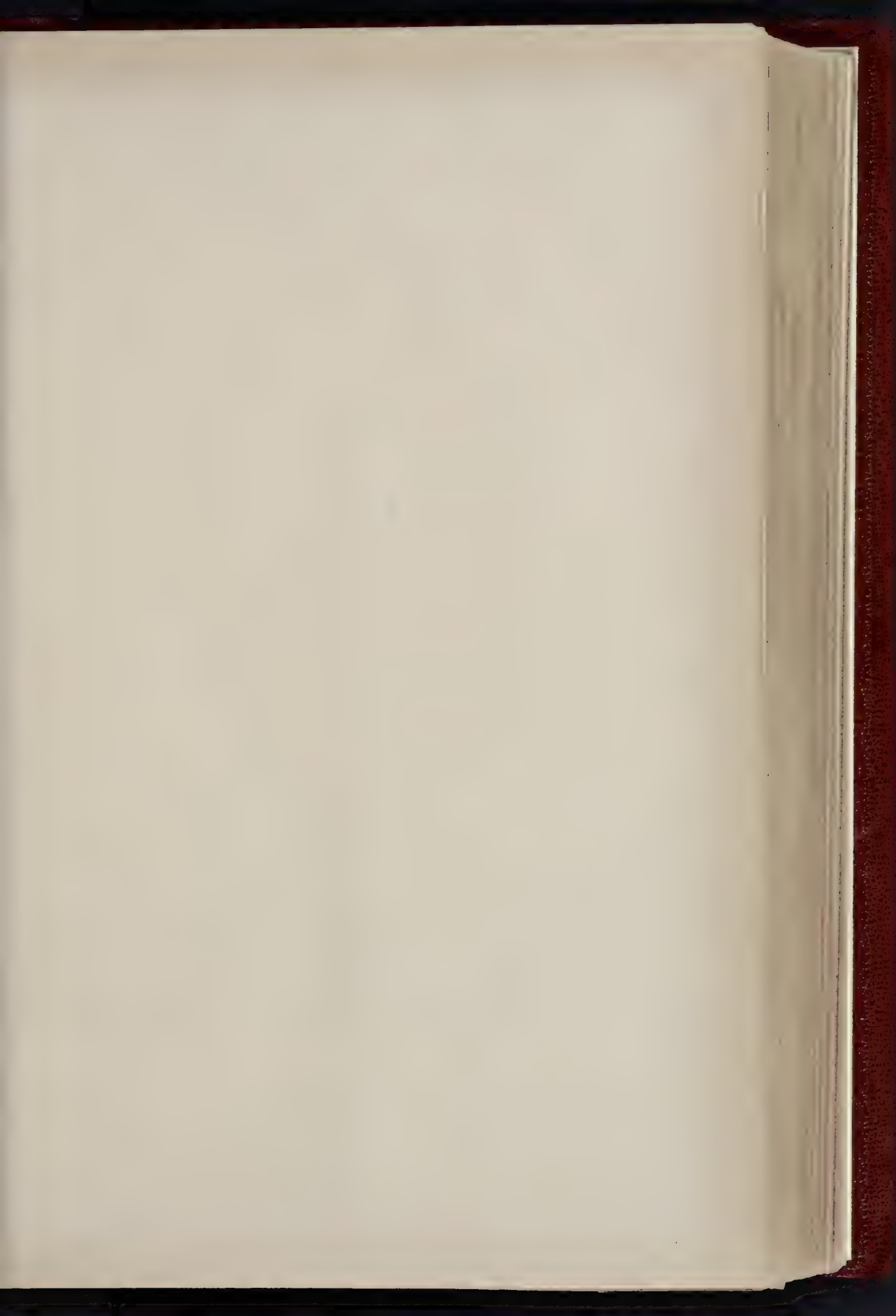
SELECTED DESIGN FOR EDINBURGH PUBLIC LIBRARY.—MR. GEORGE WASHINGTON BROWNE, ARCHITECT.

THE BUILDER, JULY 16, 1887

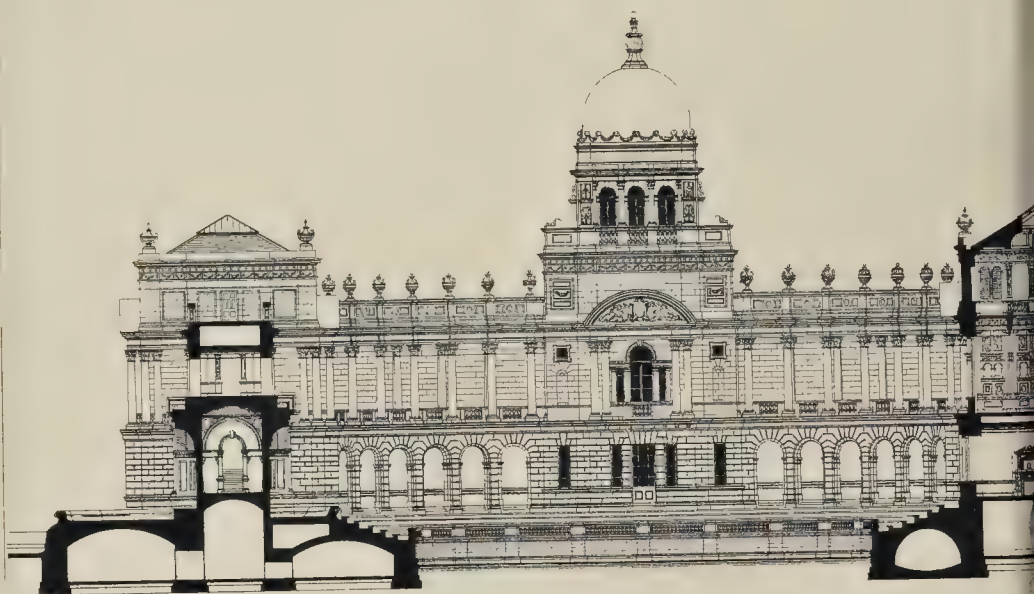












TRANS

COMPETITIVE DESIGNS

DESIGN BY MR

TRAN



SECTION.

OF FEET.

THE IMPERIAL INSTITUTE.

DEANE & SON.

SECTION.

PHOTO L. THO. SPRAGUE & CO. 28 MARTIN LANE CANNON ST LONDON E.C.





## THE BRITISH SCHOOL AT ATHENS.

As we briefly mentioned in our last (p. 57), the first annual meeting of the subscribers to the British School at Athens was held on the 6th inst. The Earl of Carnarvon was in the chair, and there were present, among other ladies and gentlemen, Sir C. T. Newton, Professor Jebb, the Earl of Morley, the Rev. Charles Evans, Sir F. Pollock, Mr. E. A. Bond, Mr. G. Godwin, Mr. Watkies Lloyd, Professor Percy Gardner, Mr. Walter Leaf, and the secretary, Mr. George A. Macmillan. Letters of apology for non-attendance were read from M. Genadiou, the Greek Minister, the Bishop of Durham, Sir Frederic Leighton, P.R.A., the Provost and the Head Master of Eton, and the Dean of St. Paul's.

The Secretary, Mr. George A. Macmillan, read the report, of which the following are the most important passages:—

At the last meeting, on October 19, 1886, it was announced that the school building\* was complete, and that a very competent Director had been found for the first year in the person of Mr. F. C. Penrose. It was further stated that an income of 400*l.* a year had been provisionally secured for three years. Mr. Penrose went out to Athens early in November, and about the middle of December Mr. Ernest Gardner, Fellow of Gonville and Caius College, Cambridge, and now Craven University student, was admitted as the first student of the school. Two months later the Oxford Craven Fellow, Mr. David G. Hogarth, of Magdalen College, was admitted. Later in the season two more students, Mr. O. J. Jasonides, of Athens, and Mr. Rupert Clarke, of Exeter College, Oxford, were added to the number. In accordance with the rules drawn up by the committee, Mr. Penrose, besides directing the work of the students, has delivered three public lectures on the Parthenon, the Erechtheum, and the Temple of Olympian Zeus (see *Athenian*, May 7, 1887), and will deliver three more in the course of October before he lays down his office. He has, moreover, at the expense of the Dilettanti Society, conducted excavations on the site of the Temple of Olympian Zeus at Athens, which have established the important fact that the temple was octastyle, not decastyle, as has hitherto been generally supposed. Before closing this brief record of the first year's work of the School, mention must be made of the very cordial welcome given to the Director and students of the British School both by the native Greek archaeologists and by the members of other foreign institutes. Special mention is due of the extreme friendliness of the relations between the British and American Schools. The American Director and students did their utmost to smooth the way for their English colleagues, generously throwing open their excellent library. Representatives of the British School were present at the laying of the corner-stone of the American School building, which is now in course of erection on the adjoining site. The two projects have been surrounded by a single fence at the joint cost of the schools, and will, it is hoped, be to a certain extent enjoyed in common. It is obvious that for the work of a school at Athens one indispensable requirement is a good library of archaeological and classical books. The committee are happy to be able to state that a very good beginning has been made in this direction during the first year. In the first place, valuable gifts of books have been received from the delegates of the Oxford University Press, from the Syndics of the Cambridge Press, and from many private publishers, including Messrs. R. Bentley & Son, Messrs. George Bell & Son, Messrs. Macmillan & Co., Mr. John Murray, Messrs. Kegan Paul, Trench, & Co., and Messrs. Calvary, of Berlin. Mr. F. F. Tuckett, Mr. Barclay Head, and other private individuals have also made valuable gifts to the library, and it is hoped that their example may be widely followed. In the next place, the committee have expended a sum not far short of 250*l.* upon the purchase of the books which it was considered most important for the School to possess. Turning to the financial position of the School, the managing committee regret to say that the appeals for aid made for last year after the meeting of subscribers in October did not produce very much result. The new donations amounted to no more than 115*l.*; new annual subscriptions were promised to the amount of 70*l.* 15*s.* a year. Donations towards the establishment of a capital fund or annual subscriptions will be gladly received by the hon. treasurer, Mr. Walter Gardner, who is the hon. Treasurer of the committee, but that there is every cause for satisfaction in the progress made by the School in this, the first year of its existence; and the outlook for the future is no less promising. As Mr. Penrose's successor the committee have been fortunate in securing, for two years, at any rate, the services of Mr. Ernest Gardner, who is a thoroughly trained archaeologist, and has had the great advantage of working under Mr. Penrose as a student during the past season, so that he will take up the work with

full knowledge of what is required. It is proposed next session to provide board and lodgings at a moderate rate in the school building for a limited number of students. Information upon this point may be obtained from the hon. secretary, Mr. George Macmillan, 29, Bedford-street, Covent Garden, W.C., to whom all applications for admission to the school should be addressed.

The Chairman, in moving the adoption of the report, said:—Ladies and Gentlemen,—Every one will have heard with great interest the report which has just been read. There was not a word which could be spared. But I think if I summed up the general purport of it, I might say, in a few words, that although much has been done, a great deal more remains to do. Like many other reports, it is of a mixed character,—there is good, there is evil in it. Still I think this annual meeting may congratulate themselves upon the large stride which has been taken in the cause in which we are all interested. It was launched under every good augury, and those of us who a few years ago were present at the meeting in Marlborough House under the presidency of the Prince of Wales will feel that the work has in a great measure responded to the anticipations of that time. At that meeting were men eminent in literature, in art, in science, in politics, in classical learning, and in society. Since that meeting the Greek Government gave us very generously a piece of land; a temporary endowment for the brief space of three years was provided; our house has been built, our library, as the report tells us, has been founded, and amid the help of our American friends and the generous rivalry of French and German students our work has been commenced, lectures have been inaugurated, students have been admitted, and under the teaching and training of Mr. Penrose, to whom we owe so deep a debt of gratitude, the undertaking has been fairly and fully launched. One thing, and one thing only, seems to be wanted,—money comes but slowly in. But I must say when I look to the nature of the work and to its probable results I marvel that there should not be found men throughout the length and breadth of this country who possess great personal and private means who are willing to identify themselves with this most remarkable movement, and to be associated for all time with the British School at Athens. I sigh to think that we cannot find some Mæcenas or Herodes Atticus who might gain glory by connecting his name and reputation with such a work. I assume, of course, that we all agree on the value of such a school as this. I do not appeal to the dull ears of those who have no sympathy with the teaching of Greek in the curriculum of the highest English education. I assume that we all agree that the life and literature of the ancient,—and particularly of the Greek,—world, lie at the root of our highest education in England, and if that be the case then I think there is ample reason and advantage in such a school as that which we have recently founded at Athens. And for these two good reasons: first of all, that Greek and Latin archaeology, and especially Greek, has been admitted within the circle of our Classical teaching. It was not always so, but the more we accept the doctrine, which is the true doctrine, that history is not entirely comprised of battles and sieges, and the biographical events of individual lives, but comprehends the whole existence and movement and progress of nations, the more we must recognise Archaeology as a very essential element in History. She is, if not in fact History, the handmaid of History. In the second place, there can be no better place in which to study the Greek archaeology than Athens. There is a *genius loci*, as it has been called for want of a better word, that sort of subtle atmosphere which arises on the spot, the presence and influence which gives interpretation, so to say, to passages which would otherwise be obscure and reality to facts which it would otherwise be hard to realise. All this we get by actual study on the spot. And he must be very cold and hard, very dull of apprehension, who can stand on that ground and not feel keenly at the sight of places where Pericles spoke, where Eschylus sang, where Aristophanes joked, and where St. Paul preached. As I take it, from the slopes of Hymettus, where our house stands, you may see all, or nearly all, these objects and places to which I have alluded, and it requires a very slight effort of vision to see the spot from which the great orator's voice rang,

the theatre where the great masterpieces of the drama were enacted, and the Areopagus, famous both in the earliest dawn of Greek history, and in the commencement of Christianity. And if Athens be the best place in which to study Greek archaeology, it is rapidly becoming, I fancy, the only place, and for this reason, that the discoveries which have been recently made in Greece are of so large and interesting and fascinating kind that the work will soon be carried on here alone with advantage. The soil of Greece is giving up treasures which have been buried for centuries. Athens alone has produced a rich harvest. Discoveries are being made in the mystical soil of Eleusis; Sicyon, which overlooks the Corinthian Gulf, has afforded much; ancient Tiryns, with its Cyclopean walls, has disclosed marvels of the Old World. In Mycenæ the work of excavation is going on. Delos, which, as the poets feign, is bound by adamant chains to the depths of the sea, and only twice, I think, underwent an earthquake,—once before the Persian invasion and once during the Peloponnesian war, the meeting-place of the great Ionian races,—is now being explored, I think, by our French rivals; and, lastly, Olympia, the solemn meeting-place of the games, has given up treasures of the highest worth. And in Delphi, where the oracle spoke to a wondering and awe-struck world, we are not without great and valuable records of the past. I might go on for a long time in the mere enumeration of what has been done. But the important part of these discoveries is this,—that the Greek Government has, with infinite care and loving attention and skill, brought together in the Museum at Athens the principal works of art and interest which have been discovered. All this is ample justification for the School, and all that we now want are the necessary funds, without which no institution in the world can exist. Our great French and German rivals in this field of classical labour are so convinced of its value that their Government have made large and handsome grants in aid. In America the Government gives no assistance, but private munificence has stepped in, and endowments and subscriptions before which our utmost private efforts pale have been made by high-minded and liberal American citizens. In England, I am sorry to say, we have a more uphill task. Our Chancellors of the Exchequer are by nature and tradition very obdurate. During the life of my dear friend Sir S. Northcote I might have had great hopes. He was one who *nil Grecum, nil Latinum a se alienum putavit*. I have some hopes of Mr. Goschen, who was a contemporary of mine at Oxford, and who had there a distinguished classical career. Therefore I would suggest to our secretary that he should press these reminiscences on Mr. Goschen on the first favourable opportunity, and use every influence he can bring to bear to induce him to assist us. But our best hope is in private liberality; and although I know well that every class and interest in this country feels the depression of trade and of finance, still there is a great deal of money left in the country, and I think also a great deal of the old spirit still exists, and we shall not make our appeal in vain. I beg to move the adoption of the report.

The Earl of Morley seconded the motion, which was agreed to.

After the transaction of some formal business,

Mr. Penrose gave an account of his work during the past year. He had been able to visit and collect objects of art from Palermo, Oropus, Sicyon, and other places, and in his labours the American and German archaeologists had afforded him much valuable help. He had, unfortunately, contracted a fever, but had been able to give lectures on the Parthenon, the Erechtheum, and other subjects, and had been honoured by the presence of Sir Horace and Lady Rumbold, and Mr. Watts, the artist. Mr. Hogarth, Mr. Clarke, and other students had been doing good work, and had achieved valuable results.

Lord Carnarvon moved a vote of thanks, which was heartily given, to Mr. Penrose for the great services which he had rendered the School.

Professor Jebb moved a vote of thanks to Lord Carnarvon, who had been connected with the project from its inception, and had throughout shown an active interest in its work. It was just twenty years ago when a resolution

\* We gave plans, view, and description of the building, of which Mr. Penrose was the architect, in the *Builder* for Nov. 20, 1886.



was passed in that room, in pursuance of which Lord Stanhope pressed the claims of such work as they had been engaged in on the attention of that distinguished scholar, Lord Sherbrooke, then Mr. Lowe and Chancellor of the Exchequer. But the only recommendation they got was to look for some Mæcenæ. There were plenty of Mæcenæ and Herodæ Attici in the country, but it was difficult rightly to guide their efforts. Their chairman was known as a translator of the *Odyssey*. Their school had not, like the heroine of that poem, many suitors as yet; but their chairman was amply endowed with the qualities of the hero Ulysses, resource and patience.

Sir C. Newton, late Keeper of the Greek and Roman Antiquities in the British Museum, seconded the motion. As a veteran he was not disappointed at the number of students, as the qualities of a real student were difficult to find in combination, and the gentlemen who were now students of the School had shown themselves to be possessed of those qualities. Great results were to be expected from their labours, such as those which the French archaeologists had already obtained in Delos. He desired specially to refer to the Greek journal, *Ἐπιγραφαὶ Ἀρχαιολογικῆς*, which was a model of what a paper devoted to such subjects should be, and ought to excite the emulation of English scholars.

The vote of thanks was heartily accorded, and the meeting separated.

[The *Times* report, from which we quote the foregoing, says that the meeting was held in the rooms of "The Society of Athens." For "Athens" read "Antiquaries."]

#### THE NEW TAY BRIDGE.

By the completion of the new Tay Bridge another gigantic engineering undertaking has been brought to what, judging from the tests applied and the strict precautions adopted, appears to be a satisfactory conclusion, and an important link in the chain of railway communication between the north and south of Scotland will be re-established. To the North British Railway Company the completion of the bridge begins a new chapter in its history which promises within the next few years to be pregnant with great results,—seeing, as it is hoped it will do, the completion of the Forth Bridge, the construction of the new Glen Farg Railway, and the opening of a direct route between South and North. There is no need, at this time, to recall the history of the former ill-fated Tay Bridge, which, after a brief existence of little over two years, fell with such tragic accompaniment on December 29, 1879. We quote the following particulars as to the new bridge from the *Scotsman*:—

In considering the question of the reconstruction of the bridge, the idea at first mooted was to utilise the old piers as far as they might serve, and a Bill on these lines was promoted in Parliament in 1880, which, however, failed to pass. Later in the same year the complete abandonment of the old viaduct was agreed to, and it was resolved that a new bridge should be erected twenty yards further up the river, having a double line of rails instead of a single line, as in the case of the old bridge. The fallen bridge had cost 350,000*l.*, and on the new structure it was proposed to expend 670,000*l.* As a matter of fact, however, the bridge has cost nearer a million sterling, which has been solely defrayed out of the funds of the North British Railway Company. Parliamentary sanction having been obtained, designs were submitted for the bridge by Messrs. W. & H. Barlow & Sons, engineers, London, and in November, 1881, an offer for its construction by Messrs. Arrol & Son, contractors, Glasgow, was accepted. It was not, however, until June, 1882, that a start was made with the bridge; and though a good deal interrupted, especially in the winter, by the storms which are frequent in the Tay valley, the work has gone on continuously since. Of its kind the bridge is a very handsome structure, though in its general aspect it has nothing but its great size to distinguish it from any modern viaduct. There are no novel principles of engineering introduced into its construction, as at the Forth Bridge, the chief parts consisting of lattice girders carried on piers, erected in sets of two, across the river. Its total length is 10,780 ft., or just a little over two miles. The number of its piers is eighty-six, with spans varying from

68 ft. to 245 ft. There are eleven spans of the largest size, two of 227 ft., and the rest are for the most part either 145 ft., 129 ft., or 71 ft. in width. The large spans are in the middle of the river, where the bridge, at its highest point, has a clear headway of 77 ft. above high-water level, or 11 ft. lower than the headway of the old bridge. From the Dundee side the bridge leaves the esplanade with a fine sweeping curve on a rising gradient of 1 in 14, which takes it out to the deep water. In the centre its straight line is broken by raising the height of the thirteen central piers, so as to admit of the rails being laid on the lower members of the large girders. North and south of this portion the rails are on the upper "booms." From the centre the gradient falls away to the south, and the bridge is joined on to the high rocky shore at Wormit by a series of four massive brick arches, which terminate in a great land abutment of immense strength and solidity.

In the founding of most of the piers which stand in the water, malleable iron cylinders of different diameters have been used. For those in the deep water of the centre of the river and carrying the large girders the basal diameter is 23 ft., with a taper upwards to 17 ft. 6 in. On each side of these the basal diameter of the cylinders is 17 ft., with a proportionate taper, and in the shallow water on the north side 15 ft. The founding of the piers took about three years and a half to accomplish,—the last of the deep-water cylinders having been put into its place on the 10th of June, 1886. In the process of founding, which took place from ingeniously-constructed pontoons, a large steel mechanical digger was used; and in addition to excavating the sand, gravel, and boulder clay of the river bed, the labour was enormously added to by the removal of hundreds of tons of large stones, which had been put into the river with the view to their gathering round the foot of the piers of the old bridge to prevent "scouring." The average depth to which the cylinders have been sunk is 30 ft. below the bed of the river, but many of them are founded much deeper down than that,—several going down as much as 84 ft. below low-water mark. Each cylinder on being founded had its interior filled with brickwork and concrete, so that a shaft of great solidity and strength was thereby formed.

The testing of the piers under the Board of Trade supervision was a work which entailed an enormous amount of labour, each pier having had heaped upon it blocks of pig-iron varying in weight from 1,248 tons for the smaller columns to 2,500 tons for the larger. This enormous strain,—which is inconceivably greater than anything that can ever be put upon the piers by the superstructure of the bridge and the traffic upon it, was, it is understood, in all cases successfully withstood. This strain is popularly described as being 33 per cent. more than would be put on the piers supposing the bridge were loaded with locomotives standing close to each other on both lines of rails.

From low-water up to 18 in. above high-water level the cylindrical shafts are continued in solid brickwork, the facings being of blue vitrified Staffordshire brick, which is quite impervious to the action of water. At 18 in. above high-water, binding girders are carried between the two members of each pier, and upon this a course of granite surmounted by 7 ft. of blue brickwork is erected. This forms a solid base for the superstructure of wrought-iron which rises to the level of the bed-plates of the railway girders. This superstructure consists of a frame-work of wrought-iron plates  $\frac{1}{2}$  in. thick, firmly braced in the interior with angle and T-bars, and tied down to the piers by bolts passing 22 ft. down into the brickwork.

The girders employed are of two types. Those for the smaller spans are lattice girders, of uniform depth, strengthened by vertical half braces, alternating with cross braces at each second lattice. For the thirteen large spans in the middle of the river, hog-backed girders curving from 20 ft. at the ends to 28 ft. at the centre, are employed. The whole of the girders for the deep water spans are newly constructed. North and south of this, some of the girders of the old viaduct were, after being thoroughly tested, lifted over to the new bridge, and form the outermost members of the various sets of four which stretch from pier to pier. Wind pressure has been provided against by lateral bracing, and to serve at once as a wind screen and parapet, there is on each side of the bridge a continuous side lattice-work, 5 ft. 6 in. in

height, surmounted by an oak coping. The immense girders were floated out from the jetties on either side upon pontoons, were placed on the piers at high water, and were raised to the requisite height by hydraulic jacks. It is estimated that 18,000 tons of iron were used in the construction of the large girders, and ten millions of bricks in the arches and lining of the cylinders, &c. The permanent way is laid on the top of a strong ridge-and-furrow flooring, and on the outer side of the ordinary rail there is a check rail to prevent the possibility of the train leaving the metals. The whole of the bridge has been painted a dull red colour. One very gratifying feature about the construction of this gigantic undertaking has been the fewness of the serious accidents attending it,—a fact due to the first-rate staging which was employed, and to the care with which all details were supervised by the resident engineers, Messrs. Barlow, the engineers, were represented by Mr. Kelsey, C.E., and the contractors by Mr. W. Inglis, C.E. The work has also had the benefit of the constant personal supervision of the head of the contracting firm, Mr. William Arrol, who, in the course of its progress, devised not a few ingenious and useful appliances for saving labour and perfecting the methods by which the bridge was built.

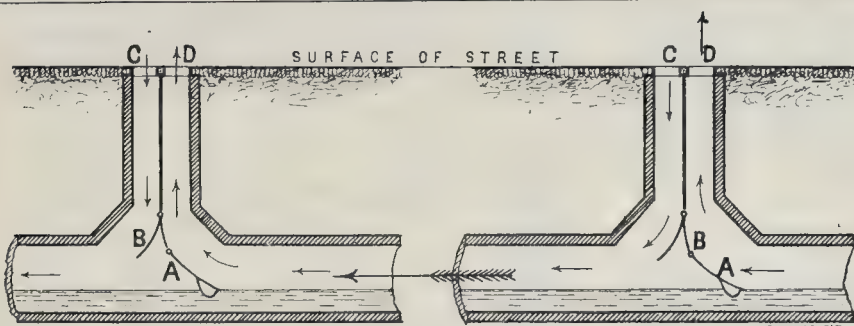
The Newport branch line leading to the bridge, and which had to some extent to be diverted by being thrown back so as to improve the junction,—necessitating the construction of a tunnel 140 yards in length,—has also been finished by Messrs. Arrol & Son. A glance at the bridge by those who had seen its predecessor is sufficient to convey an idea of the marked improvement that has been effected in its stability. There is, even to the non-scientific eye, a substantiality and a solidity that impresses one with a sense of security, and this is especially brought home to the spectator's mind when he sees still standing alongside the massive piers that support the new bridge the remains of some of the spindle-like columns that for a time served to uphold the former bridge. During the five years over which the construction of the bridge has extended, a large number of hands, who in the prevailing commercial depression would otherwise have been idle, have found employment. Upwards of one thousand have been at work at one time.

On the occasion of the recent inspection of the bridge by the Directors of the North British Railway Company, the Chairman, the Marquis of Tweeddale, in proposing the toast of prosperity to the North British Railway Company, said that in regard to the Tay Bridge, Mr. Barlow, the engineer, was well known as one of the most distinguished members of his profession in the country, and he was sure they would all congratulate him on the success which had attended the proceedings at the bridge that day. It was one of the finest works that had ever been constructed. It was the longest railway bridge in the world, and he thought he might add with perfect assurance that it was one of the safest. They might congratulate Mr. Barlow on having crowned a long and successful career with the successful completion of this very important work. As to Mr. Arrol, the contractor, he was sure that all recognised him to be one of the most remarkable men of his time. In respect of inventive genius, Mr. Arrol was second to no man in the world; and the manner in which he had carried out the contract of the Tay Bridge, as well as that for the Forth Bridge, stamped him as one of the most prominent practical engineers of whom they could boast in this country.

Mr. W. H. Barlow, in replying, said the carrying out of this bridge had been a hobby of his, and with the manner in which it had been accomplished he was glad to hear so hearty satisfaction expressed. He could not sufficiently thank the contractor for his part of the work. Mr. Arrol had been most correctly described by the chairman, and but for the ability of the contractor the bridge could not have been seen that day in the state in which they found it. To his excellent staff of assistants he also felt that he had been greatly indebted.

Mr. Arrol, in a few words, also returned thanks. The bridge, he said, had been a very pleasant job to him, and that it had been so was due to the support he had received from Mr. Barlow, the assistant engineers (Messrs. Kelsey and Inglis), and from the Railway Company.





McCallum's System of Sewer Ventilation.

### McCALLUM'S SYSTEM OF SEWER VENTILATION.

In this method of ventilating sewers, the air-current is caused by utilising the natural action of the flow of the sewage, the air coming in contact with the more powerful element being compelled to travel in the same direction as the water. In order to "harness" this power, the sewers are divided into sections by means of a light flap valve (A on sketch), actuated by a float, and so shaped and arranged that the air-current is intercepted and directed upward. At each end of such a section a shaft is carried to the surface, one (C) to act as a fresh-air inlet, and finished with a grating slightly to one side of the road, and the other (D), to act as an outlet and having its grating in the centre of the road. A curved plate (B) is used to direct the incoming air current; this plate is also hinged so that if an accident should happen to the float of the valve A, the sewage would automatically open B, and thus prevent choking of the sewer.

The constant circulation of air caused by the above arrangement prevents the gases becoming stagnant, and, by means of the large quantity of fresh air introduced and mixed with the sewage emanations, the latter are oxidised and rendered innocuous before emerging into the open. The dividing of sewers into sections also makes each district deal with its own sewer gas.

The large arrow on the sketch shows the direction of the flow of sewage, and the small arrows show the direction of the air current.

#### DRAIN VENTILATION.

The general principle is the same as with the sewers, but the disconnecting trap takes the place of the valve. Special provision is made at the inlet (which is just above the water-closet connexion) to prevent wind interfering with the air current. The outlet is taken to the centre of the street.

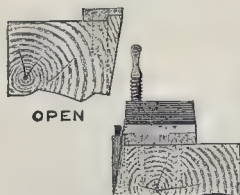
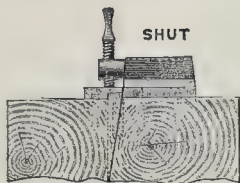
### WESTMINSTER IMPROVEMENT COMMISSION AND BONDS.

SIR,—In perusing your very sensible remarks, contained in your issue for July 2 (page 5), respecting the intended Westminster Improvements, as contemplated by the Bill now passing through the House of Commons, I am struck by the practical sense of your recommendation that all great metropolitan improvements should be carried out by a responsible public body, and you allude with some despondency to the incomplete condition of Victoria-street, Westminster, even at the present day. I share your despondency, but for far different reasons; for I am an unfortunate holder, as a trustee and otherwise, of Westminster Improvement bonds, to the amount of several thousand pounds, and have never during the whole time I have been so possessed,—some quarter of a century,—received more than at most two half-yearly dividends. At that time the secretary of the Commission disappeared, and many stormy meetings of the unfortunate bondholders have since then been held at the Westminster Palace Hotel. The secretary who was appointed after the flight of the first one, a Mr. Jacques, has recently died. The offices of the Commission in Victoria-street, Westminster, have been abandoned. The bonds I represent are

entirely renewed within the last six years with stained glass and fresco paintings, some of which are placed in memory of the late Mrs. Tait and her son, and some to commemorate the visit of the American bishops to Lambeth.

### PODMORE'S "PATENT SASH-FASTENER."

We give illustrations of this, which appears to us to be one of the best and most effective sash-fasteners that has been brought out. The self-acting fastener is a bolt fixed in a sheath, on the meeting rail of the top sash, with a spring behind it, which is kept back by a catch when required or when the window is open, but is released by the action of shutting down the lower sash, and springs forward over the bed-plate on the meeting-rail. This forms in itself an effectual fastening, so far as preventing the opening of the window, but a further recommendation is in the action of the screw and nut carried in the bolt, and which can be screwed down so as to hold both sashes perfectly tight, and thus form a defence against draughts and against rattling sashes.



Podmore's Patent Sash-Fastener.

A spring is no doubt always a weak point in a thing of this kind, in so far as it is always liable to weaken with use; but this objection, of course, applies equally to many locks and latches which are in constant use. In other respects the fastener is a very good one, as it both closes and tightens up the window, and is simple in its construction and working. Messrs. Jas. Boyce & Son are the makers and agents.

### THE ROYAL ACADEMY.

#### ADMISSIONS TO ARCHITECTURAL SCHOOL.

The following students have been admitted to the Architectural School of the Royal Academy (Mr. R. Phené Spiers, F.S.A., Master):—

#### Upper School.

Anderson, P.	McCombie, G. F.
Barnsley, S. H.	Marke, F. W.
Boney, W. H.	Masey, F.
Downing, H. P. B.	Nicolay, G. W.
Gill, C.	Sykes, A.
Graham, P. M.	Taylor, A.
Harvey, G.	

#### Lower School.

Baker, H.	Mathewman, H.
Collins, G. E.	Norton, C. H.
Draper, R. E.	Poole, E. E.
Fetch, E. E.	Powell, A. H.
Giles, A. L.	Pywell, A.
Grace, W.	Sampson, R. W.
Horton, W. F.	Taylor, W.
Inman, A. J.	Thompson, A.
Jacques, G. R.	Veal, A. G.
Martin, L.	Verity, F. J.

#### Probationers.

Bartlett, A. E.	Hastilow, A. G.
Clarkson, W. B.	Hawkins, E. A.
Faulkner, A. F.	Ibberson, H. G.
Frazer, L.	Rogers, H. C.

### ARCHAEOLOGICAL SOCIETIES.

*British Archaeological Association.*—This year's annual meeting of the British Archaeological Association will begin on August 15, Liverpool being the head-quarter.

*Royal Archaeological Institute.*—The Royal Archaeological Institute will hold its annual meeting this year at Salisbury, commencing on Tuesday, August 2.

*Surrey Archaeological Society.*—On the 5th inst. this society held its annual meeting, and visited the Church of St. Saviour, Southwark, and Lambeth Palace, under the presidency of Viscount Middleton. The former building, one of the most interesting of London churches, is the subject of a complete architectural work by Mr. F. T. Dollman, who conducted the party and described this church. Many of our readers will remember the beautiful Lady Chapel and the fine reredos. In St. Saviour's Church are many noted monuments, and one of surpassing interest to the poet Gower, seen on entering the edifice. The members and visitors, with ladies, reached Lambeth Palace at three p.m., which, by permission of the Archbishop of Canterbury, was thrown open to the society. The fine library, better known as "Jaxon's Hall," the picture-gallery, and the chapel, were all seen by the visitors. Mr. S. Wayland Kershaw, F.S.A., described the chief features of the hall, and traced the foundation of the library from Archbishop Sancroft in 1611 to the present day. He also commented on the former library in the "cloisters," which were removed in 1830, and wherein the books were placed previously to their present position in the hall. A paper "On the Manor-houses of the Archbishops in Kent and Surrey," by Mr. Kershaw, formed the next part of the programme, and then the company viewed the series of portraits of the archbishops hung in the state dining-hall. From the "Long Gallery" the private chapel was reached, and Mr. J. P. Seddon, F.R.I.B.A., pointed out its architectural features. The chapel has been



pronounced on the Stock Exchange to be altogether without value, and whether a Westminster Improvement Commission actually exists at the present moment I have tried in vain to ascertain. A glimmering light beams once more upon me on reading your remarks, and if you can afford me, and the countless sufferers, also bondholders with me, any clue to the present *locus in quo* of the present Westminster Improvement Commission, I shall feel truly grateful,  
KENSINGTONIAN.  
July 7, 1887.

#### "THE NATIONAL GALLERY."

SIR,—There is one point in your criticism of my decoration of the new staircase which you may not object to my remarking upon. You describe as "too white" the arches and string course over the entrance. The criticism is, no doubt, correct as the work now stands; because, since the long panel over this arcade has been hung with the green flock paper (as a temporary measure), this white has been "forced" by the contrast. But I never intended that this panel should be so treated, even temporarily.

From the first I pointed this out to the Trustees as a fitting space for a mural picture; and I so indicated it in my design. As a temporary finish, I had painted this space in light tones; and I still consider that to bias this elevation by the dark colour was a mistake.

It has the additional disadvantage of making the Carrara marble capitals (and the arcade, which is toned to match them) appear somewhat "too white."  
J. D. CRACK.  
Wigmore-street.

#### GOVERNMENT OFFICES.

SIR,—Even my good friend, H. B. Garling,\* has submitted to the seduction of saving a few thousands, which being spent in the centre of London on a national undertaking is no real economy.

Why should he mar a noble scheme by leaving the bottle-neck of Whitehall but 70 ft. wide, and omitting the broad way or continuation of the Mall into Charing-cross? The first scheme was spoiled by retaining the Horse Guards. This proposal is ruined by keeping the Admiralty. -  
EDWD. C. ROBINS.

#### THE NUISANCES FROM SEWER VENTILATORS.

SIR,—So far as can be judged from his letter on p. 78, it seems to me that Mr. R. H. Reeves draws important conclusions from rather curious premises. He refers to an "offensive" street sewer grating, which had "a brick ventilating pipe" under it, running below the road some 30 ft., and thence up a house wall to half-way up the chimney.

Now if this street grating had no water-trap below it, how could it be expected that stink in the sewer should not blow out at it, even although there was a so-called ventilating pipe put up as stated? If it were trapped, there must have been something faulty, or how else could the bad smell get out?

Then, was the "brick" ventilating pipe carried up the wall, or was the vertical pipe iron, and not brick? If iron, what size? and is it not nearly choked at the foot by falling rust, or is not painted or coated inside?

Further, if it was desired that this sewer ventilating pipe should act efficiently as a ventilator for the sewer, why was its outlet not carried up to above the chimney eaves several feet, and surrounded by a good fixed exhaust ventilator, instead of the outlet stopping at halfway up the chimney?

So far as I can judge at present from Mr. Reeves's letter, he has no sufficient reason, under the circumstances, to write about the "utter uselessness of stack pipes as a means of ventilation to sewers." In my opinion, the said stack pipes,—but properly connected and put up,—will be much more used in the future than they are as yet.

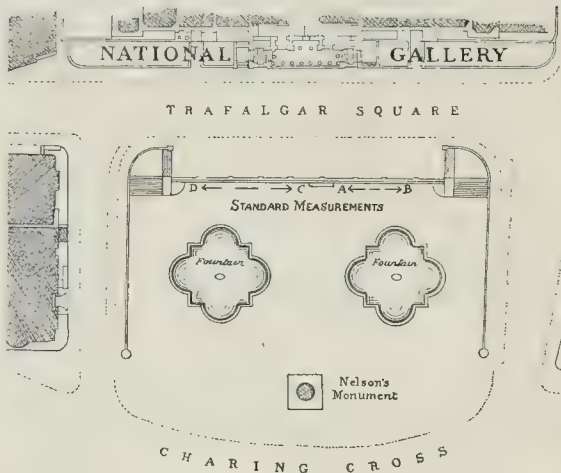
W. P. BUCHAN.

#### SCULPTURE AT ORVIETO CATHEDRAL.

SIR,—In respect of the central figure over the western doorway of Orvieto, a drawing of which appeared in your issue of July 2, I should be glad to be informed whether it is a representation of the Christ or of the Virgin. The character of the face and arrangement of the tunic about the head and shoulders point, I imagine, to the latter; while the voice and general surroundings, and especially the use of the stole crossed in front, seem to indicate the former.† I should be much obliged, also, to any

\* See pp. 9, 10, ante.

† In spite of the vesica, it appears to represent the coronation of the Virgin; but this, if we mistake not, is a modern mosaic.—Ed.



#### The Student's Column.

##### LAND SURVEYING AND LEVELLING.

##### III.—THE CHAIN AND CHAINING (continued).

CHAINS when new ought always to be examined to see if they are of correct length. They also stretch with frequent use, and need to be afterwards occasionally tested. Special standards for the use of surveyors in London have been fixed by the Government at Trafalgar-square (see fig. 5), and also in the Guildhall. Their lengths are derived from the British standard yard, which is the distance at the temperature of 62° Fahrenheit between two marks upon a certain bar, which is preserved in the office of her Majesty's Exchequer; official copies being kept at the Royal Mint, the Royal Observatory at Greenwich, and in the rooms of the Royal Society. The length of the standard yard was finally fixed and legalised by the 5th Geo. IV., c. 74, which declares that "the pendulum vibrating seconds of mean time in the latitude of London in a vacuum at the level of the sea is 39-1393 inches of the standard, and that the yard shall be in the proportion of 36 to 39-1393."

The standards above alluded to for testing chain measurements in London are marked upon pieces of brass let in flush with the masonry into which they are fixed, as indicated in fig. 7. Permanent standards have likewise been fixed by various municipal authorities in prominent positions over different parts of the country. For the purpose of testing the chain employed in an extensive survey during the progress of any work, it is well to fix two pegs upon a level piece of ground near a fence, and at a distance apart just sufficient to enable the outside of the handles of a correct chain when drawn tightly to touch the inner sides of the pegs, as shown in fig. 3 (*Builder*, July 9th, p. 78). This arrangement is better than making the chain's length measure from centre to centre of the pegs. The test distance may be set out very accurately with a level staff, or, better still, with two level staves placed end to end in measuring the line, provided each level staff has been previously tested upon the Government standards. It is sometimes well to keep a properly tested spare chain in reserve, to be used only for purposes of testing, when a level staff is not near to hand, and the distance should be proved, prior to each testing of a chain, as pegs have been known to be purposely moved by parties interested in opposition.

Figure 8 illustrates the measurement of a base line, and the method of taking offsets from one side of it to a fence line. The station or point upon a line from which the measurement is to commence being first determined, the leader carrying all the arrows draws the chain in the direction of the line to be measured, and is guided by signs from the follower who sights the line of poles or other markers, which determine the direction of the base line. The ten arrows are used as tallies, thus:—When the leader reaches the full stretch of the chain, the other end being

of your readers who would furnish me with notes of representations, the Saviour, with reference more especially to the vestments worn and position of the figures, which occur in existing remains of Medieval art, in glazing, mural paintings, MS. illuminations, and in statuary, both in England and on the Continent.

The most notable representation which has hitherto come under my notice occurs in a mural painting in the Chapel of St. Gabriel, in Canterbury Cathedral. The figure is vested in an alb-like tunic, with rich collar and band-shaped girdle; over this is worn the stole (not crossed), the ends of which appear from under an apron attached to the girdle. Above all is a loose tunic, covering one shoulder and knee, and appearing upon the opposite arm. As I write from memory, I cannot give the colours of these vestments.

The most common method of vesting the sacred form shows the two garments ordinarily used by the Jews: the *cechoneth*, or closely-fitting garment, with or without a girdle,—a person wearing this only is described as *nude* in the Bible,—and a tunic worn loosely over the shoulders and around the body.

Sometimes the latter garment only appears, as in a memorial brass at Sibstone, in Leicestershire, of which Bishop Mitchison has kindly supplied me with a rubbing.  
G. M. LIVETT.

Holy Trinity, Twickenham.

#### NUMIDIAN MARBLE.

SIR,—Having executed the whole of the marble work of the National Gallery extension and the grand staircase of the new Liberal Club, we beg to state that none of the materials used are from the quarries of the so-called "Numidian Marble Company Limited" whose revised prospectus is now before the public, and in which they infer that these marbles are the produce of their quarries, when in reality they are shipped at ports 200 and 600 miles off respectively, in North Africa, as concerns the National Gallery; the Liberal Club marbles being the products of Italy.

July 13.

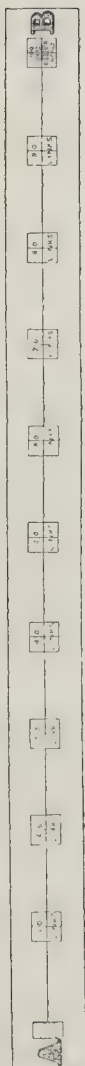
FARMER & BRINDLEY.

#### A QUERY AS TO TILES.

SIR,—We shall be glad if any of your readers can kindly give us the name and address of the maker of blue and red floor tiles, branded with a crown and W.G.  
GEO. BENSON & SON.  
York.

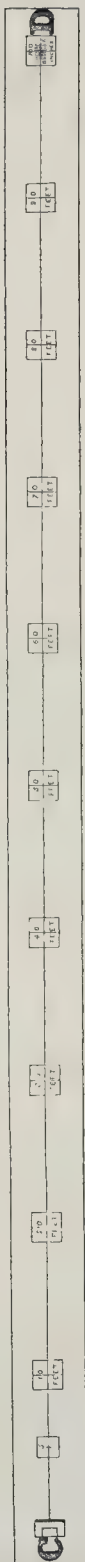
**New Street.**—On Wednesday, the 6th, was opened a new approach, by way of a continuation of Arthur-street East, from Monument-yard to Lower Thames-street over against Billingsgate Market. For the making of this street by the Commissioners of Sewers, nearly four years ago, a beginning was made by pulling down part of Monument-yard. In its course through Pudding-lane, Botolph-lane, and Love-lane, forty-nine houses had to be removed. Of the 108 claims for compensation only four, we are told, were referred to settlement by jury. The cost of the construction is large, amounting to 490,966*l.*, inclusive of the subway. The subway is 12 ft. in diameter by 7 ft. 6 in. in height. It has a central footway, and rails are laid along its length for the transit of a trolley.

# IMPERIAL STANDARD CHAIN OF 66 FEET



615

# IMPERIAL STANDARD CHAIN OF 100 FEET



# MEASURING TAPES

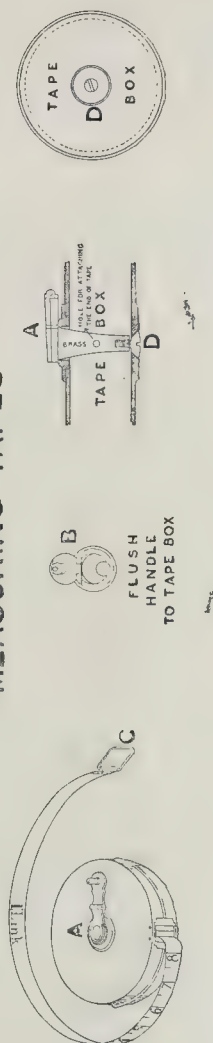
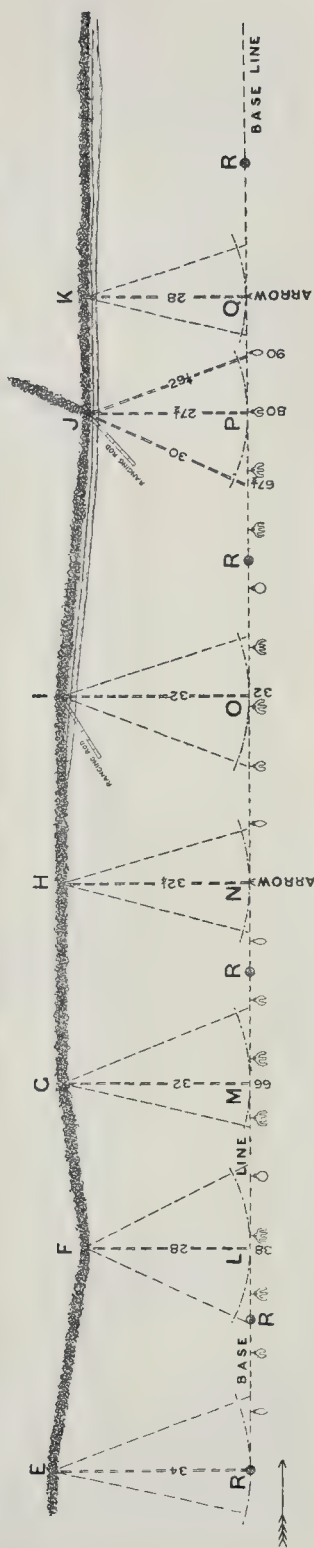


FIG 7

**FIG 8—DIAGRAM ILLUSTRATING THE MEASUREMENT OF OFFSETS WITH A TAPE**





held fast by the follower, the leader holds an arrow vertically, as shown in fig. 2, against the outer edge of the end ring or brass handle of the chain, and after shaking and pulling the chain to ensure a straight line, the leader thrusts No. 1 arrow into the ground. He then leaves it there, and advances with the chain, until the follower who has the hold of the other end of the chain reaches No. 1 arrow, and calls upon him to stop. The leader places another arrow against the brass handle or terminal ring of his chain, which is again stretched and directed as before. He then fixes No. 2 arrow into the ground and leaves it there to show the follower what point upon the base line he has next to measure from. The follower now picks up No. 1 arrow, and both the leader and the follower advance as before, until the required length of line is measured, or until all the ten arrows have changed hands, when a pole can be placed in line to mark the position of the tenth arrow, or length of one thousand links, while the follower hands all the ten arrows to the leader. If the ground is too hard to press the arrow at the end of any chain's length into its place, the leader marks the ground with the point of an arrow, thus,  $\nearrow$ , and lays the arrow down. The intersection of the lines in this mark shows the follower to which point the end of the chain has to be held in continuing the measurement of the line.

In taking offsets, the surveyor reads the tape at the chain, and the ring of the tape being held at a point to which the offset is required, the surveyor twists the tape round in a horizontal plane, as shown in fig. 8, in order to read the shortest measurements, and also to ascertain the link upon the chain at which the offset would form a perpendicular to the base line. When a ditch intervenes, the centre of a hedge may be reached by placing the spiked end of a ranging rod in the ring of the tape C, as indicated in fig. 7, and proceeding as in fig. 8.

### RECENT PATENTS.

#### ABSTRACTS OF SPECIFICATIONS.

10,150, Preventing Down-draught in Chimneys. J. De Baere.

According to this invention, a box or casing is made double the width of the chimney opening, and an opening is made near the back of the case corresponding with the opening or flue of the chimney. A stop-plate projects half way across the width of the case, and being so placed allows a passage for the smoke to pass around it and so up the chimney. The stop-plate is also hinged, so that when the chimney is to be swept it can be turned back.

10,219, Ventilation of Drains. P. R. Smyth. By this invention ventilating-boxes are fitted, preferably at the surface, for drains and traps leading to the common sewers. Each of these boxes consists of a light cast-iron circular case about twice the diameter of the pipe to which it is to be fitted, and having in the centre a smaller pipe of near the diameter of the trap or pipe. This is fitted with an open spigot end, and the sides of the short central pipe are perforated with holes, as a rose.

10,682, Improvements in Lavatories. P. Everitt.

This invention consists in an application of the automatic principle, whereby the appliances may be used by the introduction of a coin. A lock is so fixed that only on the introduction of a coin or token can any part of the apparatus be raised or lowered for use.

13,313, Disinfecting and Ventilating Drains or Sewers. R. H. Reeves.

The chemicals used by the inventor for disinfecting are mixed in separate chambers before being passed into the basin or receptacle. By the admixture of suitable chemicals, with drip-taps and other appliances to regulate the same, a vapour is formed which, it is claimed, greatly increases the power of the disinfectant. Different forms of the appliance are used for separate situations.

14,386, Manufacture and fixing Metal Tiles. F. H. Rees.

The chief improvement to which this invention refers consists of making the flange-pieces, which are used to fasten the tiles in position, of a non-corrodible metal. Instead, also, of being made out of the same pieces of metal as that of which the tile is formed, they are in smaller detachable pieces. These two simple points are, it is claimed, of some importance, as it is found that the tiles are liable to be destroyed by rust when fixed to damp walls.

16,694, Window Fastenings. J. L. Seymour. This invention relates to a lever-catch, which, when the window is fixed in position, falls by gravity and prevents the sash being lifted.

6,494, Metallic Roofing. L. L. Sagendorph.

By this invention special ridges and corrugations are made with the view of forming a joint which is perfectly impervious to water, and which is easily connected, and allows the tiles to be readily secured in place. The form slightly varies for special purposes, but is not unlike the general make of metallic tiles.

#### NEW APPLICATIONS FOR PATENTS.

July 1.—9,828, S. Bromhead, Intermittent Valve Action for Water-closets, &c.

July 2.—9,354, J. Miller, Ventilators.—9,393, J. Johnson, Domestic Fire-grates.

July 4.—9,434, J. Easley, Automatic Apparatus for Dry Closets and Water-closets.—9,448, H. Allan, Service Cisterns for Water-closets, &c.—9,452, W. Youlton, Sliding Window Sashes.—9,457, S. Hill and R. Hodges, Spring Hinges for Swing Doors.

July 5.—9,479, M. Sherry, Planing and Dressing Wood.—9,489, W. Lee, Circular-saw Spindles.—9,504, C. Norton, Window Fasteners.

July 6.—9,535, T. Smith, Excavating Apparatus.—9,543, E. Hurley, Chimneys and Ventilating Shafts.

July 7.—9,583, D. Goddard, Wood Block Paving for Floors.—9,585, R. & C. Kidd, Opening and Closing Ventilators.—9,593, H. Hanson, Fire-places.—9,605, G. Innes, Manufacture of Portland Cement, &c.

#### PROVISIONAL SPECIFICATIONS ACCEPTED.

7,516, H. Godwin and W. Hewitt, Making and Connecting Tile or Ceramic Fenders and Millings.—7,757, C. Rabbit, Construction of Walls, Cellings, Roofs, &c.—7,810, C. Irwin, Auger Bits.—7,959, G. Lewis, Flooring Wainscoting, &c.—4,046, P. Chinnery, Window Fasteners.—7,341, H. McKibbin, Hinges.—7,389, R. Fladgate, Securing Double Doors, Panels, &c.—7,584, H. Schallhorn, Domestic Fireplaces.—7,976, W. Haworth, Chimney Pots.—7,983, J. Root, Distemper Paint Brushes, &c.—8,055, W. Thompson, Roofing.—8,316, C. Laspe, Fire Bricks.—8,361, H. Belcher, Brick-pressing Machine.—8,473, G. Newman, Combined Door Spring and Check.—8,510, W. Wise, Flooring.—8,914, J. Danby, Metallic Buildings.—8,939, J. & J. Crombie, Concrete Pavements, Floors, &c.

#### COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

10,408, J. Wilson, Ventilation of Rooms.—10,625, J. Denny, Tiles for Enclosing Girders and Construction of Ceilings, &c.—11,266, J. Jones, Hanging Sash Windows.—797, M. Hussey and W. Clark, Roofing Tiles and Slates.—10,919, M. Bayliff, Chimney-tops, Cows, or Ventilators.—11,360, G. Soper, jun., Hanging Sashes.—11,435, R. Bucknall, Construction of Temporary Buildings.—12,031, M. Syer, Syphon Water Waste Preventers.—4,598, S. Elliott, Metal Water Bars for Doors and Windows Opening Inwards.—7,544, F. Wickes, Paving, Flooring, &c.

#### STAINED GLASS.

Chester.—A Manchester paper says that the Duke of Westminster is about to fill with stained glass the great west window of the Church of St. John, Chester. The subjects to be depicted will be taken from episodes in the history of St. John. Mr. Frampton, of London, has, it is understood, been commissioned to prepare the designs for the window.

Ilkley.—A window has been placed in Ilkley Parish Church by the change-ringers of England, in memory of Mr. Jasper Whitfield Snowdon, late president of the Yorkshire Association of Change-Ringers. The window, a three-light one of rich colouring, is placed at the north-side of the church, near the tower, and introduces Gothic details of stonework, with swinging bells visible through the openings. A group of angels, portrayed as offering praise on strings and pipe, forms the leading feature of the window; and three views are given in the base showing the bells "at rest," and when "set" at "hand-and-back stroke." In the upper part of the middle light the heavens are shown opening, and permitting the sacrifice of praise to ascend; and across the three lights are scrolls bearing portions of Psalm cl. The entire work has been designed and executed by Messrs. Powell Brothers, of Leeds.

Holborn Theatre.—The Holborn Theatre, High Holborn, which has been for a long time vacant, is about to be converted into a public hall, which is proposed to be called West Central Hall. The hall will be about 160 ft. long and 85 ft. wide for the greater part of its length, and 54 ft. high, to the apex of the roof. The hall will have two tiers of galleries, and will have exits into French Horn-yard and Eagle-street. The architect is Mr. E. Clark, of West Strand.

### RECENT SALES OF PROPERTY.

#### ESTATE EXCHANGE REPORT.

July 1.

By R. Reid.  
Charing Cross-road and Shaftesbury-avenue—The letting of 62 plots of building land, for a term of 80 years, averaged from 8d. to 4s. 9d. per foot .....

July 4.

By F. J. Bury.  
Bermondsey—1, 3, and 5, Francis-street, freehold .....

Rotherhithe—41 and 50, Swan-street, freehold .....

By J. & R. Kemp & Co.  
Barnes—Ground-rents of 19½, reversion in 80 years .....

By Brand & Son.  
Paddington—33, Hercules-street, 59 years, ground-rent 5½ .....

July 5.

By Bral, Sor, & Charters.  
Shoreditch—77, 78, and 81, Curtain-road, freehold .....

By Daln & Son.  
Ratcliff—115, Brook-street, 33 years, ground-rent 10½ .....

By B. H. L. Lewis.  
Bow—5 and 6, Merchant-street, freehold, for a term of 99 years, ground-rent 24½ .....

By C. & H. White.  
Clapham-road—28, Aldebert-terrace, 76 years, ground-rent 7½ .....

By Patching & Jordan.  
Worthing—The freehold house "Grayingham," and .....

By E. & H. L. Lewis.  
Portman-square—4, Granville-place, 66 years, ground-rent 55½ .....

By Debenham, Tawson, & Co.  
City of London—Ground-rent of 42½, reversion in 10 years .....

Poplar, Burcham-street—Ground-rents of 18½, reversion in 67 years .....

Ground-rents of 8½, reversion in 58 years .....

St. Leonard-avenue—Ground-rents of 9½, reversion in 88 years .....

Canning Town—Ground-rent of 33½, reversion in 60 years .....

East India Dock-road—No. 173, freehold .....

Poplar—41, Pennyfields, and 14, King-street, copyhold .....

East India Dock-road—16 to 22 even, Kerby-street, 55 years, ground-rent 12½ .....

61 to 77, Telley-street, 55 years, ground-rent 22½ .....

72 to 78 even, Telley-street, 55 years, ground-rent 12½ .....

42, Telley-street, 55 years, ground-rent 12½ .....

195, Grundy-street, 55 years, ground-rent 21½ .....

Poplar—15 to 19 odd, Follett-street, 62 years, ground-rent 12½ .....

July 6.

By Waterhouse & Green.  
Wandsworth, Garrett-lane—Somerset Lodge, freehold .....

By W. W. Jamieson.  
Norfolk, West Valley House Farm, 164a, 3r. 2p., freehold .....

Wall and Garton's Farms, 27½a, 2r. 33p., freehold .....

By Harman Bros.  
Kennington—32, Queen's Gate-gardens, and stabling, 69 years, ground-rent 22½ .....

Belgravia—28, Eaton-terrace, 34 years, ground-rent 12½ .....

By Mansel & Row.  
Norwood, Beulah-hill—The Rectory, 74 years, ground-rent 38½ .....

By H. J. Bromley.  
Forest-hill—7, Woodvale, 73 years, ground-rent 8½ .....

By Glaser & Son.  
Barnsbury—63, Huntingdon-street, 62 years, ground-rent 11½ .....

By Prickett, Venables, & Co.  
Mitcham—The Fountain Print Works, freehold .....

By Newson & Harding.  
Barnsbury—123, Hemingford-road, 55 years, ground-rent 6½ .....

Camden Town—68, Arlington-road, 13 years, ground-rent 11½ .....

By Humbert, Son, & Elmt.  
Beddington—A plot of freehold garden ground, 14½ r. 0 p. .....

Two freehold cottages .....

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July 8.

By J. M. Kew & Co.  
West Kensington—71, Byrie-road, 94 years, ground-rent 13½ .....

Forest-gate—26, Strode-road, freehold .....



By GEORGE GOLDBERGER, Son, & Co.	
Belgrave—68 and 70, Ebury-street, 38 years, ground-rent 131.	£2,750
6, 7, and 8, Ebury-mews, 38 years, ground-rent 131.	470
Pinlloe—10, Farnley-street, 38 years, ground-rent 81. 10s.	630
Brompton—34, Montpelier-row, 38 years, ground-rent 151.	90
Harrow—A plot of freehold land	100
A plot of about Three Acres, freehold	720
Paddock Wood, Kent—Belting Farm, and 46a, 2r. 33p. freehold	2,610
By NORTON, TRIST, & GILBERT.	
Bloomsbury—35, Great Russell-street, 69 years, ground-rent 401.	1,650
By DAYVEN & CO.	
Rotherfield, Sussex—Ground-rent of 84, reversion in 90 years	120
By REXFOLDS & EASON.	
Hackney—28 and 30, Broadway, and 1 to 5, Goring-street, 44 years, ground-rent 151. 10s.	1,130
31, 33, 43, and 45, Parmiter-street, 42 years, ground-rent 81. 12s.	450
14 and 16, St. Peter-street, 21 years, ground-rent 71.	260
34 and 36, St. Peter-street, 54 years, ground-rent 61.	430
84 and 86, Old Ford-road, 14 years, ground-rent 41. 12s.	100
Hackney-road—No. 371, and 13 and 26, Gloucester-street, 28 years, ground-rent 81. 6s. 6d.	475
64 to 72, Treadway-street, 18 years, ground-rent 102. 10s.	315
9, Patriot-square, freehold	330
Bethnal-green—74 and 76, Chesbro-street, 31 years, ground-rent 41.	410
Shoreditch—11, Moat-street, freehold	220
By NEWSON & HARDING.	
Camden Town—21 and 23, York-road, term 54 years, ground-rent 141.	650
Kentish Town—10, 161, and 163, Goring-street, 501.	550
St. Luke's—77 and 79, Lever-street, 17 years, ground-rent 61.	410
Seven Sisters-road—14, Campbell-road, freehold	225
Peckham-rye, Stewar-road—A plot of freehold land	31
Islington—18, St. Peter-street, freehold	885
Peckham—Ground-rent of 351, reversion in 65 years	895
Bermoudey—An improved rent of 361, term 59 years	585
Notting-hill—261, Fortchello-road, 76 years, ground-rent 101.	610
49 and 51, St. Mark's-road, 76 years, ground-rent 161.	1,175
Maylebone—16 and 17, Richmond-street, 34 years, ground-rent 101.	485
Seven Sisters Road—2 and 4, Palmerston-road, 78 years, ground-rent 141.	260

# MEETINGS.

SATURDAY, JULY 16.

Architectural Association.—Visits to Sutton Place, near Guildford, and Loseley Park. (See advertisement on p. 1, July 9.) Trains from Waterloo at 9.45 a.m., and 2.45 p.m.

Association of Municipal and Sanitary Engineers and Surveyors.—Annual Meeting at Leicester. (Third Day.) Visits to Victoria Stone Company's Works, Bradgate Reservoir, Mount Sorrel Granite Quarries, and the Barrow Lime-works.

St. Paul's Ecclesiastical Society.—Visit to Salisbury.

Train from Waterloo at 9.45 a.m.

Liverpool Engineering Society.—Excursion to view the Park Extension of the Mersey Railway, the Wirral Railway, and the Bidston Observatory.

TUESDAY, JULY 19.

Victoria Institute.—Annual meeting: Address by Professor Stokes. 8 p.m.

WEDNESDAY, JULY 20.

Builders' Foremen and Clerks of Works' Institution.—Half-yearly meeting. 8.30 p.m.

# Miscellaneous.

**The Will of the late Sir Horace Jones.** The will of Sir Horace Jones, the City Architect, late of 80, Devonshire-place, and 4, Codrington-place, Brighton, and also of the Guildhall, who died, on May 21st last, was proved on the 2nd inst. by Dame Ann Elizabeth Jones, the widow, and Mr. Octavius Hansard, two of the executors, the value of the personal estate exceeding 20,000l. The testator gives all his household furniture, plate, glass, linen, pictures, carriages, horses, wines, consumable stores, and jewelry, and 1,000l. to his wife; 20l. to his executor, Mr. Hansard; the use, rent free, of his house, White Lodge, Sunbury, to his three sisters, Mary Shepherd Jones, Sarah Gardiner Jones, and Lydia Lynch Jones, for their lives, and numerous legacies to relatives and friends. His property at Rotherhithe, together with his houses, 22, Ulster-place, and 62 and 54, Cannon-street, he leaves upon trust for his wife for life or widowhood, and then to his daughter, Annie Horatia. The residue of his real and personal estate he leaves upon trust for his wife during her life or widowhood, and then to his said daughter absolutely; but by a codicil the testator (in the event of his having other children besides his said daughter) leaves the residue of his property between them in equal shares.—City Press.

**Great Indian Peninsular Railway Terminus, Bombay.**—The central keystone of the large masonry dome of the above buildings was fixed on Jubilee day, the 20th of June, thus bringing this large work to another stage nearer completion. The event was signalled by the contractors, Messrs. Burjiojee Rustomjee, Maistry, & Co., having a ceremony, and presenting their sub-contractors, head maistries (foremen), with presents of handsome shawls, turbans, and money, the usual native method of appreciating services rendered when any great work has been practically completed. The dome, which is 45 ft. clear span, is entirely of cut-stone masonry, and has been constructed without any centering or supports whatever. The whole of the interior masonry construction of the dome is exposed to view, and covers the grand staircase and hall. Now that the keystone has been fixed there only remain the embellishments of the interior and exterior, such as the mouldings, carvings, and statuary. The dome will be terminated by a colossal figure of "Progress" in Bath stone. The buildings will in all probability be completed by the beginning of next year. The statue of H.M. the Queen-Empress, representing the State, the railway being guaranteed by Government, will be placed under the canopy in the central gable of the building. The cost of the terminal buildings when completed will be 27 lacs of rupees, or 250,000l. They were designed by Mr. F. W. Stevens, late of the Public Works Department, and are being carried out by that officer with the assistance of Mr. Siteram Khanderni, assistant engineer. The sculpture for the buildings has been executed by Messrs. Bap & Son, of Lambeth.

**Another Inter-oceanic Railway.**—The contract for the construction of another important inter-oceanic highway has just been concluded. It is proposed to construct a railway in Guatemala, to extend from Santa Tomas, on the Atlantic seaboard, to the Pacific Ocean, a distance of 275 miles. The new railway is to be in operation in eighteen months. The scheme was postponed in consequence of the death of President Barrios, but negotiations between representatives of Guatemala and two American contractors, Mr. Charles Mackin and Mr. J. H. McCreery, have been concluded in New York, and the necessary funds provided. Guatemala is the richest coffee country in the world, and an inter-oceanic railway, such as is projected, means a curtailing of the route to California by over 2,000 miles. In renewing negotiations for the railway, the Government has made some very valuable concessions. By the terms of the present contract the contractors are to receive 50,000 dols. per mile in gold-bearing government bonds, 5,000 dols. in gold per mile, and a grant of 280,000 acres of land along the line of the road, the route of which the contractors can select themselves. Of the bond issue, 6,000,000 dols. worth are stated to have already been assured of sale in Paris,—enough to ensure the completion of the line. Of the land conceded, General Queralt, who will be in charge of the construction, states that no less than 80,000 acres of it are in rubber trees, and the remainder is rich in mahogany, rosewood, and other valuable woods. Last year Guatemala exported 80,000,000 pounds of coffee, and the trade is susceptible of rapid expansion.—Iron.

**Chubb's Push and Pull Locks.**—On the 8th instant an interlocutory application was made on behalf of the plaintiff in the case of Kaye v. Chubb to the Master of the Rolls (Lord Esher) and Lords Justices Lindley and Lopes, for a stay of proceedings in the action pending an appeal to the House of Lords. When the action was tried, Mr. Justice Mathew decided in favour of the plaintiff; but in the Court of Appeal their lordships gave judgment with costs in favour of the defendants, Messrs. Chubb, lock and safe manufacturers. The plaintiff having entered a further appeal to the House of Lords, now applied for a stay of execution pending the result of such appeal. After hearing the arguments, however, their lordships refused the application with costs.

**Numidian Marble.**—Our columns have of late contained several references to Numidian marbles, which, owing to their richness and beauty, are beginning to be used in modern buildings in this country. In our advertisement columns will be found the prospectus of a company which has been formed to work the Numidian quarries, which are stated to be practically inexhaustible.

**A New Public Hall at Mitcham.**—A new Vestry-hall, which is also intended to serve the purposes of a public hall for meetings and general entertainments, has just been erected and opened at Mitcham. The land upon which it has been erected is on an open and central situation overlooking Mitcham Green, and the principal frontage of the building to the high road from Mitcham to Sutton. The building is in the "Queen Anne" style, the materials used being red brick, with patent red-brick window heads and bands, and Shawk stone dressings, entrances, and cornice. The principal frontage, facing Mitcham Green, is 80 ft. in length, the height of the cornice being 40 ft., and to the ridge of the high-pitched roof 60 ft. At the north-east corner a clock tower, in which there is an illuminated clock and a peal of bells, rises to a height of 80 ft., and in a central position, above the summit of the roof, there is a ventilating *fliche* rising to the same height as the tower. The building is isolated, the north and south return frontages being 35 ft. in length, and the west frontage of the same length as the principal elevation to the east. The ground-floor contains a committee-room and three offices, one of which forms the general office for the business of the parish of Mitcham, the other two offices being let to the Croydon Sanitary Authority. The upper floor contains a public-hall, 58 ft. in length and 31 ft. in width, and is 32 ft. in height to the apex of an open timber roof, in which there are three central outlets connected with the ventilating *fliche*. In the walls are also inserted Benham's ventilating inlets. The hall will seat an audience of about 400 persons. At the south end there is a moveable platform or stage. In connexion with the hall there are retiring and cloak rooms: The architect of the building, which has cost about 3,500l., is Mr. R. M. Chart, and the contractor was Mr. E. J. Burnard, of Wallington. It may be added that the building has been erected on the site of the old stocks and "cage," which were removed for the purpose.

**Sale of a Building Estate in Kent.**—On Thursday in last week the first portion of a building estate, situated on Swanley Hills, in Kent, was offered for sale by Messrs. Baker & Sons. It is known as the Rowall Estate, comprising about 15 acres, and has been laid out for the erection of upwards of 250 houses and shops, five new roads, each 50 ft. in width, having been formed on the estate. It is about a mile and a half distant from the Swanley Junction of the London, Chatham, and Dover Railway, and nearly two miles from the Crayford Station of the South-Eastern line. It stands upon high ground, commanding extensive views of the county of Kent for several miles around. The number of plots offered was 166, being nearly two-thirds of the entire number of plots on the estate, twelve being shop plots, and one a hotel plot. Before inviting offers, Mr. Baker, the auctioneer, reminded the company present that the whole of the plots to be submitted would be sold without the slightest reserve for whatever they might fetch, it being the object of the vendor to offer every encouragement for the immediate commencement of building on the property. He added that the purchasers of the several lots would have conveyances made to them free of expense except the stamp duty. On the sale commencing, the whole of the plots were rapidly sold, several purchasers taking as many as six and twelve plots each. The plots for the erection of private houses, having frontages of 16 ft., and depths of about 70 ft., were sold at from 3l. to 4l. each, whilst the shop plots, having frontages of 18 ft., and depths of about 80 ft., realised from 6l. to 8l. each. The hotel plot, having a frontage of 54 ft. to Clarendon-road (the main road to London), and a return frontage of 80 ft., was sold for 45l.

**Andover.**—The Mansion of Enham-place, near Andover, belonging to the late Colonel Earle, which was destroyed by fire four years ago, is about to be re-built by his brother, Mr. Thomas Hughes Earle, Clerk of the Peace for Hants. Except by the incorporation of the old cellars, the house will be erected from entirely new plans, by Mr. Samuel Knight. The style adopted is Italian, Classic in its detail, but with high-pitched tile roofs, tall chimneys, and otherwise Jacobean features. The elevations in red brick and Ham-hill stone. The general contract has been entered into with Messrs. Stephens, Bastow, & Co., of Bristol.



**Carved Statuary Marble Mantelpieces for Melbourne.**—We have had an opportunity of inspecting, at the show-rooms of Messrs. George Wright & Co., 155, Queen Victoria-street, one of a pair of large and handsome mantelpieces executed by that firm for the drawing-room of a new mansion at Melbourne for Sir William Clarke, Bart. The mantelpieces are Renaissance in style. The fireplace or opening is 4 feet wide, with deep splayed lined with large and very good hand-painted tiles. The cast-iron dog-grate has nickel bars, and the "dogs" are of hollow cast brasswork, pierced and burnished, the supports for the fire-irons being of the same material, similarly treated. The piers of the mantelpiece are 18 in. wide. The height to the top of the shelf (which is 21 in. wide) is 5 ft. 7 in. The shelf, which is richly moulded, is supported by carved consoles, in their turn supported by diminishing pilasters. The frieze is broadly treated, and has in the centre a shield supported by two cherubs—rather too sedate of feature, perhaps. On each side of these is a "swag" of roses and leaves, and smaller "swags" are looped round the consoles which support the mantelpiece. The workmanship is very creditable. The show-rooms of this firm, we may add, are well worth visiting, for, among other specialties, they contain a new tile-canopied dog-grate which, while excellent in appearance, seems to be well calculated to prevent the smoky chimneys too often resulting where dog-grates are used.

**Handy Reference Books for the Office.**—"May's British and Irish Press Guide for 1887" (London: F. L. May & Co., 159, Piccadilly) is a compact and well-arranged handy-book, and that its merits are appreciated evidence is afforded by the fact that this is its fourteenth year. It is what it claims to be, "a classified, concise, and comprehensive index to the Press of the United Kingdom," and it also includes a list of the principal Colonial and foreign journals. We can cordially recommend it. It is published at 1s.—Another work of a reference of a kindred character, but with some special features superadded, is "Bell's Dictionary of the World's Press for 1887" (London: H. Bell, 187, Fleet-street). Of this work we are able to say, after careful examination, that, on the whole, it is perhaps the most complete reference-book of its kind—as, indeed, it ought to be, taking its bulkiness into consideration. With one or two exceptions which we have noticed, it appears to be very accurate and quite up to date. It gives lists of foreign journals, as well as those of Great Britain and Ireland, and a large mass of matter interesting to all who buy, read, or advertise in papers,—in other words, to everybody. It claims to be the largest 2s. book ever published.

**A Memorial Pulpit** has been erected in Sparkwell Church, Plympton, South Devon, of which the Rev. Pender H. Cudlip is the vicar. It was designed by the Rev. E. Geldart, of Little Braxted, Witham, Essex. The base is of freestone, and the superstructure in English oak, with tracery and carved panels and cornices; the central panel contains a sculptured figure of St. John the Baptist, in high relief, standing on a carved corbel, and a riband over the figure bearing the words "Bring forth fruits of penance" carved thereon. A "brass" inserted in one of the panels bears the following inscription in Old English text—"In loving memory of Vice-Admiral George Woolcombe, of Hamerton, died 3rd July, MDCCCLXV, aged 70, and of Mary Elizabeth Woolcombe, his wife, died 26th Jan'y, MDCCCLXXXIII, aged 81. Erected by Major and Mrs. Robert Woolcombe." The whole of the work has been executed by Messrs. Luscombe & Son, of Exeter.

**St. George's-in-the-East Workhouse.**—The Report of the Local Government Board Inspector (Dr. Brydges) upon the recent additions to this establishment has been laid before the Guardians. It states that the new workhouse block (Messrs. Wilson, Son, & Aldwinckle, architects) is all that could be desired as regards drainage, warmth, and ventilation, which is on the Boyle system. On the occasion of Dr. Brydges' visit, the Workhouse was full of people, but we are informed that the air was remarkably pure. The report was referred to the House Committee for consideration.

**National Gallery Alterations.**—We are asked to mention that the material of the steps in the new work is from the Craigleith quarries.

**The Banner Sanitation Company** has recently issued a very concise and instructive catalogue, entitled "The Sanitarian's Companion." It is not confined to the Company's own well-known specialties, but includes specialties of other makers, so that, in short, it forms a complete conspectus of the best modern practice in sanitation and sanitary fittings. It is not overloaded with a multiplicity of detail, but shows at a glance typical specimens of the best kind of fittings and apparatus for varying requirements. The Company a year ago opened excellent show-rooms at Wessex House, Northumberland-avenue (opposite the Hôtel Métropole), where may be seen in action a great many of the appliances figured and described in the catalogue. We would specially call attention to Banner's patent "drain grenade" or "drain ferret," a small tube of thin glass charged with pungent and volatile chemicals. When one of these "grenades" or "ferrets" is dropped down any pipe, it breaks, and the odour of its contents can, with necessary precautions, be confined within any particular section of a house-drainage system which may be suspected of allowing the escape of sewer-gas. The advantages of enclosing the chemicals in glass are obvious. Among valve-closets figured in the catalogue is the "Nestor," the special feature of which is that the trap of the overflow is formed by the water in the basin itself, and therefore cannot be unseathed, nor is it likely to get choked, for the water in the overflow-pipe is necessarily changed each time the closet is used. The catalogue also includes particulars of a very efficient and cheap "wash-out" closet.

**Upper Helmsley.**—A consistory court was recently held at York Minster, before a surrogate to Lord Grimthorpe, when a faculty was decreed to the Rev. G. J. Horner, rector of Upper Helmsley, and Colonel G. E. Herbert, churchwarden, for the carrying out of what are described as improvements at the parish church. It is proposed to re-roof the edifice, and to build new chancel, porch, vestry, and heating-chamber. Internal alterations are also to be made, the church being re-seated and refitted, and other desirable improvements effected. The plans are being prepared by Messrs. William Lewis & Son, architects, York.

**Paper Doors.**—Paper doors are coming into use in America, and it is not difficult to foresee that, should they answer requirements, they will soon be introduced in Europe. It is said that they compare favourably with those of wood, as they neither shrink, swell, crack, nor warp. The doors are formed of two thick paper boards, stamped and moulded into panels, and joined together with glue and potash, and finally rolled through heavy rollers. After being covered with a waterproof coating, and with another which is fireproof, the doors are painted, varnished, and hung in the usual way.

**George Neal & Co. (Limited).**—Our advertisement columns this week contain the abridged prospectus of a company which has been formed to acquire, as a going concern, and to further develop, the business,—well known throughout the whole of the Metropolis,—of Mr. George Neal, of Wandsworth and Battersea, lime, cement, and brick merchant, wharfinger, ballast, tar-paving, and general contractor and carman, started by the late Mr. Robert Neal as far back as 1826.

**Arbitration in re the Sheffield Sewerage Works.**—The Sewerage and Rivers Committee of the Sheffield Town Council have recommended that the corporate common seal be affixed to the appointment of Mr. C. J. Innocent, architect and surveyor, as single arbitrator to settle the amount of compensation to be paid to Mr. David Ward, "for the loss and damage alleged to have been sustained by him in respect of his property at Walkley Bank, by reason of the construction of certain works of sewerage."

**Preservation of Stone.**—In reference to our recent articles on this subject, a correspondent writes:—"About twenty years ago two houses were built in Ashley-place, the exterior being formed of brick and Bath stone dressings; the stonework was, on completion, covered with Ransome's silicate, which has preserved the stone from any decay whatever."

**Upton (Essex).**—The new church for the Franciscans, at Upton (Essex), is now being built from the designs of Messrs. Pugin & Pugin. The contractor is Mr. James Morter, of Stratford.

**Parish of St. Mary Magdalen.**—The Commissioners appointed *ad hoc* recommend in their report that the contemplated union of the parishes of St. Mary Magdalen, Old Fish-street, and St. Gregory-by-St. Paul with that of St. Martin-by-Ludgate, should be carried out forthwith. An income of 570*l.* per annum will be paid to the rector of the new benefice, and the proceeds of the sale of the site of St. Mary Magdalen, in Knight-riding-street (the church having been lately destroyed by fire), will be devoted towards the building of a new church in London.

**Architectural Lectures.**—The lectures on Style and Styles in Building, to be delivered by Mr. Harvey at the Guilds' Institute, will begin on the 19th inst. The fee for the whole course is 5*s.* Applications for tickets and syllabus to be addressed to the Secretary of the City and Guilds of London Institute, Exhibition-road.

**Linthgow.**—The new Catholic church at Linthgow, designed by Messrs. Pugin & Pugin, has just been commenced. It is being built in memory of Mary, Queen of Scots.

#### PRICES CURRENT OF MATERIALS.

TIMBER.		2. s. d.	2. s. d.
Greenheart, B.G.	.....ton	5 10 0	7 10 0
Teak, E.I.	.....do	8 0 0	12 0 0
Sequoia, U.S.	.....foot cube	0 2 3	0 3 0
Asp. Canada	.....load	3 0 0	4 10 0
Birch	.....do	2 0 0	3 10 0
Elm	.....do	3 10 0	4 10 0
Fir, Dantsic, &c.	.....do	1 10 0	4 0 0
Oak	.....do	2 10 0	4 10 0
Canada	.....do	3 0 0	6 0 0
Pine, Canada red	.....do	2 0 0	3 10 0
.....yellow	.....do	2 10 0	4 10 0
Lath, Dantsic	.....fathom	3 0 0	5 0 0
St. Petersburg	.....do	3 0 0	5 10 0
Wainscot, Riga	.....log	0 0 0	0 0 0
.....Odessa, crown	.....do	2 10 0	3 0 0
Deal, Finland, 2nd and 1st	.....do	7 0 0	8 0 0
.....4th and 3rd	.....do	5 10 0	6 10 0
Riga	.....do	5 10 0	7 0 0
St. Petersburg, 1st yellow	.....do	8 0 0	13 0 0
.....2nd	.....do	7 0 0	8 0 0
.....white	.....do	6 10 0	8 10 0
Swedish	.....do	0 0 0	0 0 0
White Sea	.....do	10 0 0	16 0 0
Canada, Pine, 1st	.....do	10 0 0	26 0 0
.....2nd	.....do	10 0 0	15 0 0
.....3rd, &c.	.....do	6 0 0	9 0 0
.....Spruce, 1st	.....do	8 0 0	9 0 0
.....3rd and 2nd	.....do	5 0 0	7 0 0
New Brunswick, &c.	.....do	5 0 0	10 0 0
Baltens, all kinds	.....do	4 0 0	10 10 0
.....pared, First	.....do	0 8 0	0 11 0
.....Second	.....do	0 8 0	0 7 8
.....Other qualities	.....do	0 4 0	0 6 0
Cedar, Cuba	.....do	0 0 3	0 0 3
Honduras, &c.	.....do	0 0 3	0 0 3
Australian	.....do	0 0 2	0 0 3
Mahogany, Cuba	.....do	0 0 3	0 0 3
St. Domingo, cargo average	.....do	0 0 4	0 0 6
Mahogany, Mexican, cargo av.	.....do	0 0 3	0 0 4
Tobacco	.....do	0 0 0	0 0 5
Honduras	.....do	0 0 3	0 0 5
Maple, Bird's-eye	.....do	0 0 5	0 0 7
Rose, Rio	.....ton	8 0 0	11 0 0
Balsa	.....do	7 0 0	9 0 0
Box, Turkey	.....do	5 0 0	13 0 0
Satin, St. Domingo	.....foot	0 0 5	0 0 9
Porto Rico	.....do	0 0 6	0 0 10
Walnut, Italian	.....do	0 0 3	0 0 5

#### METALS.

Iron—Bar, Welsh, in London	.....ton	4 7 6	4 15 0
....." in Wales	.....do	4 2 6	4 7 6
.....Staffordshire, London	.....do	5 10 0	5 0 0
Sheet, single, in London	.....do	6 10 0	6 10 0
Hoops	.....do	6 0 0	7 0 0
Nail-roads	.....do	5 15 0	6 10 0
COPPER—			
British, cake and ingot	.....ton	43 0 0	44 0 0
Best selected	.....do	44 10 0	45 0 0
Sheet, strong	.....do	50 0 0	0 0 0
Chili, bars	.....do	39 15 0	40 2 6
Yellow METAL	.....lb.	0 0 0	0 0 0
LEAD—			
Pig, Spanish	.....ton	11 18 3	0 0 0
English, common brands	.....do	12 2 6	0 0 0
Sheet, English	.....do	13 3 3	15 6 0
SPELTER—			
Silesian, special	.....ton	14 12 6	14 15 0
Ordinary brands	.....do	14 10 0	14 12 6
TIN—			
Strait	.....ton	103 17 6	0 0 0
Australian	.....do	104 10 0	0 0 0
English ingots	.....do	107 0 0	0 0 0
ZINC—			
English sheet	.....ton	0 0 0	0 0 0

#### OILS.

Linseed	.....ton	21 15 0	22 0 0
Cocanut, Cochia	.....do	30 0 0	33 0 0
Ceylon	.....do	24 5 0	0 0 0
Palm, Lagos	.....do	21 10 0	0 0 0
Rapeseed, English pale	.....do	23 15 0	24 0 0
.....brown	.....do	22 0 0	23 10 0
Cottonseed, refined	.....do	21 10 0	22 0 0
Tallow and Oleine	.....do	25 0 0	45 0 0
Lubricating, U.S.	.....do	5 0 0	8 0 0
.....refined	.....do	5 0 0	12 0 0
TURPENTINE—			
American, in casks	.....cwt.	1 7 3	1 7 6
Tar—			
Stockholm	.....barrel	0 14 0	0 14 8
Archangel	.....do	0 9 8	0 10 6



## COMPETITIONS, CONTRACTS, &amp; PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

## COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Masonic Building	Masonic Buildings Co.	Not stated	August 1st	ii.
Leasing-out Property, Isle of Man		35 <i>l.</i> and 16 <i>l.</i>	Not stated	ii.

## CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Materials for Macadam	Brighton Town Council	P. C. Lockwood	July 19th	xii.
Leaking-up and Paving Roads	Wandsworth Bd. of Wks	Official	do.	ii.
Leaving away Material	Hammersmith Vestry	do.	July 20th	xii.
Phosphate and Wood Paving	St. Martin-in-the-Fields	do.	July 21st	ii.
Painting, Repairs, &c.	Westry	do.	do.	ii.
Level of Romaney Marsh	Lewisham Union	H. D. Good	July 22nd	ii.
Admiralty	Level of Romney Marsh	Official	do.	ii.
Dray's Company	Admiralty	G. F. Hayward	July 23th	ii.
Southgate Local Board	Dray's Company	G. Reilly	July 26th	xii.
Met. Board of Works	Southgate Local Board	do.	July 26th	xii.
Great Northern Ry. Co.	Met. Board of Works	J. Fraser & Sons	August 15th	ii.
Farnham Local Board	Great Northern Ry. Co.	Official	do.	xii.
do.	Farnham Local Board	do.	do.	xii.
Albion U. S. A.	do.	B. Latham	July 30th	ii.
Harrow Local Board	Albion U. S. A.	Official	do.	xii.
do.	Harrow Local Board	do.	August 2nd	xii.
Ilalsham Union	do.	C. O. Blaber	do.	ii.
Bournemouth Commrs	Ilalsham Union	G. R. Andrews	August 8th	ii.
East Grinstead Local Bd.	Bournemouth Commrs	E. S. Gordon	August 15th	ii.
Schl. Board for London	East Grinstead Local Bd.	Official	do.	ii.
Aston Union	Schl. Board for London	Dane & Hipkins	do.	xii.

## PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Surveyor	Oldbury Local Board	Not stated	July 21st	xvi.
Surveyor's Clerk	St. George's, Hanover-square, Vestry	2 <i>l.</i> 12 <i>s.</i> 6 <i>d.</i> weekly	do.	xvi.

## TENDERS

CHESHUNT.—For drainage works for the Cheshunt local Board. Messrs. Gotto & Beasley, engineers:—

Contract No. 1.—Iron Pipes and Manholes.

Edington & Sons	£6,973 0 0
Lowery & Co.	6,614 0 0
Dickenson & Son	6,205 0 0
Smith, Patterson, & Co.	6,087 0 0
Neve	6,023 0 0
H & S. Roberts	5,747 0 0
Hilton & Son	5,707 0 0
Jukes, Coulson, & Co.	5,627 0 0
Cochrane & Co., Dudley	5,674 0 0
Firminsons & Bros.	5,614 0 0
Stanton Ironworks Co.	5,368 0 0
Cochrane, Grove, & Co. (accepted)	5,003 0 0

Contract No. 2.—Steam Engines, Boilers, and Pumps.

Gwynne & Co.	£3,993 0 1
Crosley	3,854 0 0
J. Watt & Co.	1,789 0 0
Grant	1,750 0 0
Tanyes	1,740 0 0
Stott & Co.	1,694 0 0
Scott & Son	1,641 0 0
Owen & Co.	1,603 0 0
G. Waller & Co.	1,580 0 0
J. Warner & Son	1,550 0 0
Bird	1,553 0 0
Easton & Anderson	1,450 0 0
Kirk & Co.	1,441 0 0
Wildridge Bros.	1,421 0 0
Hainsworth	1,354 0 0
Turnwell & Warham	1,345 0 0
Cashbrooke & Co.	1,323 0 0
Silverstar & Co.	1,316 0 0
Glenfield	1,305 0 0
Abell	1,250 0 0
Albion	1,210 0 0
Parker	1,201 0 0
Bever & Durling	1,181 0 0
Lilleshall Co. (accepted)	1,125 0 0
Hodman	949 0 0
Covishaw	788 0 0

Contract No. 3.—Sewers and Buildings.

Webster	£31,776 0 1
Bruce & Co.	29,066 0 0
Bugbird	28,878 0 0
Cooke & Co.	20,903 0 0
Hilton	20,600 0 0
Bortoma	20,400 0 0
Dickenson	19,993 0 0
Nicholls	19,935 0 0
Bell	19,690 0 0
Bentley	19,650 0 0
Adams	18,672 0 0
Ince & Wood	18,2 0 0
Neave & Co.	17,850 0 0
Robson	17,846 0 0
Lowery & Co.	17,300 0 0
J. Dickson (accepted)	16,333 0 0
Edmondson	16,325 0 1

DEAL (Kent).—For building new rectory-house for the Deal and Walmer Gas Company.

Cottew, Deal	£746 0 0
W. & T. Denne, Walmer	682 0 0
Trotter, Walmer	688 0 0
Denne & Son, Deal	647 0 0
Wise, Deal (accepted)	645 0 0

BOURTON (Somerset).—For new laundry, for the Guardians of Bodminster Union. Mr. J. A. Sharp, engineer and surveyor:—

J. Child, Bourton	£380 0 0
J. James, Bristol	349 0 0
C. N. Hayes, Bristol	286 0 0
N. J. Heaven, Bristol (accepted)	280 0 0
J. Bastow, Bristol	275 0 0

Llewellyn & James, Bristol	278 15 0
J. Childs, Bourton	270 0 0
J. B. May, London	240 0 0
J. S. Leary, Bristol	235 0 0
N. J. Heaven, Bristol (accepted)	230 0 0
W. J. Pope, Bristol	215 0 0

EASTBOURNE.—For alterations to No. 8, Cornfield-road, for Mr. Easton. Messrs. Fuller & Oakden, architects, Eastbourne:—

G. Gravett	£132 0 0
J. Noakes	105 0 0
Dove & Son	97 10 0
M. Martin	97 12 0

[All of Eastbourne.]

EASTBOURNE.—For alterations to No. 13, Ashford-road, for Mr. J. A. Provost. Messrs. Fuller & Oakden, architects, Eastbourne:—

J. Martin	£143 0 0
Martin	141 0 0
Dove & Son	93 0 0

[All of Eastbourne.]

ESHER.—For the Esher and Ditton sewerage works, pumping-station, machinery, &c. Mr. B. Latham, C.E., F.R.S., engineer:—

B. Cooke & Co. (accepted)	£40,841 0 0
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FOREST-HILL.—For alterations and additions to banking premises, for the Directors of the London and South-Western Bank. Messrs. Tolley & Son, architects. Quantities supplied:—

Whitwick & George, Forest-hill	£1,863 10 0
A. Smith, Forest-hill	1,731 0 0
Smith & Sons, Norwood Junction	1,667 0 0
C. J. Bowyer, Upper Norwood	1,621 0 0
T. Roberts, Forest-hill	1,610 0 0
Bryan, Norwood Junction	1,579 0 0
J. Waddington, Sydenham (accepted)	1,574 0 0

GATESHEAD.—For two houses in Derwentwater-road, Gateshead, for Mr. M. Turner. Geo. W. Carr, architect, No. 15, West-street, Gateshead:—

Hosell & Wain	£180 0 0
Greason Bros., Gateshead	460 0 0
F. Briggs, Gateshead	465 0 0
R. Henderson, Low Fell	440 0 0
F. Wakefield, Gateshead	430 0 0
Greenham Bros., Gateshead	431 0 0
T. Watson, Gateshead (accepted)	389 10 0

GIPSY-HILL.—For new wing and additions to the Bungalow, for Mr. H. H. Macdonald. Mr. Marshall N. Luman, architect, 7, Bedford-row, W.C.:—

W. Poole	£477 10 0
W. Fox	474 0 0
J. Hitchcock (accepted)	469 15 0

GRIMSBY.—For alterations and additions to the Grimsby News Offices and Printing Works, for the Directors. Mr. E. W. Farebrother, architect:—

Walker & Cook (accepted)	£230 5 0
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GRIMSBY.—For the erection of a factory for the Grimsby Fish Biscuit Company, Limited. Mr. E. W. Farebrother, architect:—

W. H. Smith	£2,000 0 0
Roebuck & Gooseman	1,938 0 0
J. & R. G. Guy	1,750 0 0
Riggall & Hewins	1,657 10 0
T. Simonson (accepted)	1,600 0 0

For Boilers, Setting, &c., and Extra Timber for Foundations.

T. Simonson and H. Marrows (accepted)	£217 0 0
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For Fencing in Site.

Riggall & Hewins	£89 10 0
H. Marrows (accepted)	87 0 0
Joland Chapman	70 0 0

GRIMSBY.—For additions to the Corporation Ice Works, Grimsby. Mr. E. W. Farebrother, architect:—

Nightingale & Danby	£280 0 0
Roebuck & Gooseman	485 0 0
J. & R. G. Guy	490 0 0
Riggall & Hewins (accepted)	423 0 0

GRIMSBY.—For new shop, Victoria-street, for Mr. Drakes. Mr. E. W. Farebrother, architect:—

Roebuck & Gooseman	£101 2 6
Frank & Jagger	87 0 0
Nightingale & Danby	92 10 0
H. Marrows (accepted)	72 0 0

GRIMSBY.—For alterations and additions to Spring Church Schools, for the Trustees. Mr. E. W. Farebrother, architect:—

W. H. Emerson	£239 0 0
Roebuck & Gooseman	375 0 0
W. Kirk	372 0 0
Thomas Swain	365 0 0
G. Betts	353 0 0
Thos. Simonson	333 0 0
F. Grant (accepted)	280 5 11

GRIMSBY.—For additions to Holme Hill Schools, for the Grimsby School Board. Mr. E. W. Farebrother, architect:—

Roebuck & Gooseman	£293 5 8
J. & R. G. Guy	290 0 0
Riggall & Hewins	270 0 0
Thos. Simonson (accepted)	231 0 0
Walker & Cook	222 10 0

GRIMSBY.—For additions to South Parade Board-Schools, for the Grimsby School Board. Mr. E. W. Farebrother, architect:—

Walker & Cook	£465 10 0
Roebuck & Gooseman	465 0 0
Riggall & Hewins	463 10 0
J. & R. G. Guy	463 0 0
Geo. E. Thompson	443 10 0
Thos. Simonson (accepted)	436 16 0

GREENSTEDT (Essex).—For new buildings and repairs at New House Farm, Greenstedt, for the Trustees of the Budworth Estate. Mr. Thomas Milbourn, architect:—

Noble, Ongar	£825 17 0
H. & E. Lea, London	489 0 0
Falman & Fotheringham, London	441 11 0
Barlow, Ongar	432 0 0

\* Accepted.

HENDON.—For addition to house, for Sir Theodore Brackenman, Bart. Messrs. Buckland & Sons, surveyors:—

Donne, Hendon	£428 0 0
E. A. Roome, Clapton (accepted)	403 0 0

HOLLESLEY.—For additions to the Red House, Hollesley, for the Colonial College and Training Farm. Messrs. John Giles, Gough, & Trollope, architects. Quantities by Mr. C. H. Goode:—

Girling, Ipswich (accepted)	£2,350 0 0
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HORNSLEY.—For the erection of a caretaker's cottage, at Irish-corner, also for the construction and erection of two street fire stations, for the Horsey Local Board. Mr. T. de Courcy Meade, engineer:—

Street Fire Stations.	
Station A.	Station B.

Smith & Sons, Maxwell Hill	£497 0 0
Holmes & Son, Highgate	489 0 0
Marke, Crouch End	465 9 3
Wheeler & Co., North Finchley	458 0 0
Prior, Britton	403 0 0
Dixon, Highgate	397 0 0
King Bros., South Norwood	369 0 0
Kerry & Son, Highgate	350 0 0
Kestell, Highgate	349 0 0
Mattcock Bros., Finsbury Park	345 0 0
Paine Bros., Stamford Hill	323 19 11
Linzell, Bedford-row, W.C.	315 0 0

\* Accepted.

† Withdrawn.

Rosser & Russell, Charing-cross	£232 0 0
Kerry & Son, Highgate	177 0 0
Holmes, Highgate	172 0 0
Dixon, Highgate	165 0 0
Marke, Crouch End	168 15 8
Kerry, Birmingham	105 0 0
Cutting & Co., Strand	95 0 0
Linzell, Bedford-row	68 0 0

\* Accepted.

† Withdrawn.

HOXTON.—For rebuilding house and shop in the East-road, for Mr. T. Potter. Mr. Ernest Newton, architect:—

E. A. Roome, Clapton (accepted)	£769 0 0
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KINGSTON-ON-THAMES.—For new shop front, &c., at No. 35, Market-place, for Charles D. Hodgson, Esq. Mr. T. C. Barralet, architect, Bridge-chambers, Richmond. Quantities supplied:—

Lamb	£235 0 0
Havell	279 10 0
Henley & Son	273 18 0
Judd	236 0 0
Carman (accepted)	238 0 0



**LEICESTER.**—For the erection of shop and warehouse, Belgrave-gate, Leicester, for Messrs. W. H. Staynes & Smith, leather merchants. Mr. R. J. Stephens, architect, Belgrave-street, Leicester.

Clark & Garrett.....	23,349	0	0
Hutchinson.....	3,236	0	0
Elliott.....	3,160	0	0
Tyers & Gates.....	2,100	0	0
Wood, Darby (accepted).....	3,038	0	0
Jewsbury.....	2,898	0	0
Kellett.....	2,970	0	0
Holmes.....	2,821	18	0
Stevens.....	2,897	10	0
Duxbury.....	2,819	0	0
Harrison.....	2,815	0	0

**LEWES.**—For detached villa residence, St. Anne's, for Mr. F. A. Drake. Messrs. Fuller & Oakden, architects, Eastbourne.

J. Martin, Eastbourne.....	£1,980	0	0
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**LONDON.**—For painting and decorating the reception-room and other rooms of the principal floor of the Royal Society, Burlington House. Messrs. D. Biddle & Son, architects and surveyors, Montague-chambers, Bedford-street, Strand.

Marchant, Lady Somerset-road, N.W. (accepted).....	£118	10	0
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**LONDON.**—For painting and cleaning for the School Board for London:—

<i>Angler's Gardens Schools.</i>			
M. McCormack.....	£113	0	0
T. W. Smith.....	96	0	0
E. Green.....	95	18	0
Grover & Son.....	95	10	0
Deering & Son.....	92	0	0

<i>Bowman's Place Schools.</i>			
Kirby & Chase.....	£371	0	0
Williams & Son.....	312	0	0
Fleming.....	310	0	0
Goodman.....	274	0	0
Stevens Bros.....	273	0	0
Vigor & Co.....	273	0	0
Flaxman.....	264	0	0
T. W. Smith & Son.....	239	0	0
Knight & Walden.....	228	0	0
Deering & Son.....	210	0	0

<i>Curtain-road Schools.</i>			
Steel Bros.....	£169	0	0
E. Green.....	169	0	0
Williams & Son.....	149	0	0
Rogers & Tesson.....	129	15	0
Johnson & Co.....	119	0	0
Fritchard & Son.....	113	10	0
Deering & Son.....	103	0	0
G. Flaxman.....	97	0	0
Hayworth & Son.....	93	0	0

<i>Shepperton-road Schools.</i>			
E. Green.....	£114	0	0
McCormack & Son.....	110	0	0
T. W. Smith & Son.....	108	0	0
Grover & Son.....	95	10	0
Deering & Son.....	92	0	0
Willmott.....	81	10	0

**LONDON.**—For new stabling, Cottage-place, Sloane-street, S.W., for Mr. D. Vipo. Mr. J. G. H. Buckmaster, architect, 28, Cadogan-place.

Raymont & Son.....	£1,670	0	0
Turrell.....	1,669	15	0
Holloway.....	1,480	0	0
Stimpson & Co.....	1,470	0	0
Oldrey & Co.....	1,417	0	0
Garlick.....	1,390	0	0
W. Gladding (accepted).....	1,314	0	0

**LONDON.**—For the erection of an additional block of dwellings in North-row, for the St. George's, Hanover-square, Workmen's Dwellings Association. Mr. R. H. Burden, architect. Quantities by Mr. Rookwood:—

Simpson & Co.....	£13,580	0	0
Holland & Hannes.....	18,870	0	0
Macey.....	18,718	0	0
Fatman & Fotheringham.....	13,998	0	0
Lilly & Gayford.....	12,836	0	0
Bywaters.....	12,673	0	0
Scrivenor.....	12,618	0	0
Higgs & Hill (accepted).....	12,500	0	0

**LONDON.**—For works to house and shop, No. 172, Kenish Town-road. Mr. E. W. Poley, architect, 4, Duke-street, Adelphi:—

Shop. House. Total.			
£. s. d.	£. s. d.	£. s. d.	
James & Sons, Landel's road, East Dulwich.....	156	5	0
J. R. Lacey, Rochester-terrace, N.W.....	164	0	0
Scharien & Co., Gloucester-terrace, S.W.....	123	10	0
G. Arthur, Dale-road, Kenish Town.....	127	10	0
F. Mitchell, Peckham Park-road, S.E.....	122	18	6
T. Collins, Regins-road, Finsbury Park.....	107	6	0
Groome & Puley, 332, New North-road.....	90	0	0

\* Accepted conditionally.

**NEWPORT (Mon.).**—For alterations to premises, No. 138, Commercial-road, for Mr. G. Harries. Messrs. W. G. Habershon & Fawcner, architects:—

T. Cook.....	£410	0	0
G. F. Shawrun.....	410	0	0
E. Richards.....	337	0	0
Martin.....	337	0	0
Moulton & Browncombe.....	328	0	0
Morris.....	297	0	0

[All of Newport.]

**NEWPORT (Mon.).**—For reconstruction of business premises, Commercial-street, for Mr. Bear. Messrs. W. G. Habershon & Fawcner, architects:—

C. Miles.....	£1,042	0	0
J. Linton.....	999	0	0
W. Blackburn.....	989	0	0

[All of Newport.]

**NEWPORT (Mon.).**—For new corn-store, warehouse, &c., Skinner-street, for Mr. J. Smith. Messrs. W. G. Habershon & Fawcner, architects, Newport:—

L. B. Moore, Newport.....	£1,690	0	0
T. Goldsworthy, Newport.....	1,630	0	0
Moulton & Browncombe, Newport.....	1,625	0	0
H. Parfitt, Newport.....	1,500	0	0
W. Price, Newport.....	1,469	0	0
C. Miles, Newport.....	1,452	0	0
G. Wilkins, Newport.....	1,472	0	0
W. Blackburn, Newport.....	1,435	0	0
J. Linton, Newport.....	1,400	0	0
The Executors of William Gradwell, Barrow-in-Furness and Newport.....	1,320	0	0

**NEWPORT (Mon.).**—For reconstruction of premises, Nos. 185 and 196, Commercial-road, for Mr. Pell. Messrs. W. G. Habershon & Fawcner, architects:—

E. Richards.....	£883	10	0
Moulton & Browncombe.....	812	10	0
G. Wilkins.....	770	0	0
W. Blackburn.....	770	0	0
Morris.....	700	0	0

[All of Newport.]

**OXFORD.**—For the erection of Mansfield College, Oxford. Mr. Basil Champney, architect:—

Castle.....	£33,949	0	0
Kingclere.....	30,733	0	0
Levett.....	30,517	0	0
Brown, Son, & Co.....	29,090	0	0
Bell & Son.....	29,381	0	0
Cowling & Son.....	28,773	0	0
Dove Bros.....	28,324	0	0
Franklin.....	27,854	0	0
Symons.....	27,948	0	0
Edelcourt, Gloucester.....	27,440	0	0
Horsman, Wolverhampton.....	27,293	0	0
Beaven, Bristol.....	27,133	0	0
Parnall & Son, Rugby (accepted).....	26,338	0	0

**STAMFORD-HILL.**—For the erection of St. John's Vicarage, Mr. Spencer W. Grant, architect, No. 93, Finsbury-pavement, E.C. Quantities by Mr. C. W. Froby:—

Wall Bros.....	£1,679	0	0
Atherton & Latta.....	1,450	0	0
J. Holloway.....	1,120	0	0
Faine Bros, Stamford-hill.....	1,395	0	0

\* Accepted.

**SUTTON (Surrey).**—For proposed Christ Church, at Sutton, Surrey. Mr. J. T. Newman, F.R.I.B.A., architect, Pen-court, E.C. Quantities by Messrs. Curtis & Sons, London-wall, E.C.:—

Fatman & Fotheringham.....	29,773	0	0
B. B. Nightingale.....	9,662	0	0
Dove Bros.....	9,225	0	0
J. Chappell.....	9,887	0	0
J. Morter.....	8,954	0	0
Gregory & Co.....	8,647	0	0

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We are compelled to decline pointing out books and giving addresses.

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# The Builder.

Vol. LIII. No. 2330.

SATURDAY, JULY 25, 1897.

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### Pottery at the Burlington Fine Arts Club.



THE examples of Hispano-Moresque and of Majolica ware, now collected at the Burlington Fine Arts Club, form one of the most attractive of the loan exhibitions which have been

seen there; though the interest of the first-named portion of the collection, the Hispano-Moresque ware, has been somewhat exaggerated. It is a type of work which, as representing a special development of pottery design under special influences, was no doubt worth collective illustration, but its merit in regard to design and execution is not, for the most part, of the highest order; a good deal of the work is roughly delineated and executed, and the designs based on a few rather commonplace motives, though some of them are certainly valuable as suggestions which might be further worked out. The majolica portion of the collection consists of a class of work with which most visitors will be tolerably familiar; but it is not often that there is an opportunity of studying and comparing so fine a collection of examples in one room.

The work defined as Hispano-Moresque has been supposed to be the production of Moorish potters working in Spain under Christian rule, though there seems no special reason for this conclusion beyond the negative one that it is difficult to account for its character under any other supposition as to its origin. Moresque is in character, but later than the period of Moorish power, and its designs are mingled with Christian emblems. There is thus a vagueness and uncertainty in regard to it which gives it interest as a historical curiosity; and amid some rather coarse work of very varying degree of excellence, are some fine designs of rather unusual character.

The majority of the examples of this work in the collection, which are attributed to the fifteenth and sixteenth centuries, consist of rather large circular dishes, with broad rims, and in many cases with raised bosses in the centre. The general decoration is in most cases in conventional floral diaper of metallic lustre, and in some cases the design is raised or embossed in parts, the embossed portions being most generally the flower forms which are the salient points in the ornamental design, though in some cases mere repetition forms, mechanically repeated, are thus emphasised by partial relief. A feature occurring in a good many examples is the employment of broad lines or divisions spring-

ing tangentially from a centre boss or medallion, so as to impart a spiral character to the design. This rather obvious and well-worn device is repeated so often as to appear as a kind of recognised fashion among the producers, whoever they were, of this ware.

Among the examples possessing special characteristics are two dishes, forming a pair (2 and 3 in the catalogue), which are covered with a small diapering in gold lustre, but have large figures of a lion and a bull respectively, coarsely incised in outline on the surface, the figure occupying the entire surface of the dish as a ground, entirely irrespective of the division into sides and centre. The animals, the bull especially, are rude and clumsy in drawing, but the incident is so peculiar as to be worth attention on that ground. One of the examples that is of value, on far different grounds, is No. 5, a dish of a make of which there are only a few examples in the collection, with a deep centre and vertical sides or walls between centre and rim. The surface is entirely covered, except for a shield in the centre, with concentric circles of vine leaves and tendrils, the leaves being alternately gold lustre and blue; the general arrangement is nearly symmetrical, with variety in the details. There is no decorative sense, it is true, in making the same leaves of alternating colours; in every design where colour comes in as an element, there should be some obvious reason for distinction of colour, the one colour should be a leaf, the other a flower, or the leaves of contrasted colours should be of different outline. But, apart from this little æsthetic lapse, the effect of this dish, with its sparkling circlets of leaves, is charming, and it suggests a *motif* which might be further carried out and developed with greater elaboration. That is one use of such exhibitions as this; quite beyond the mere "collector's" interest in it is the artistic interest of noting what has been attempted in the way of decorative idea which may furnish new suggestions, and be susceptible of new and perhaps better treatment.

This concentric arrangement, which is shown with good effect in the last-named example, is found in a good many other instances carried out in a more mechanical manner and with little artistic effect; it is more like pattern-making than designing. Another peculiar form among these exhibits, not beautiful, but worth noting from its peculiarity, is that exhibited in No. 20, and in some other examples, where the prominent decorative feature consists of raised lines in relief, radiating from the central boss at equal distances, like the spokes of a wheel. It is a poor and mechanical effect, but seems to have been a fashion at

one time, and is tried in two or three different ways. The "spokes" usually cross to the outside of the rim without any reference to the structural division of the dish. The reference of the decorative design to the structural form is entirely neglected in many of these Hispano-Moresque designs; in some, and those among the best otherwise, it is carefully kept in view. Thus in No. 91, a very fine example, the centre boss, the surface of the bowl, and the rim, are kept quite distinct in treatment, the surface of the bowl being ornamented with a zone of conventional floral design, leaving a space on each side of it; the rim having a gadrooned ornamental form embossed on it. This gadroon ornament is a characteristic of the school, and recurs frequently. In some cases it is made out in relief, without any special decorative outlining; in others, as in No. 80, it is treated with considerable elaboration, the gadroons being varied in detail, either singly or in groups. In No. 117 is found a design entirely differing from any other in the collection, though the plateau on which it is found obviously belongs to the same class of manufacture as the rest; this is a Japanese-like eccentricity, where the circle is divided into four quarters by strong blue lines crossing each other at right angles, and two of the opposite divisions are filled up with similar lines, all running parallel to one of the central ones, the other two divisions being filled with foliated ornament. This is so completely different from any other design in the collection, that it looks like an experiment on the part of a single free-thinking designer.

Some other special examples may be noticed. No. 22 shows a surface covered with very delicate and flowing floral ornaments in gold lustre, while over all this is painted a great *fleur-de-lis*, in dark blue, the whole width of the dish. This looks rather rampant, but it is certainly bold and effective. Nos. 31 and 34 are worth attention as fine bold designs; the latter shows a main design of two Maltese crosses interlacing, the one in a mass of gold lustre, the other in geometrical diapering in gold lustre. The description adds, "At the back, concentric circles of lines of zigzags, with an arrow-head in the centre." From the catalogue it appears that a majority of the examples have this kind of subordinate decoration at the back; and as this decoration of the back of the plate is a special feature of some interest, it is a pity that some of them were not arranged so as to show back and front, or, where the designs are in pairs, as in some cases, to show the front of one and the back of another. Nos. 44 and 47 are two other fine examples of bold work, designed more or less with reference to construction; while



No. 49 is a warning as to a radical mistake in designing conventional foliage, as the bits of foliage on the rim show growth from opposite ends of the same stem, a feature most uncomfortable to the sense of logic in design. It would have shocked Owen Jones to find any artist of his beloved Moresque School committing such a deadly sin as this. The plateau, No. 53, with little bunches of leaves in relief on the outer rim, is another unrighteous piece of work, for these little blobs of leaves have no principle of arrangement and no growth from anything else in the design, and are clumsily designed in themselves. No. 59, with some very finely-drawn conventional leafage in gold lustre, with dark blue flowers interspersed, is well worth attention. Nos. 74 and 75, hung as pendants, and evidently by the same hand, are interesting as showing a special character differing from any other examples; the surface covered with floral diapering in gold lustre and dark blue, radiating from the centre, but in thin interlacing sprays; pretty in effect, but a little weak. Nearly all the floral decoration employed is of the type so largely pervading Moresque design; that which looks as if it arose from the influence of Greek ornament on Moorish feeling and taste, and which consists of cleanly-drawn flowing stems, with small conventional leaflets growing from them at intervals. This is a beautiful form of decorative foliage when well carried out; but in a great many of the examples here it is carelessly and clumsily drawn, and, in fact, produces an impression of being the imitation of good work by inferior draughtsmen.

The majority, in fact, of these Hispano-Moresque plates seem, in comparison with the majolica collection, like the decorative efforts of children as compared with those of practised artists and draughtsmen. This latter part of the collection is of the greatest interest in more senses than one; for splendour of colour and often of draughtsmanship, and for the atmosphere of the world of Renaissance Italy, its tastes and feelings, which seems to pervade the whole. A large number of the examples, of course, contain painted figure-subjects; and though the drawing of the figure, as is the case in the majority of these majolica plate pictures, is not up to the great standard of the Renaissance, and shows especially far too strongly marked curvatures in the outlines of the limbs, still the spirit and earnestness of action, and the direct way in which the story is told, render these ware-pictures of considerable interest, even from the pictorial point of view. The best of them date during the first half of the sixteenth century. The writer of the short introduction to the catalogue, remarking that a great number of majolica examples are named and dated, says, "It thus appears that the most interesting works were produced about 1480-1525, and the most artistic about 1525-1570, and that they were chiefly produced in and around the Duchy of Urbino." He does not define, however, what he means by "interesting," nor in what sense the admittedly less artistic work is to be ranked as "more interesting" than the more artistic. This, we presume, is a piece of collector's logic; from our point of view, we confess that we find the most artistic examples the most "interesting." Among the finest designs in this portion of the collection are two remarkable works in blue and white, grisaille shaded; one (140) lent by the Queen, the other (174) lent by Mr. Drury Fortnum. The first of these is a large circular dish, with grotesques, monsters, and birds left in white on a ground of dark blue, and shaded and modelled in grisaille. The design extends all over the dish, without taking account of its shape, and the figures and scrolls are designed with that combination of boldness and refinement which is characteristic of the finest decorative work of the Renaissance. The other, No. 174, is less bold, but even finer and more finished in execution. In this case the blue, a much lighter one, is painted on, and forms the design, on a grey ground, the design being heightened with touches of white. The centre shows a figure of a mermaid with a mirror in her hand, the

figure drawn with more delicacy and finish than is to be found in any other example in the collection. She is floating on water, with buildings seen on the shore in the distance. On the rim is a beautifully-designed symmetrical ornament of interlacing sprays of flowers, &c., representing the perfection of Renaissance ornament of this class. Both these two are Venetian, and 174 is said to be the earliest dated piece of Venetian ware (1540); but why on earth the catalogue should therefore jump to the conclusion that they are "perhaps by the same hand" it is impossible to understand; this is another piece of "collector's logic"; to any artist it must be manifest at a glance that they could not be by the same hand; the whole touch and style of the two is so different as possible,—as well as the colour and the method of execution; but they are both splendid pieces of work, and the former especially (140) seems full of the exuberant life of the Renaissance.

Of course, however, fine as are these blue and white examples, we generally connect the idea of rich colour, creamy yellows and deep blues, with the idea of majolica, or maiolica, ware (the catalogue adopts the latter spelling); and of the ware of this type there is a splendid collection. It is impossible to do more here than give a general idea of what is to be seen, and note a few of the most striking examples. The top and one side of the room, and the cases in the centre, are entirely occupied by examples of majolica of the richest decorative type, and many containing figure subjects of more or less spirit and interest. Among the most interesting of the pictorial ones, and also a very well designed piece in a decorative sense, is No. 167, one of a series of which several pieces are, we are told, in the Correr Museum at Venice. It has a deep centre, in which is the figure of a bull within a circle, and the wide rim is occupied by a scene from the history of Midas, who is enthroned on the right, a Cupid, bound, kneels before him, and on the left three women, two draped and one nude, come from a house, the architectural details of which, including a projecting balcony on heavy corbels, are shown with some minuteness. This is dated 1482, and is therefore one of the "more interesting," according to the catalogue preface, and here we concur; it is one of the most interesting in the room in its intensely Renaissance feeling, and also in the disposition of the figures and architecture, and one of the best executed in regard to the figures, in spite of its early date. Architectural accessories occur in a good many of the pictured scenes, but they are not of much interest in general to the architect, except as illustrating the rather odd manner in which Classic detail is modified to suit the purpose of the decorative designer, or perhaps rather to save him the trouble of drawing it correctly. Two large dishes, or rather a dish and a tazza, which both illustrate the Rape of Helen (233 and 260), are interesting, as showing a repetition of nearly the same action and position of the principal figures in the foreground (notice in both the boatman seated on the edge of the boat, with his back to the spectator, and turning to observe the contest with those on the bank); in both a palace is shown on the right, though with considerable difference of treatment. These are not among the most decorative in effect; they are interesting rather as figure-compositions. The first is by Nicola da Urbino, and the second is put down as "probably" by him, but that, we imagine, is merely a conclusion from the fact that the arrangement of the groups is similar. That is, however, eluding the very question which the comparison of the two suggests, viz., whether there was any generally accepted treatment of the subject which was adopted in its main lines by various artists, as there have been in regard to other subjects, both in Classical, Mediæval, and Renaissance periods.

Among the other objects in this fine collection which we specially noted for their decorative effectiveness are No. 189, a plate with a portrait in the centre and a fine border of dolphins and acanthus leaves, very bold in design; No. 194, a small tazza, the centre representing an open music-book, with

grotesques filling up the rest of the space, a beautiful decorative effect with a special suggestion in it; No. 199, tazza, with grotesques moulded in relief and coloured grey against a dark blue background; 200, remarkable for the boldness of its border of grotesque figures; 201, the Death of Tarpeia, with architectural details of considerable interest, figure very spirited in action, and the landscape fine as far as a landscape in such a medium can be fine,—the whole with a very Titianesque glow about it; 207, plate with a sunk centre and a medallion portrait with a very fine border; 209, of somewhat similar type; 213, a medallion with coat of arms and cupids and tritons in white on a dark blue background,—this is a most brilliantly effective thing; 214, a cupid riding a dolphin in the centre, with a magnificent border of torsos and masks; 234 and 235, plateau and tazza; pilgrim bottles (239 and 241) on one of the centre cases; two large drug-pots (345 and 348), companion pieces, each with saints in medallions, and the rest of the surface covered with foliage; 256, dish with a man in Mediæval dress playing the violin, and a border of grotesques, &c., in white on a deep blue ground; 247, part of the rim decorated with a dance of cupids, a charming bit of design; 293, tazza, Aurora rising from the Sea, a bright mass of light behind her, and her horses led by the Hours; this is a curious and very spirited composition, rather reminding one of the feeling of Blake.

These are only a few to be noted as exhibiting special effects of colour and design. The whole collection deserves study on the part of those who are concerned in designing in this class of work. The periodical display of porcelain painting at Messrs. Howell & James's would improve very much in artistic value if its contributors could catch some of the decorative spirit, the feeling for rich colour and broadly-treated conventional design, which characterises so much of the majolica ware of the sixteenth century, as illustrated at the Burlington Club.

#### NOTES.

**M** DE LESSEPS has issued his proposals for the second series of *Obligations nouvelles* for the Panama Canal. The terms are almost identical with those of the issue of last year, except that the *Obligations*, which are re-imburseable at 1,000 francs each in forty-eight years, are issued at 440 francs, instead of 450 francs. The subscription will be opened, at Paris and at New York, on July 26th, and closed on the same day. The notice is accompanied by a letter from M. de Lesseps, in which he states that more than half the sum realised by the emission of 1886 is in the coffers of the company, and that, "if the 100 millions of francs which we have on *casse* are a great source of quiet and of force to us, this quiet and this force will be simply tripled by a balance raised to 300 millions." "What is necessary," he adds, "is that with the 600 millions realised, all measures should be taken that the ships may pass from one ocean to the other." Desirable as this object is, it is not quite evident how the proposed issue will tend to effect it. If 8,000,000 are received by the company, on the terms proposed, this whole sum will be required for paying interest and sinking fund (in the form of repaying 6,000 *Obligations* per year) for between ten and eleven years, without laying out a single centime on the works of the canal, and the net result of the operation will be to leave the company burdened with a debt of 16,000,000, in respect of the loan, after that amount of interest and of sinking fund has been paid. The figures come out very simply and clearly on paper. The puzzle is,—what is the object of borrowing money on such terms?

**A**T the Kensington Petty Sessions, on Wednesday last, the 20th inst., a case of some importance as regards railway companies was decided. The Vestry of Hammersmith applied for an order on the London and North-Western



Railway Company to demolish a building erected on the north side of North Pole-road, Wood-lane, Hammersmith, adjoining the Wormwood Scrubs Railway Station, used as a booking-office, which building was alleged by the Vestry to be in advance of the general line of buildings on the north side of North Pole-road, and had been certified to be so by the Superintending Architect to the Metropolitan Board of Works. Mr. Besley appeared for the Vestry, and the railway company was represented by the assistant solicitor to the company. The facts of the case were not disputed, but the company relied upon a decision of Vice-Chancellor Wood in the case of the London and Blackwall Railway Company v. the Board of Works for the Limehouse District (Law Journal's Reports, vol. 26, p. 164, 1856-7), in which a bill was filed to restrain the defendants from demolishing certain buildings for the purpose of a new station and railway over Commercial-road, Limehouse. In the course of his judgment, the Vice-Chancellor remarked:—"I think it quite plain, upon the construction of an Act of Parliament of this special character, that, whenever the Legislature has enacted that certain powers of a special character shall be vested in a corporate body or any body of commissioners for the express purpose of carrying out a special object which the Legislature has in view, no subsequent Act, giving in merely general terms powers which, by their generality, apply to the powers of the special character given by the first Act, will override the special powers so delegated to the particular body of commissioners or corporation." The Bench considered that they were bound by the decision of Vice-Chancellor Wood, and decided the case in favour of the railway company. It has already been decided that a railway company is exempt from the Metropolitan Building Act with regard to the construction of all buildings erected by them even in the heart of the City, and at a distance from their railway, if such buildings can be colourably shown to be for the use of their undertaking; and the effect of recent decisions seems to be that it is competent for a railway company to erect a wooden building in Pall-mall or Cheapside, and to place it in front of the adjoining buildings, without anybody being able to object.

WE regret to see that Mr. Butterfield repeats in the *Times* his extraordinary proposition to remove the front row of columns of the portico of St. Martin's Church, to provide against a more imaginary than genuine obstruction of traffic. Mr. Butterfield states that the parish possesses a model of the church with a portico of only one range of columns, which he concludes "must have been made" under the direction of Gibbs. This, however, is only a possibility, or at best a probability; and supposing the model was made under Gibbs's direction, that would only prove that he was dissatisfied with the shallow porch and improved upon it afterwards. Seeing what a number of blockheads there are who are always ready to pull about a fine building for the sake of "practical" advantage, we cannot but regret that Mr. Butterfield should have been led to give his support as an eminent architect to such a proposition, which we should not scruple to characterise as a wanton act of destruction. Mr. Ralph Nevill's letter on the same subject is much more to the point. He says:—

"The only pinch is at the corner of the National Gallery.

All that is required is to take down the flight of steps leading to the disused door of the former residence of the keeper of the Gallery, and to carry the pavement over the useless area adjoining. The railings to the front area would start from the corner of the building.

By this means a 40-ft. road would be obtained at very small expense, and without damage to any architectural feature of either building."

This is a common-sense proposition, the more so as it is probable that the front of the National Gallery will be rebuilt sooner or later in a manner more worthy of its position and contents; and therefore even some slight disfigurement to it could only be a temporary

evil, instead of a permanent spoliation, as in the case of St. Martin's. We must protest most strongly against what we must call Mr. Butterfield's extraordinary and most ill-advised proposition.

PROPOSALS are before the shareholders for amalgamating the East and West India (London and Tilbury) and St. Katharine's Docks Companies. The East India Docks, at Blackwall, having a water area of thirty acres, were opened on August 4th, 1808, for the Honourable East India Company. They have since passed to the West India Dock Company, whose basins were opened on August 27th, 1802, the first stone having been laid by William Pitt on July 12th, 1800. William Jessop was the engineer; his plans cover nearly 300 acres, including the canal across the Isle of Dogs. Hardwick constructed the St. Katharine's Docks, next eastwards of the Tower, from the designs of Telford, at a cost of 1,700,000*l.* As many as 2,500 navvies were employed for a period of fifteen months, 1827-8, in digging out the ground. Most of the excavated earth was carried up the river to Millbank, and thence utilised for filling in the Chelsea Water Works reservoirs, near to the new Victoria Railway Station, in pursuance of Cubitt's building operations at Pimlico. The space taken by the Dock Company included a densely-crowded area of twenty-four acres south of Upper East Smithfield, lying between Little Tower-hill (*olim* Fosse-side) and Burr-street, King's Distillery, and Nightingale-lane. Within these limits were situated a vast number of streets, courts, and alleys, together with Hangman's, or Hanson's, Gains, the Flemish Church and its graveyard; a Whitehall, St. Katharine's-square, and the original dock; together with the church, cloisters, Sisters' Close, the master's house and orchard, the Brethren's and Sisters' almshouses and the burying-ground of the hospital, which had been founded by Queen Maud, 1148, and reconstituted by Queen Eleanor. The hospital church, with its appurtenant buildings, stood where are now the inner lock gates and the entrance basin. Western Dock covers the site of the Flemish church and churchyard, whilst Hangman's or Hamsden's Gains lay where are some of the Company's buildings that have lately been demolished for an approach to the new Tower Bridge. In 1824 the hospital site was disposed of to the Dock Company for a sum assessed by Lord Eldon at 125,000*l.*, in addition to which grants were allowed of 36,000*l.* for new premises, 2,000*l.* for new site, and so on. The old church, as is recorded in a letter to the editor of "The Every Day Book," vol. i., col. 1405, was finally closed on October 30, 1825; and by 1828 Ambrose Poynter's new hospital was erected in the Regent's Park. Hither were removed, at an expense of 1,000*l.* the tomb of John Holland, Duke of Exeter; and the carved wooden pulpit given by Sir Julius Caesar whom Queen Elizabeth, *pleno jure*, appointed Master in 1596. From the earliest times nearly all the nominations to a share in this charity, about 6,000*l.* a year, are in the absolute gift of the queen consort or dowager, and, failing them, of the sovereign. This privilege saved from spoliation at the Dissolution one of the most ancient ecclesiastical endowments in England. Hollar made some drawings of the earlier buildings, and in the Soane Museum may be seen a plan of the property as it existed in 1781.

MESSRS. DOULTON have just made, and are exhibiting, a terra-cotta and Doulton-ware reredos, font, and pulpit, for the Prince and Princess of Wales. The furniture is destined for the English Church of St. Alban, at Copenhagen, and was designed by Mr. A. W. Blomfield, M.A., the architect of the church. The reredos consists of a large and two small panels within trefoil-headed arches, supported on small Doulton-ware columns, and surmounted by gablet-formed hoods; the whole is enclosed between small buttresses, and stands above a super-altar, in the back of which are three oblong panels, filled with Doulton-ware. The large panels, representing the Ascension,

and, at the sides, the Betrayal and the Unbelief of Thomas, are from the hand of Mr. Tinworth, and are none the worse for having a little more repose and less of the robust naturalism than some of the works of that original and vigorous artist. The font is octagonal, and stands on an octagonal centre shaft and eight columns of plain blue Doulton ware. The angles of the basin are marked by little Doulton-ware shafts, and the side panels are alternately figure-subjects by Mr. Tinworth, and ornamental devices. The pulpit is ordinary in character, with open traceried sides, and stands on Doulton-ware columns. That the design and detail of these works are refined and scholarly, and the execution nearly perfect, is what one expects, seeing who have been concerned in the matter; and we are not disappointed; but, as critics must have their growl, we may ask, perhaps, whether the forms of mouldings and conventional foliage that suggested themselves to a thirteenth-century carver of obdurate stone are likely to be the most appropriate for the use of a nineteenth-century modeller in a plastic material?

THE escape of St. Bride's Church from the thunderstorm of Friday afternoon last week reminds us that on two previous occasions its spire has been struck by lightning. As originally built by Wren, 1701-3, it rose to a height of 234 ft. The spire, unprovided with a conductor, had been so greatly damaged by a stroke of lightning on June 18, 1764, that it was found to be necessary to take down 85 ft. of the fabric. Franklin's experiments had been made ten or twelve years before. In repairing the injury, Sir William Staines lowered the spire by 8 ft.; the portion removed was for a long while preserved in a mason's yard in Old-street-road, St. Luke's. The cost of making good the damage done in that year amounted to 3,000*l.* In 1803 this beautiful steeple was again struck by lightning, but with injury less serious than on the previous occasion. Last week the lightning passed down the conductor into the ground, though not without causing considerable alarm by the violence of its current, manifest in the wreck and *débris* at the steeple's base.

VISITORS to Edinburgh who from the Dean Bridge have looked down upon the gorge through which flows the Water of Leith may have noticed upon a ledge of rock by the side of the stream a circular Grecian temple. There are comparatively few, however, who descend to inspect the structure, which covers a mineral spring, and is known as St. Bernard's Well. For some years past this structure and its surroundings have not met with proper attention, and been allowed to fall into a dilapidated state. Through the munificence of Mr. William Nelson, publisher, this state of matters has been remedied, the temple has been restored, and the domed chamber decorated in mosaic and ultramarine and gold. A new statue of Hygieia is to be placed under the open canopy. A handsome new entrance and flight of steps has been placed at the Stockbridge end of the ground, and an elegant parapet erected along the margin of the stream. There are few more picturesque spots than this to be found in or about Edinburgh.

FURTHER up the Water of Leith another improvement has been effected at Belford, on the old Queensferry road. The bridge which crossed the stream at this point having shown symptoms of decay, and having been found too narrow for the increasing traffic caused by the extension of the city, a new bridge, with improved access, was resolved upon. The new bridge, designed by Messrs. Blyth & Cunningham, civil engineers, now completed, is on a higher level than its predecessor, the approaches from the east and west having been raised to a corresponding degree; and an entirely new access has been formed from the north end of Palmerston-place, thus forming a direct outlet from this quarter to the north-west. The situation is one which suggests picturesque



treatment, and it is to be regretted that the aid of an architect was not called in to impart somewhat of an artistic feeling to the structure; for anything more unmeaning and commonplace than the battlemented coping, albeit composed of granite, it would be difficult to find, and the treatment of the approaches is such as one may see at railway bridges in the country, but hardly expects within a city.

A CORRESPONDENT of the *Field*, "H. E. L.," under the heading, "Horses in London Streets," objects strongly, in the interest of the horses, to the use of wood and asphalt pavings on slopes: they ought only to be used, he urges, on level streets, and where there is light traffic, not where heavy two-horsed vehicles, such as omnibuses and carts, are the rule. From the point of view of the horses we have no doubt he is right. The noise from London traffic, increasing almost year by year, has, however, been such a serious evil to the human beings who have been compelled to carry on their vocations in the midst of it, that some change from paving and macadam seemed inevitable. We have no doubt the constant uproar of the City streets in old days tended to shorten life; only the toughest nerves could remain unaffected by it. Now the horses suffer instead, unhappily. The ideal pavement, which should equally suit the comfort of man and horse, has not yet been found; who will find it?

THE memorial to Rossetti, of which we gave an illustration some time ago, was unveiled on the Chelsea Embankment on Thursday, last week, by Mr. Holman Hunt, before a small concourse of persons, chiefly relatives and friends of the late artist. As our readers may remember, the monument consists of a drinking-fountain, designed by Mr. Seddon, with a quarter-length figure of the poet, modelled by Mr. Madox Brown. This should have been a head and bust merely, with a conventionally-designed pedestal; the head and upper portion of the body, cut short off for no apparent reason except that there is no room for more of it in the space allotted, has an exceedingly bad effect. It is neither one thing nor the other, neither a bust nor a figure, and produces a somewhat ludicrous impression. Mr. Holman Hunt delivered an address in regard to the genius of Rossetti, in which he formed an estimate of him which we do not think future generations will ratify, and to single out Rossetti's mannered piece of archaic prettiness, "The Annunciation," in the National Gallery, as remarkable for "vitality of expression" and as superior to the *Assisi* Madonna in "artistic discrimination of form," was, at all events, a proof that Mr. Hunt has the courage of his opinions.

IN the summer of 1885 the Council of the Royal Scottish Academy supplemented their annual winter exhibition by one devoted to works in water colours by living artists. The financial results were not satisfactory, and the existence last year of the International Exhibition was a sufficient reason why the experiment should not be repeated that summer. Under the same auspices a similar exhibition was opened on the 13th instant, but it is not, as in the previous instance, confined to the works of living artists, but contains examples of lately deceased painters. The works exhibited are 852 in number, and besides water colours embrace examples of black and white, and of the product of the sculptor. Amongst the names of deceased artists who are represented on the walls are those of Turner, David Cox, Landseer, G. P. Chalmers, and George Mason.

IT appears that the Leeds Architectural Society sent a memorial to the Leeds School Board some time since asking that the designing of schools might be taken out of the hands of any special architect, and left open to the profession generally. The Board eventually gave a qualified consent, in the form of an inquiry from members of the architectural profession as to the terms on which they would undertake such work, and it

appears that certain architects who are named offered to carry out the work at 3½ per cent., 3½ per cent., and 4 per cent. respectively, and that some of these "cheap" architects have accordingly been commissioned to erect schools for the Board. One of these is an architect of considerable repute and large practice. The work to be done includes, it should be observed, more than an architect is usually expected to do for the ordinary fee of five per cent.; it embraces the survey of sites, the taking of levels, the furnishing of sketch-plans, and the preparation of quantities. Architecture, of course, is not bound up with the sacred ritual of five per cent.; but we do not think the architects who have thus responded to an inquiry, the literal meaning of which was "who will do the work cheapest?" have acted in a way calculated to raise either their own dignity or that of the profession to which they belong.

#### SUTTON PLACE AND LOSELEY HOUSE.

ON Saturday last the Architectural Association visited two of the most interesting houses in Surrey,—Sutton Place and Loseley House, near Guildford. They have neither of them changed hands since they were built, but have been handed down either by direct descent or by will to their present owners. In Sutton Place mass has been said without a break for 350 years. They have both always been occupied, and have undergone a certain amount of alteration and curtailment, but not enough to destroy the very important evidence they afford with regard to the domestic architecture of the sixteenth century; that is, of the Early Renaissance. Sutton Place was built first, and was the first to be visited on Saturday, under the guidance of Mr. C. Forster Hayward, F.S.A., who has made careful measured drawings of the whole house, which, it may be hoped, will some day be published. Mr. Hayward's researches, together with those of Mr. Frederic Harrison, whose mother now occupies the house, ought to suffice to clear up its history, and to throw a considerable amount of light on a very interesting period of house-building. Mr. Harrison has already collected a good deal of information, which was published in the "Collections of the Surrey Archaeological Society" (vol. ix., part 1, 1885).

Sutton Place was built by a Sir Richard Weston about the year 1525, and is remarkable for three special reasons; firstly, that it was one of the earliest fortified houses in England; secondly, that all its ornamentation is in moulded terra-cotta; and thirdly, that here may very distinctly be seen the commencement of the change from Gothic to Classic, exhibited in a manner almost unique, and depending largely for its significance upon the material employed. First, as to plan. The house was originally built round a quadrangle, 80 ft. square or thereabouts, which was entered beneath a large tower, opposite to which, on the other side of the Court, was the Hall. There was also a second court attached to one of the wings, but this was quite subordinate and devoid of fine architectural treatment. The large courtyard was the centre of interest, and was arranged with a symmetry almost rigid, and to which convenience of planning had to bend. This arrangement was of very frequent occurrence in houses of the period, though, as Mr. Harrison claims, Sutton Place is probably the earliest example of it. When the tide of house building had fully set in during the last half of the century, numerous examples of a perfectly symmetrical court with the hall on the side opposite to the entrance may be found; but about Sutton Place is this curious feature, that apparently the door to the hall opened direct into that apartment instead of into the "screens," which invariably divided the hall from the buttry and kitchen. The rooms arranged round this quadrangle numbered nearly forty, and are all mentioned by name in an inventory of the furniture and effects of the builder, Sir Richard Weston. Mr. Harrison remarks that the house "was planned with all the apartments required by modern habits," but it must not be forgotten that these apartments were arranged for the most part in a highly inconvenient manner, and though the material required by modern habits is here, its disposition by no means accords with modern ideas. In those days the larger number of

rooms were thoroughfare rooms, and many of the bedrooms or "lodgings" opened direct into the court, across which open space was the only means of access to them.

The present house consists of three sides of the original quadrangle, the fourth, or entrance front, in which was the large tower, having been taken down in 1782. The return of this from the two remaining sides may still be seen, and Mr. Hayward exhibited on Saturday a conjectural restoration, for all the features of which he had found some authority.

The plan, therefore, of Sutton Place is its first point of interest: it shows the absence of fortification; the introduction of many rooms with modern designations, but ill arranged, except as producing an imposing symmetry; and the subsequent destruction of one whole side as being, in fact, superfluous and an unnecessary expense to maintain.

But, perhaps, more interesting than the plan are the general appearance and details of the structure. The general appearance, as may be seen from Nash's Mansions (plate 43), is that of a Tudor or Late Perpendicular house, with windows having cusped heads, with flat-pointed doors, and with a panelled parapet; but a closer inspection reveals the fact that all the mouldings of jambs, mullions, transoms, and strings are adorned with raised ornaments of Italian character, and that all the dressings are of terra-cotta. Probably, in this use of terra-cotta is to be found the key to the singularly early introduction of the essentially Italian ornamentation, which is not confined to the strings and mullions, but appears over the front door and elsewhere in the shape of amorini in panels divided by half-balusters and a raised floral pattern. The impression conveyed by the meagre and ineffective treatment of these panels over the front door, by the unworkmanlike way in which the string cuts into the middle of a moulded panel on the canted sides of the bays, and by the patched appearance of the parapet, is that here were English workmen using a material to which they were unused, which had to be designed and moulded and made before it came to its place in the work, and which could not be humoured to meet an emergency in design as stone could. No worker in stone would have let his string butt right up against the middle of a carved panel. But with this terra-cotta what could you do? No special mould was supplied for such an emergency, and so a bungle it was, and a bungle it had to remain. It may be that difficulties of this kind prevented the use of terra-cotta from spreading, for we find it hardly anywhere else in any quantity except at Layer Marney, in Essex, which was finished before Sutton Place was begun. These two buildings, indeed, are abnormal. Though so early in date they have much Italian detail, and all in terra-cotta. Most of the contemporary buildings were of stone and still quite Gothic in treatment. May it not be inferred from this that the moulds from which the terra-cotta details were made were supplied from foreign sources? That, the English workmen not taking kindly to the new material, it fell into disuse? and that only after the lapse of some decades and by a gradual process, did Classic detail become the general language of the English workman? The reason of the employment of so much Classic detail here may be found in the fact of Sir Richard Weston having spent much of his lifetime abroad in the service of Henry VIII., to whom he was closely attached.

But the ornamentation at Sutton Place is not all of foreign inspiration. The "tun" which so frequently appears as half a rebus on Weston, has its counterpart in many English buildings of the preceding fifty years, while the grapes that adorn the small end of the quoins may equally have been derived from English sources, but undoubtedly most of the designs, especially the amorini and those in the window mouldings, must have come direct from abroad. It is interesting to note how the various moulds have been used, how by combination they are made to produce different designs, and how frequently they have been reused, and yet how, in spite of his ingenuity, the builder was hampered by his material, and unable to do all he would have done had he been working in stone.

These, then, seem to us the lessons to be drawn from an inspection of the workmanship. That we have here the result of the owner's travels abroad; that he procured the coveted Renaissance detail from foreign sources and



by using moulds made possibly abroad, but utilised at home by English workmen, because he knew that no Englishman working in stone could have given him what he wanted; and that the difficulties inseparable from the use of ready-made detail prevented the material in which it was made from being brought into general use. Had the application of terracotta been more successful no doubt the English Renaissance would have been hurried on, but as the Italian forms had to win their way in stone, the process was longer, and not fully accomplished for fifty years or more, and by that time doors, windows, and mouldings, as well as carved ornament, partook of the Classic spirit. But, however that may be, Sutton Place must always be remarkable as a building Gothic in all its detail, except what would be (were it of stone) its carved ornament.

Not less interesting than Sutton Place is Loseley House, where the members of the excursion were hospitably entertained, and were conducted over the house by the owner, Mr. Molyneux, who knows and loves every stone of the building, and who explained all the points of interest. There is not much detail outside; and the inside has been considerably pulled about at various times, so that few of the features are in their original places, but this matters little with Mr. Molyneux as a guide. Perhaps the most important thing in regard to Loseley is that a plan of it is to be found in John Thorpe's book (fol. 39-40), with the title, "Sir Geo. Moore's house." (It is a remarkable thing how little distance one can go in the study of the English Renaissance without coming across John Thorpe.) The date of the commencement of the building is fixed by the original building accounts which are preserved among the numerous and highly interesting Loseley MSS., from which it appears that the original house was begun by Sir William More in 1561, and finished in 1569, and cost 1,660*l.* 19*s.* 7*d.* Every item of expenditure is set forth at large, and at the end is written:—"Sm<sup>e</sup> totalis of all mye buldyngs from 1561 untill Mychylmas, 1569. Mv*ij*.xl*ii*.xix.*s.* vii*d.*" There must have been an earlier house than this one, built by Sir William; for at Christmas, 1558, one Edward Tyle writes to him from Windsor:—"I ham very glad to here of yo<sup>r</sup> reynsh wyne, I praye yo<sup>r</sup> kepe yt well, for I trust my p<sup>te</sup> [part] ys therin"; but of this earlier house which held the excellent Rhensian, no traces remain. In the new house which Sir William built, the family lived till the beginning of the seventeenth century, in the first year of which he died. His son, Sir George, succeeded him, and desiring to be in the fashion, and to be as magnificently housed as his friends, he called in the assistance of John Thorpe to enlarge the building. It is Thorpe's plan for the enlargement that is given in his book under the title "Sir Geo. Moore's house." The plan shows the original house,—which can to this day be identified, window for window, and room for room, though the internal arrangements are slightly different,—and the new wing on the west side. It also shows, partly in pencil, a suggested wing on the east side, and a screen-wall from wing to wing, with a gateway tower in the middle, thus completing a quadrangle about 200 ft. wide by 130 ft. long. Had these suggestions ever been carried out, the house would have been one of the most imposing in the country; even as it was, the old house and the new wing made a large place, so large, indeed, that some sixty years ago the new wing was pulled down as being too great a burden to maintain. In Manning & Bray's "History of Surrey" a view of Loseley is given, which corresponds in all but a few unimportant particulars with Thorpe's plan, showing that the new wing was carried out as shown thereon. The house, therefore, has reverted to its original size, save for an eighteenth-century projection on the south side, containing a staircase and study, and for a small new wing built by the present owner; and it still deserves Camden's description as the "delicate seat of the knightly family of the Mores." Thorpe has, rather curiously, omitted to show the small porch at the south end of the "screens," which must have been part of the original structure, as it bears the date 1568, the only date to be found.

The chief apartment, of course, is the hall, but the drawing-room, called by Thorpe the parlour, has more original work left, and the ceiling, cornice, and chimney-piece are examples of the period. They are figured in Nash's "Mansions." In the cornice occurs the rebus of the Mores,—a mulberry tree with an

inscription on either side, *Morus tarde moriens; Morum cito moriturum*,\* as who should say, the tree itself lives long, but the fruit dies quickly. There were formerly many of these inscriptions, only one of which is now left, and that over the front door: it is a Latin hexameter:—

"Invadit claudor patet sed semper amico."

The sentiment is the same as in the pithy saying over the door of Montacute, "And yours, my friends." The others are given in the "History of Surrey," and were curious for their aptness to the rooms to which they were assigned. Over the kitchen door was, "For hunger, not gluttony"; over the buttery, "For thirst, not drunkenness"; and over the parlour, "For the upright, not the wicked." But these are gone, and no remains are left. There are, however, in various panels of the hall and in a small bedroom upstairs, some very beautifully painted panels, which from their character and design and from the date of the panelling which surrounds them, justify the belief that they came from the palace of Nonesuch, which was destroyed early in the eighteenth century, when they probably were brought to Loseley and worked into the panelling then being put up. These painted panels are of singular delicacy, and are conceived entirely in the spirit of the Italian Renaissance, much more so even than the work at Sutton Place which we have been discussing.

The "delicate seat" of Loseley is a difficult place to leave; there is so much to be explored, the views are so fine both back and front; the old garden with its long high terrace and quaint garden-houses at the corners, is so fascinating that it is hard to leave it for the prosaic work-a-day world. But the return must be made, and it is at least a satisfaction to feel as we go away how wide a glimpse into history the two houses of Sutton and Loseley have given.

#### CONGRESS OF MUNICIPAL AND SANITARY ENGINEERS AT LEICESTER.

LEICESTER is a growing and rapidly-improving town, and very important and in some respects unique public works are now in progress there, from the plans and under the superintendence of Mr. Joseph Gordon, the Borough Surveyor, who, before he came to Leicester, several years ago, had become favourably known as the engineer of several important sanitary works on the Continent, Frankfurt and other large towns in Germany having been completely sewered and drained by him. The Association of Municipal and Sanitary Engineers and Surveyors have this year elected Mr. Gordon their President, and the fourteenth annual meeting of the Association was held in the Council Chamber of the Town-hall, Leicester, last week. The Association, we may here say, was established in 1873 (its founder being Mr. Lewis Angell, now Borough Engineer of West Ham), and it has been steadily growing ever since its commencement. At the time of writing it has 11 honorary members (including the chief municipal engineers of London, Paris, Brussels, and Amsterdam), 304 ordinary members, and 9 graduates, making a total of 324. Of the importance of such a society, and of the value to the public of the free interchange of opinions and experiences between gentlemen holding the important positions of engineers and surveyors to municipalities, local boards, and other public authorities, there can be no question, and we are therefore very pleased to notice the growth and increased usefulness of the Association.

Mr. R. Vawser, M. Inst. C.E., of Manchester, presided temporarily at the opening meeting on Thursday morning, and amongst the members present were:—Mr. Thomas Hewson (Leeds), Mr. H. U. McKie (Carlisle), Mr. A. M. Fowler (Manchester), Mr. H. P. Boulnois (Portsmouth), Mr. J. Gamagame (Dudley), Mr. E. G. Mawbey (York), Mr. T. W. Stainthorpe (Eston), Mr. J. Howcroft (Redcar), Mr. J. Haigh (Abergavenny), Mr. C. G. Lawson (Southgate), Mr. G. Eedes Eachus (Edmonton), Mr. John Price (Toxteth Park), Mr. G. B. Laffan (Bridgewater), Mr. T. Farrell (Sharnbourn), Mr. E. Pickering (Whitby), Mr. P. Newman (Ryde, I.W.), Mr. W. H. White (Oxford), Mr. C. Jones (Ealing), Mr. Jos. Lobley (Hanley), Mr. S. S. Platt (Rochdale), Mr. F. Ashmead (Bristol), Mr. John Parker (Hereford), Mr.

\* The Mulberry (tree) is slow to die. The Mulberry (fruit) shall quickly die.

J. Cartwright (Bury), Mr. A. W. Parry (Reading), Mr. T. de Courcy Meade (Hornsey), Mr. John T. Eayrs (West Bromwich), Mr. J. W. Cockrill (Great Yarmouth), Mr. Sidney G. Gamble (Grantham), Mr. Thos. Coulthurst (Derby), Mr. Alfred T. Davis (Stratford-on-Avon), Mr. J. W. Walshaw (Peterborough), Mr. Robert Godfrey (King's Norton), Mr. H. J. Clarson (Tamworth), Mr. E. R. Window (Bishop's Stortford), Mr. Geo. R. Strachan (Chelsea), Mr. F. J. C. May (Maidstone), Mr. G. R. Andrews (Bournemouth), Mr. W. H. Savage (East Ham), Mr. W. H. Leete (Luton), Mr. G. E. Shore (Crewe), Mr. Geo. Hodson (Loughborough), Mr. T. Gledhill (Heckmondwike), Mr. Jas. Lemon (Southampton), Mr. W. Dent (Nelson), Mr. W. Banks (Rochester), Mr. E. B. Ellice Clarke (London), Mr. J. Buchan (Grimsby), Mr. A. Creer (Lancaster), Mr. J. W. Wardle (Longton), Lieut.-Col. Jones, V.C. (Wrexham), Mr. S. Dyer (Bridlington), Mr. W. Stewart (Rugby), Mr. A. Comber (Kidderminster), Mr. S. F. Rolley (Tipton), Mr. C. J. Dawson (Barking), Mr. J. D. Watson (Arbroath), Mr. C. H. Lowe (Hampstead), Mr. W. G. Laws (Newcastle-on-Tyne); and Mr. Thomas Cole, Secretary.

The visitors included Sir Robert Rawlinson, K.C.B.; Major Tulloch, one of the Local Government Board Inspectors; Alderman Hart, Mayor of Leicester; Alderman Chambers, J.P.; Alderman Kempson, J.P.; Councillor Goddard, Chairman of the Highways Committee; Dr. H. Tomkins, Medical Officer of Health for the Borough; Mr. William Eassie (London), Mr. R. W. Peregrine Birch (London), Mr. Walter Jennings (London), Mr. J. S. Hodgson (Rotherham), and other gentlemen.

Mr. Vawser having explained that he presided temporarily, owing to the retiring President, Mr. Lobley, being detained on his journey from Hanley,

The Mayor, on behalf of the Corporation, gave the Association a very cordial welcome to Leicester.

Mr. Vawser, on behalf of the meeting, thanked the Mayor, and then resigned the Presidential chair to Mr. Lobley, of Hanley, who had now arrived: he had been unexpectedly delayed at Uttoxeter. The minutes of the last annual meeting were passed, and

The Secretary then read the fourteenth annual report, which expressed the pleasure with which the Council were able to record that all the statistics in the account of the proceedings of the past year showed a larger increase of numbers than in any previous year, as well as a satisfactory advance in the financial position of the Association, while there was evidence that the examinations which it had instituted were being received with confidence by the public. Since the last annual meeting, held at Hanley on July 8, 1886, and two following days, district meetings had been held at Rochester, Walthamstow, West Hartlepool, Warrington, Portsmouth, Kidderminster, and Bolton. During the past year 44 new members, consisting of 39 ordinary members and 5 Graduates, had joined the Association. Death, resignation, and other causes had removed 14 members. The Council recorded with regret the deaths of Mr. William Whittington, Borough Surveyor of Neath (Glamorganshire), and of Mr. John Green Hall, City Surveyor, Canterbury. The extension of the rules made at the last general meeting, so as to admit the metropolitan surveyors to membership, was being appreciated, inasmuch as up to the present time more than a quarter of their number had been enrolled as members. A similarly satisfactory result had also to be recorded with regard to another new rule made at the last general meeting, by which certificated candidates were admitted as Graduates of the Association. Up to the present time, thirty per cent. of the candidates who had successfully passed the Association's examinations had joined as Graduates. The audited balance-sheet showed a balance in hand on the 30th of April of 298*l.* 6*s.* 2*d.* The Sanitary Institute of Great Britain, jointly with the Parkes Museum, having petitioned her Majesty for the grant of a Royal Charter of Incorporation, under the name of "The Sanitary Institute," the Council, on behalf of the Association, petitioned against the granting of such Charter, or, at all events, against including in such Charter the power of granting certificates to local surveyors. Up

\* The results of these will be found recorded in the Builder for Oct. 23, 1886, and May 14, 1887.



to the present time no decision had been arrived at by the Privy Council. The Parliamentary Committee of the Council of the Association had held many sittings during the year, and had given careful attention to "The Sanitary Registration of Buildings Bill" and "The Sanitation of Houses (Metropolis) Bill." The draft of the first-named measure had been considerably modified, and the second measure was withdrawn at an early stage of its existence. In conclusion, the report dealt with proposed alterations of the rules, &c. The ballot lists having been duly issued, the scrutineers reported the following gentlemen elected for the Council:—

*President*.—Mr. J. Gordon.

*Vice-Presidents*.—Messrs. H. P. Boulnois, C. Dunscombe, and E. B. Ellice Clarke.

*Ordinary Members of Council*.—Messrs. A. Brown, J. Cartwright, T. Coulthurst, J. H. Cox, J. T. Eayrs, A. M. Fowler, T. Hewson, H. U. McKie, T. de C. Meade, A. W. Parry, R. Read, and T. Walker.

*Honorary Treasurer*.—Mr. Lewis Angell.

*Honorary Secretary*.—Mr. C. Jones.

The report was adopted, on the motion of the President, seconded by Mr. Vawser, and the following telegram was despatched to Her Majesty the Queen:—

"The Association of Municipal and Sanitary Engineers, assembled at their annual meeting now being held at Leicester, desire to offer their congratulations to your Most Gracious Majesty on the completion of the fiftieth year of your reign, and they pray that your Majesty may long be spared to continue your happy reign over your loyal and contented subjects.—J. Gordon, President."

In the course of the sitting the following reply was received:—

"The Queen has received with much pleasure the congratulations of the members of your Association.—FORSYTH."

A proposal to alter the title of the Association to that of "The Association of Municipal Engineers," introduced by Mr. T. De Courcy Meade (Hornsey), was first considered. He urged that the old title was cumbersome, and he thought that the suggested abbreviated title would express all that was necessary, and be much more convenient.

Mr. Godfrey (King's Norton) seconded the proposition.

Mr. C. Jones (Ealing) moved, as an amendment, that the title should be, "The Association of Municipal Engineers and Surveyors." He held that the title should express as nearly as possible the character of the Association, and he thought the one he proposed would do this better than the title Mr. Meade suggested.

Mr. W. H. White (Oxford) seconded the amendment, chiefly on the ground that the term "Surveyor" was that by which they were designated in the Act of Parliament.

Mr. Hewson (Leeds) said he thought that the argument employed by Mr. White was inconclusive. What did not the term "Surveyor" embrace? The title was used by all sorts of unqualified persons.

Mr. Fowler (Manchester) said that there was equal ambiguity as to what was embraced in the term "Engineer."

Sir Robert Rawlinson said he happened to know that the Government were going to take action with regard to setting out new districts, which would alter the constitution of the local government of the country very materially. He suggested that the question of the alteration of the title of the Association should stand over until it was seen what effect the Government Bill would have on the local government of the country.

Mr. Meade (Hornsey) withdrew his motion, conditionally that Mr. Jones withdrew his amendment. Mr. Jones acceded to this, and the question of alteration in the name of the Association accordingly stands over until next year.

The District Secretaries were reappointed until the next meetings of the various districts, as follows, viz.:—Home Counties, Mr. O. C. Robson, Willesden; Midlands, Mr. A. T. Davis, Stratford-on-Avon; Yorkshire, Mr. J. W. Horsfield, Batley; Lancashire and Cheshire, Mr. S. Platt, Rochdale; Western, Mr. Jos. Hall, Torquay; Northern, Mr. P. W. Thomson, Wiltlington Quay; Eastern, Mr. E. Buckham, Ipswich; and Wales, Mr. J. W. M. Smith, Wrexham.

Mr. Lowe (Hampstead), Mr. Price (Toxteth Park), Mr. Eayrs (West Bromwich), and Mr. De Courcy Meade (Hornsey), were appointed scrutineers to conduct the ballot for the election of the next Council; and Mr. Godfrey (King's

Norton), and Mr. Strachan (Chelsea), were chosen as auditors.

On the motion of Mr. C. Jones (Ealing), seconded by Mr. White (Oxford), a cordial vote of thanks was passed to the retiring President, Mr. Lobley, for the exemplary manner in which he had discharged his duties, and for the services he had rendered to the Association.

Mr. Lobley expressed his thanks, and observed that his interest in the Association would be rather augmented than lessened by his having passed the chair.

#### The President's Address.

Mr. Joseph Gordon, M.Inst.C.E., the Borough Engineer of Leicester, as President elect, then took the chair, and delivered his inaugural address. After thanking the members for his election to the chair of the Association, he said that the original object for which the Association was established had been fully maintained in the present aim and usefulness of its operations. The diffusion of knowledge on the subjects coming within the range of municipal engineering in all its varied phases, differing, as they must necessarily do, in different parts of the kingdom, amongst the members by the papers read and discussed at the various district meetings during the year, coupled with the advantage of an opportunity for an inspection of the works to which the papers referred, in the various towns, was a distinct and very material advancement upon the very limited opportunities which the municipal engineer had, prior to the establishment of this Association, for gaining a knowledge of what was being done elsewhere than in his own town, in the solution of those problems which municipalities and Local Boards had to deal with to meet the growing wants of their districts, and for the improvement of the sanitary condition of their respective localities. It was to the distinct advantage of the corporations and Local Boards that their Surveyors and Engineers should belong to the Association, and take as active a part in its work as possible, for he thought he might venture to say on behalf of every member who was in the habit of attending the District Meetings, no matter how experienced he might be, that he had in every instance learned something of advantage, whether it had been some better way of carrying out some particular class of work or some minor detail, or something had been brought under his notice which it was desirable to avoid in any similar works. Very few of the members were able to attend all the meetings held in different parts of the country during the year, and it must not be forgotten that it was at considerable expense on the part of those members who did so, and that consequently the full advantages of the Association would not be realised until the municipal authorities and Local Boards became impressed with the benefits which would accrue to the towns represented, by knowing that their surveyor attended all such meetings, so as to keep himself abreast of the times in his knowledge of the actual works of the country of a municipal character. That, he was afraid, would never be practicable unless the local authorities themselves came to the rescue, as they heard at their Oxford Meeting in 1883 several boroughs and Local Boards had already done (as regarded the annual meeting, at any rate), by paying the expenses of the members attending those meetings. The good effects and results of the Association by bringing its members into contact with each other at the various meetings were, he was quite sure, being felt in all those towns and districts whose surveyors were members of it. After alluding to the annual volume of "Proceedings of the Association," the President said:—

A step in the right direction was taken by our Society two years ago in the establishment of Examinations for the office of local Surveyors. The success attending the inauguration of that step has been most satisfactory indeed, and deservedly so, I think, when it is considered that in addition to the many other duties the Members of the Council have to perform, they are also chosen as an Examining Board, and that a section of them devote two days of their time twice a year to these examinations without any remuneration.

It had long been felt that there was an examining body for certificates of competency for local surveyors which fully met the requirements of the case. The Royal Institute of British Architects have for some years held

examinations and granted certificates of competency for District Surveyors practising in London, and the Metropolitan Board make it a condition that all candidates for such offices should hold such a certificate. This is, no doubt, as it should be in principle, but the question arises whether the Institute of British Architects is the most fitting body to hold examinations for provincial Surveyors, whose duties are scarcely identical with those of metropolitan Surveyors working under different Acts of Parliament.

The Sanitary Institute of Great Britain instituted also, some years ago, examinations for local Surveyors and Inspectors of Nuisances, conducted by a Board of Examiners composed of gentlemen eminent in sanitary science. It has been felt, however, that a certificate emanating from a body composed of gentlemen filling the most important surveyorships in the kingdom, daily and hourly occupied in the practical work which all surveyors to local authorities have to encounter, would be of great practical value, and recommend itself to local authorities.

There is one other body whose certificate would have all the force and weight of authority, not only in this kingdom but throughout the British Dominions, if that institution would undertake the task,—I mean the Institution of Civil Engineers,—because that body includes within its ranks not only the greatest living authorities on all engineering subjects, but also the chief City and Borough Engineers and Surveyors to Local Boards of the United Kingdom.

It might be urged that as many of the duties of the local Surveyor are of an architectural character, that element would not receive sufficient attention by a body of engineering examiners. On the other hand, while many local surveyors are drawn from the architectural profession, and have been entrusted with important architectural works, yet it will be conceded that the great bulk of their duties are of an engineering character, and that therefore the engineering element is paramount. An engineering body of examiners would appear to be, therefore, a more fitting body to examine and certify as to the competency of candidates for local Surveyors than a Board selected from a purely architectural institution, although perhaps both elements should be present on such a Board.

If the Institution of Civil Engineers were to undertake the task, I think it is fair to presume that with so practical a body of men they would largely select their examiners from that very class of men who have the most complete knowledge of the subject.

What, then, so natural as that this Association should undertake the task until a Board of Examiners has been established, either by the Institution of Civil Engineers, or by the joint action of all the institutions affected and interested, in which all could have confidence? That the Association was right is shown by the fact that the number of candidates who have presented themselves at the three examinations which have been held is much larger at each examination than has appeared before the Examining Boards of other institutions to which I have referred, and I think the Association is to be congratulated on the inauguration of this new step, and that we owe a deep debt of gratitude to those members who took such an active interest in its establishment, and also to those active members of the Board of Examiners who have, at great sacrifice of their time, presided so efficiently over the examinations which have already been held.

A perseverance in this work cannot but be productive of good to the community at large, and I am even sanguine that Local Authorities may eventually follow in the footsteps of the Metropolitan Board of Works, and admit only candidates possessing the certificate of competency of this Association.

The President next proceeded to review the sanitary progress which has been made during the reign of Queen Victoria. In the course of his remarks under this head, he said:—

The average mortality for England and Wales was 22.4 in 1838, and in 1836 19.3, which shows a saving on last year's population of England and Wales of 86,400 lives annually, and a saving in suffering from an estimated number of about 1,728,000 cases of sickness.

To accomplish all this vast sum of money have been expended, probably not always wisely, inasmuch as there have been mistakes made in this direction, as in all new developments of science when applied in practice, and evils have



arisen which, if foreseen at all at the outset, were underrated.

The great object of the Public Health Act, 1848, was to enable Local Authorities, by its adoption, to properly sewer, drain, and cleanse their towns, and to provide efficient supplies of water, free from contamination and impurities dangerous to health. The raising of money by loans repayable in a series of years, which the Act empowered, enabled all these objects to be accomplished, and whilst the first duty of Local Authorities was undoubtedly the provision of a good supply of water and proper sewerage for the removal of liquid filth from the immediate vicinity of inhabited dwellings, the carrying out of proper works for the latter object has been of much slower growth than the former. Private companies led the way, in fact, in providing supplies of water, inasmuch as there was a prospect of the works becoming remunerative to shareholders investing their money in them, and in nearly every instance where Local Authorities have eventually found it to be in the interest of the inhabitants of their districts to purchase the works, they have had to pay high prices for the undertaking. This has generally led to a great deal of dissatisfaction with companies holding such works, but it must not be forgotten that the companies would, in most instances, never have had any existence if the Local Authorities had taken the initiative, and that but for the companies this great boon of a pure supply of water would most probably have been long delayed to many large as well as small communities.

The evils which have arisen from the sewerage and draining of towns, have been of a two-fold character. Firstly, in the increased pollution of rivers and streams into which the sewage, in the earlier stages of these works, was poured without any previous treatment; and, secondly, in the production of sewer gas, which, up to the present moment, seems so difficult to deal with. These concomitant evils and difficulties attending the execution of sanitary works are in no way to be underrated, but it still remains the first duty of town authorities to remove, as quickly as possible, all liquid and other refuse from the midst and immediate vicinity of large populations, before putrefaction has had time to take place. There are some minds whose course of reasoning seems to lead them to the conclusion that the evils attending the introduction of modern systems of sewerage are greater than those of the old methods of dealing with town sewage and refuse, but the facts are against them to such an extent that it would be difficult to point to a responsible medical officer in the kingdom who would be courageous enough to advocate a return to the old régime of cesspools, privy ashpits, open ditches, and flat-bottomed culverts. The introduction of earth-closets as one of the safeguards against sewer-gas has made no headway for large populations, and is beset with practical difficulties. In the Midland and Lancashire towns the system known as the pail or tub system has been much more largely introduced as a substitute for the water-closet, and it has, from a landlord's point of view, many attractions. In the first place, the first cost, as compared with that of a water-closet, is very small, and the landlord is relieved for ever afterwards, I believe, in most towns, of all future costs and maintenance; whereas, in the case of water-closets there is undoubtedly great difficulty, in cottage property, in keeping them in good working order, especially during the frosts of winter. There are, however, many objections to the pail-system, which it is not proposed to touch upon in this address beyond this, that it appears to be a costly appendage to the water-carriage system, without the expected corresponding advantage of relieving the municipal authorities of any of the difficulties of river pollution, inasmuch as the remaining liquid refuse of the town has still to be dealt with by the modern systems of precipitation or irrigation, at practically the same cost as would have been the case, if the water-carriage system had been adopted in its entirety.

The Rivers Pollution Act gave an impetus to works for the treatment of sewage, although much had been done prior to that, and Leicester was one of those towns which led the way so early as 1854, in precipitating the solids of the sewage before allowing it to enter the river. The innumerable methods which have since then been tried, and, after large expenditures of money, have proved to be failures, show the

difficulties of the question. On the whole, however, sewage-farms, or a combination of the chemical system with irrigation or intermittent filtration, have been the most successful, so that the first evil to which the cleansing of towns, viz., the increased pollution of rivers, gave rise, may now be said to be capable of satisfactory solution, notwithstanding that the old battle of the systems of precipitation *versus* application of sewage to land still wages whenever opportunity occurs.

The second evil to which I have made reference, viz., that of sewer ventilation, seems still unsolved, and I would earnestly entreat members, all of whom have, more or less, opportunities of experimenting and making observations of the behaviour of sewer gas under certain conditions, to direct their attention to this subject. It is admitted on all hands that the sewers must be ventilated,—that is, that there must be a means of escape for the polluted air of the sewers, for it is well known that the conditions prevailing within the sewers during the twenty-four hours of the day are very varying, and on this subject the early observations of the late Medical Officer for the City of London (Dr. Letheby), and the present Engineer for the City of London (Lieut.-Colonel Haywood), and the still more recent investigations of Professor Pettenkofer, of Munich, Professor Soyka, of Prague, and our own members, Mr. McKie, of Carlisle, Mr. Read, of Gloucester, and others, are well worthy of attention. It does not, however, seem to be so readily or universally conceded that a plentiful supply of fresh air is of equal importance, and that the great aim and object of sewer ventilation should be the introduction of atmospheric air for the purpose of diluting and oxidising the air of the sewers, and the creation of a current to some exit, which shall, if possible, either be above the roofs of the houses, or still better, to some point where the sewer gas can be cremated. The most recent contribution to this subject, in direct opposition to these views, is to be found in the address of Professor Atfield to the Hertfordshire Natural History Society and Field Club, in which it is laid down that all that is necessary is a vent at an elevation above the ground, and that, therefore, the surface ventilators or other openings for the introduction of fresh air are not only not necessary, but are, on the contrary, injurious, even when acting as down-cast shafts.

These aims and objects are beset with difficulties, and the most scientific minds of the country have failed so far to devise a method of ventilation, which shall at the same time be within the range of practical application as regards cost, and universally satisfactory.

The report of last year of a Committee of the Metropolitan Board of Works is worth attention, as showing the opinion of the metropolitan Surveyors. Out of the forty districts the opinions of whose surveyors were taken, thirty-five were in favour of open ventilation; two were doubtful, two against, and one had no experience in this matter. The average distances of the ventilators were from 30 to 200 yards, and the Committee came to the conclusion "that pipe ventilators of large section can be used with great advantage in addition to, and not in substitution for, surface ventilators."

To supplement the street openings as much as possible with vertical cast iron or other shafts up the house sides would seem to be the first thing to do, for there can be no doubt that the more this is done the more perfect will be the ventilation of the sewers. It must also not be forgotten that the anxiety of late years of English sanitarians to protect each house from the possible dangers of sewer gas from the street sewer has led to a system of so-called disconnection of the house drains by a water seal or syphon trap, and that consequently the soil-pipes of the houses, which, when carried through the roofs acted as ventilators to the public sewers, have been lost for this purpose, and thus the difficulty of sewer ventilation has been greatly increased.

In Leicester we have been fortunate enough to secure the co-operation of factory owners, who have allowed us to connect no fewer than fifty-two chimneys, whilst we have already carried out, at a cost of about 1,250*l.*, 146 special shafts up the house sides, with a locked opening upon a large number of them, by means of which we can test the velocity of the current as well as the temperature of the outflowing air. The connexions with the high factory chimneys are all of too small a calibre to be of great use,

being generally only 6 in., with a few exceptionally of 9 in. diameter.

The radius of effect of specially-erected chimneys, as shown by the experiments of Sir Joseph Bazalgette, and as experienced with the special ventilating towers erected at Frankfurt, is disappointing and discouraging when the cost is taken into consideration. It cannot be expected, however, that manufacturers will admit larger connexions to be made with their chimneys, otherwise, of course, much more satisfactory results would be obtained. To fall back upon special shafts up the house sides means, in my opinion, that there should be probably as many in number as are represented by the soil-pipes of the houses, for in this we have a tested example at Frankfurt, which, so far as I know, has up to the present moment proved eminently satisfactory. The distance apart of such shafts would largely depend on the size of them, but as a rule it will be found that house owners object to large pipes, in which case the number must be increased, and if we take a distance of about 30 yards, we should require about 5,000 such shafts in Leicester.

Whether some artificial means of inducing currents in sewers by drawing down fresh air from shafts above the eaves of the houses, and sending forth the diluted sewer gas to still higher levels, or burning it in an outcast shaft, will take the place of natural ventilation, and prove to be less costly and more certain in its action, remains to be seen; but it is quite certain that notwithstanding the patents which have already been taken out and failed, and those now before the public, there is still a wide field of research before this question is satisfactorily solved, so that no cause whatever shall remain of complaint on the part of the most fastidious.\*

One other important question common to all towns is that of the collection and disposal of the ashes and refuse of the households. It is one which is becoming daily more difficult to deal with, especially in those large communities where the old privy and ashpit system has not been entirely abolished. The removal of such ashes is at all times a source of nuisance, and if they cannot be disposed of to the agriculturists of the district they become a source of difficulty. In purely water-closeted towns the so-called dry ashpits cannot be kept in such a condition as to be entirely free from nuisance, especially in the summer months, inasmuch as the refuse of vegetable and animal matter finds its way into them, and they are, in close and inhabited districts, necessarily too close to the living apartments of the dwellings; the tendency therefore now is rather to discourage the establishment of ashpits by the substitution of ashbins, to be collected daily or weekly as the case may be, and I think there can be no doubt that, from a sanitary point of view, this is by far the best system, harmonising as it does with the general principle applicable to town sanitation of removing all refuse likely by decomposition to become dangerous to health, as quickly as possible from the precincts of human habitations. The difficulty of disposing of the ashes, mixed as they must necessarily be with animal and vegetable matter, is one that is forcing itself upon the attention of all town authorities, and the days of the rich dust contractors of the Metropolis are practically numbered.

Destruction by fire seems to be the ultimate end to be aimed at, and in this respect several towns have led the way, but as this is a subject which will be fully dealt with by a paper to be read during the meeting, I will not anticipate the information which will be brought before you, further than to say that the great end to be aimed at in this method of disposing of the ashes and refuse of towns is greater economy in cost of construction of destructors, as well as in the cost of working them.

The progress in sanitation on the Continent, America, and the Colonies has not been coincident with the progress in England, but these countries have largely benefited by the experience of the United Kingdom, and in some respects their specialists take more extreme views than those of this country in matters of

\* On this subject, we may mention that in the course of the proceedings at Leicester, Sir Robert Rawlinson intimated his intention to place at the disposal of the Council of the Association the sum of 10*l.* 10*s.*, to enable them to appoint a person in whom they had confidence to work out all the present information on "Sewer Ventilation." It was intimated on behalf of the Council that this generous offer would be further supplemented by them.



detail. This is, perhaps, more particularly the case with the Americans, who have devised all sorts of exceptional details in connexion with private drainage, in order to protect the interior of the houses from sewer gas, and to perfect its ventilation.

In plumbing matters they seem also to be very advanced, and to have established examinations for plumbers, and far-reaching regulations for house drainage. Time will not permit me to examine into the works of a sanitary character which have been undertaken in the several countries after the works of England, but they have been attended with similar beneficial results and saving in life and sickness as in this country, although the Continental towns which have led the way with such works cannot as yet point to the low rates of mortality for large towns which have attained in England, with the exception of the German towns of Karlsruhe, Frankfurt, Wiesbaden, and Stuttgart, which show death-rates of 20.55, 20.64, 22.00, and 21.40 respectively. The greatest reduction of the mortality by the execution of proper sewerage and water works took place in Danzig on the Baltic, and Linz on the Danube, where, after the execution of the works, the mortality was reduced by 7.85 and 10.17 per thousand respectively, and in the case of Danzig this reduction is almost exclusively in zymotic diseases.

Berlin is also a remarkable example of the enterprise of German sanitarians, for there they are demonstrating to the world the practicability of dealing with the sewage from a population of over 14 millions upon 16,000 acres of land, of which about 10,000 acres are already under irrigation.

In conclusion, the President alluded to the important public works now in progress and in contemplation at Leicester, including flood prevention and sewerage works of a very difficult and costly character. A notice of these is necessarily deferred till next week.

Sir Robert Rawlinson, in proposing a vote of thanks to the President for his address, said he had known Mr. Gordon ever since he was nineteen years of age, and had been proud to continue his acquaintance ever since. He had the highest opinion of him as an engineer, and hoped he would live long enough to have his eminent abilities recognised by the country.

Mr. Jones (Ealing) seconded the proposition, which was carried by acclamation, and the President briefly acknowledged the compliment, and said he hoped that at the termination of his period of office he should still retain their esteem.

Subsequently a paper was read by Mr. G. R. Strachan (Chelsea), on "Concrete, Cement, and Asphalt Footways,"\* and after some discussion the meeting adjourned, and the members visited the old Townhall, the Roman pavement, the public baths, and two or three of the local manufactories.

In the evening the annual dinner took place at the Masonic Hall, Halford-street.

**The Memorial to Alexander III. of Scotland.**—The memorial erected at Kilmory, in memory of Alexander III. of Scotland, was unveiled by the Earl of Elgin on the 19th inst. The memorial, which has been erected at a cost of some 300l., takes the form of a shaft over 11 ft. in height, slightly tapered, square on plan, each face being about 21 in. broad. Upon each angle is a roll moulding, with capitals and bases. On the front of the pedestal is a slightly-recessed panel, on which is the following inscription:—"To the illustrious Alexander III., the last of Scotland's Celtic Kings, who was accidentally killed near this spot, March 19, 1286. Erected on the sixtieth anniversary of his death." The front panel shows a *bas-relief* in bronze by Mr. John Rhind, sculptor, representing King Alexander surrounded by his courtiers, hearing the pleadings of some of the peasantry during one of the Circuit Court assemblies, which are said to have been a special feature of Alexander's reign. A cross terminates the whole at an altitude of 28 ft. above the rock base upon which the memorial is founded. The entire structure is of Peterhead granite, from designs by Mr. Hippolyte J. Blanc, architect, Edinburgh.

\* Of this and of the other papers read before the Congress we will give some report in our next, together with an account of the visit to the important flood-prevention works now in progress in Leicester, to the Groby and Mount Sorel granite quarries, the Victoria Stone Works at Groby, the Leicester Waterworks at Bradgate, the Leicester Gasworks, &c., &c.

## Illustrations.

### COMPETITION DESIGNS FOR THE IMPERIAL INSTITUTE.

WE give this week the principal elevation, section, and plan of Mr. Blomfield's design for the Imperial Institute. The following extracts from the report sent in with the design will serve to explain the objects kept in view in working out this design:—

"In the instructions issued to the competing architects, the only part of the specified building, or group of buildings, which appears capable of having a monumental character imparted to it, without in some measure detracting from its convenience or utility, is the entrance-hall. In the accompanying design this hall has, therefore, been treated, both externally and internally, as the general dominating feature of the whole composition. In order to give it as much prominence as possible, it has been kept to a certain extent detached from the main building on each side, and rises straight from the ground, with nothing in front of it but an open porch.

In plan a octagon of 4 ft. clear internal diameter, surrounded by a dome the few rows of all neighbouring buildings, it would in itself form a monument not unworthy recording the occasion of its erection.

The main building faces south. The entrance-hall is in the centre, and communicates directly with every department; it is approached under an spacious *porte cochée* by a carriage drive from the few roads, and has doorways of ample width, so contrived that the whole may slide back on special occasions, leaving a clear opening of 20 ft. in width. On entering the hall, the first and most prominent object that meets the eye is an enthroned statue of the Queen and Empress, seated right and left are statues of the Prince Consort and the Prince of Wales. Passing straight on, the reception-hall is approached by a lofty corridor which carries on the architecture of the entrance, and is lighted from above.

A great reception-hall, except on State occasions, is commonly a useless and somewhat dreary place; an attempt has been made to avoid anything of the kind in the case of the present hall. As will be seen, it is brought into close communication with the Exhibition Courts by means of corridors on each flank, these corridors having on one side numerous doors leading into the reception-hall, and on the other arched openings commanding the Exhibition Galleries 9 ft. below. These galleries would be approached by staircases at intervals.

The hall might thus, when not required for meetings, be used for temporary exhibitions, or merely as a 'Salle des pas perdus.' Ample storage is provided in the basement below for seats or any other movable fittings.

Returning to the entrance, the Secretary's offices will be found close at hand in the right wing, and beyond these the various conference-halls and committee-rooms, refreshment-rooms, &c.

At the extreme west end are the Emigration Offices, communicating with the main building, but having a separate entrance. The upper part of this wing is occupied by the smaller committee-rooms, refreshment and smoking rooms, and by the kitchen and domestic offices, which are completely shut off, and are provided with a separate service staircase and ample lift accommodation. Rooms for stores and baggage are placed in the basement of this wing, in immediate connection with the lift and service stairs, and with the serving-rooms attached to the refreshment-rooms.

On the left of the entrance-hall will be found, first, the post and telegraph offices and telephone room, and then the Mercantile Reading-room, and the Intelligence Offices close to the postal department on one side and the library on the other. On entering the library from this end, the Sub-Librarian's room is found close to the door on the right, and opposite to it the Librarian's room.

At the other end of the wing are placed the general reading-room and students' reading-room, with a separate entrance.

The whole of the upper part of this wing is devoted to the storage of books or to work connected with the library. In the basement, beside book-rooms, a large receiving and unpacking rooms, and heating-chamber, provision is made for porters' rooms, police-room, and a fireman's room.

This completes the main building, which may be termed the administrative portion of the Institute. The remainder is entirely distinct, and is divided into two exactly equal and symmetrical sections, each of which consists of suites of galleries for permanent exhibitions or museums so arranged as to enclose a quadrangle of 220 ft. square, entirely occupied at a lower level by galleries principally of iron and glass for temporary exhibitions.

Although no requirement of this kind is hinted at in the instructions, it is quite clear that, if large exhibitions are to be held in these courts from time to time, a considerable number of comfortable and roomy offices will be required in immediate connexion with them, and entirely distinct and separate from the administrative department of the Institute itself; such offices have therefore been provided in

a convenient, easily accessible, and central position at the north end of the great reception-hall.

The question of style appears to be almost settled by the character of the immediately surrounding buildings, and even by the *genius loci*, with which any style other than some phase of the Renaissance would be palpably incongruous. Great freedom of treatment should nevertheless be permitted and even encouraged in a building of this kind, and in such a position. A period at which the picturesque character of northern Medieval architecture had not yet entirely disappeared under the chilling influence of rigid Classical rules and formalism, and, therefore, to be indicated as the best source of inspiration.

The principal materials proposed to be used are red brick and stone. Terra-cotta, attractive as it is for some reasons, has inherent defects which make it unsuitable for a building of this character, in which stone of some kind is much to be preferred. Portland stone would naturally be selected as best able to resist London smoke and atmospheric changes; but the contrast with red brick is too marked. Corehill (a red sandstone from Dumfries), which is easily worked, weathers well, and can be used at about the same price as Portland, is strongly recommended. Granite, both rough and polished, would be used in such positions as would give it its full value in the general effect of the building. External statues and groups would be of bronze.

The dome, surmounted by a gilded figure of Britannia, would be covered with copper scales and relieved with plating. The whole of the constructive portion of the outer dome and cupola would be of iron.

The roofs generally would be covered with green slates. The principal and most elaborate portion of the internal decoration would be confined to the entrance and to the reception-hall, where British granite and marble would be freely used, both in the form of columns, dados, and plain ashlar, and in mosaic decoration of various kinds.

It appears that there are few, if any, Colonial stones or marbles which would be available for extensive use in the building; but in the internal fittings there would be ample opportunity for the employment of many of the beautiful woods of which such fine examples were seen in the Colonial and Indian Exhibition.

We give also the perspective view and principal plan of the design sent in by Dr. Rowland Anderson. The following explanatory remarks are taken from his report:—

"As the level of the site is below that of New-road, I propose to keep the basement entirely above ground, and to set back the building about 30 ft. from the line of this road, and enter by an elliptical ramping approach, somewhat similar to that to the Natural History Museum. The floor of this basement is kept a little above the surface, so as to form tunnels below the corridors, and at some other parts for drains, water, steam, and all other piping, &c., and large enough for workmen to get at any part of everything that is in them.

Off the entrance-hall is the porter's and inquiry office on one side, and on the other the post-office, telegraph-office, and telephone-room.

Branching right and left are the corridors for access to all the business parts of the building, which are thus kept quite separate from the parts of the Institute that would be frequented by the general public and sight-seers; beyond this a fore-hall, and then the great reception-hall. The public access to the museums is right and left from this fore-hall, those on one side being equal and similar to those on the other, and thus evenly divided between the United Kingdom, India, and the Colonies.

The public lavatories are provided in such a position as makes them easily accessible, and where they can be ventilated to the open air, and at a distance from all room windows.

I propose to locate the boilers, engines, dynamos, &c., in a central position in the basement, between the entrance and the great hall.

I would suggest the use of oil as a fuel, because it is cleaner, and economises labour to a large extent in attendance, stoking, and the removal of ashes, and renders a large chimney unnecessary.

The suggested disposition of the electric lighting will be placed in the courts, and so prevent any noise penetrating into the building.

The building would be heated by low-pressure steam, returning all the water of condensation automatically to the boilers.

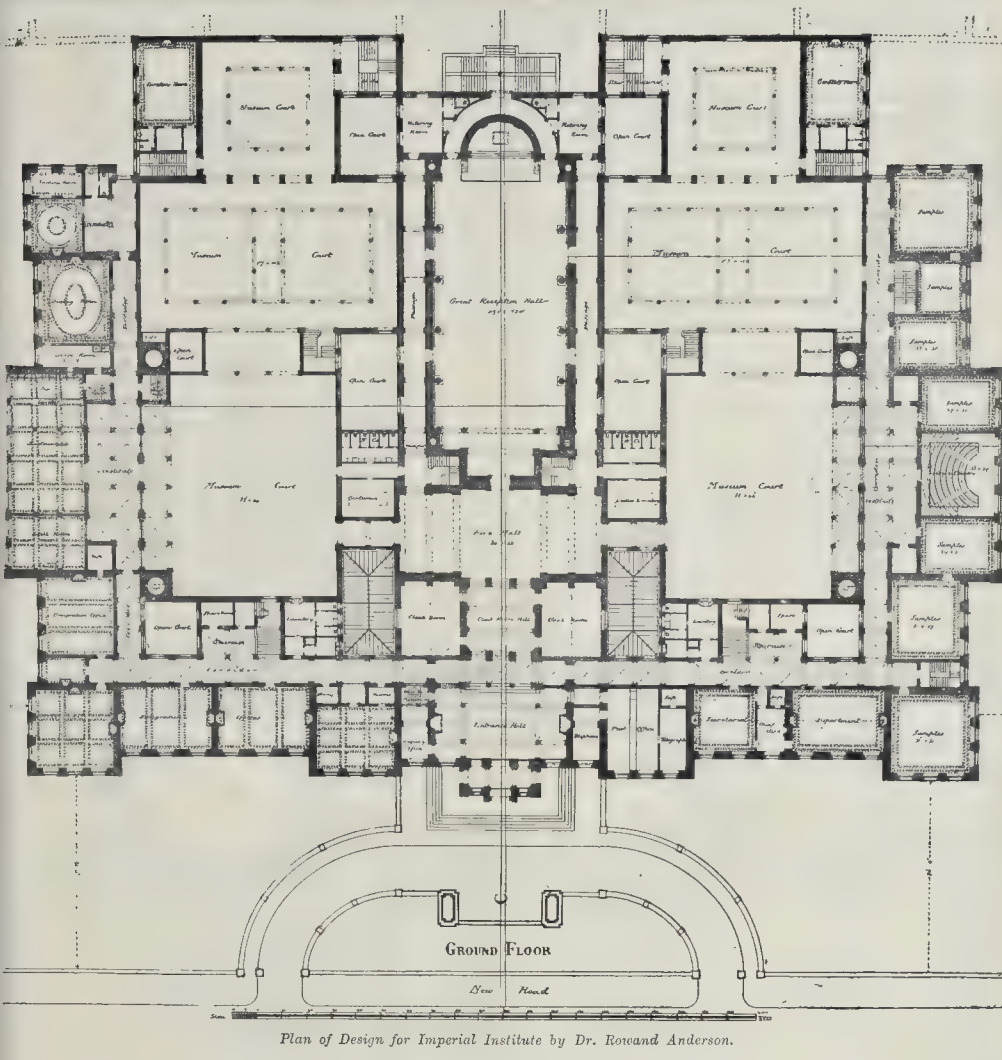
The great reception-hall, general conference-room, library, entrance-hall, staircases, and corridors would be fitted with steam radiators, and the museums warmed from steam piping arranged in compartments below the floor, provision being made for the introduction of fresh air wherever required. Ordinary fireplaces would be used in all the business rooms.

The ventilation of the building would be chiefly effected by the four great upcast shafts,—the draught being produced by the use of compressed air. Over each corridor is a ventilated air-chamber, having connections with all the apartments, and the museums, and these upcast shafts.

The great hall is provided with its own upcast shaft.

In dealing with the architectural treatment of





Plan of Design for Imperial Institute by Dr. Rowland Anderson.

this building, considering its purposes, and their exclusive associations with the United Kingdom and the Colonies, and also the place where it is to be erected, I have endeavoured to make this building look like our own country, and to give it the character of the old buildings about London. I have, with these views, adopted that phase of Classical art which prevailed in the United Kingdom about the middle of the last century, and which at that time assumed a character distinct from Classical art in other countries of Europe.

The building is designed for erection in brick and stone of a cream colour tint. The roofs to be covered (for the sake of colour and durability) with lead, but the use of this covering must be determined by the cost; if too expensive green slates should be used.

This combination of materials is founded on good precedents, and it produces a fine artistic effect, which time improves.

The small scale to which the plans are made, and the somewhat limited time allowed for their preparation, has prevented me showing more fully the decorative treatment of the various parts of the building; but there is throughout a large field for the exercise of the Arts of Painting and Sculpture, the stone and wood carver, the glass-painter, and worker in metal.

In the great hall, large spaces are available for wall-paintings, and the entire surface of the vaulted ceiling for decorative painting. Raised on a dais in the circular recess at the north end, I suggest a seated statue of her Majesty, and on the wall behind it a hemicycle of the great men of her time. In the entrance-halls, the large conference-room, the

museums, and refreshment-rooms, &c., there is ample space for paintings, sculpture, and decorative work of every class; and in the reading-rooms and Emigration Offices there are large wall-spaces for maps, &c. Outside and in front I suggest places for two equestrian statues, such as Lord Olive and General Wolfe, who are so intimately associated with the founding of our Empire in India and Canada. In the tympanum of the portico, sculpture represents the Arts of Peace, and above this a seated figure of Britannia."

#### ORVIETO CATHEDRAL.

We give a general view of the façade of the famous building which its architect, Lorenzo Maiani, under whom it was commenced in 1290, had the good fortune to see completed during his own lifetime, a circumstance which probably operated in favour of the unity of design and character in the building itself.

The illustration of the north-west door on a larger scale shows the general effect of the remarkable sculptured panels, once erroneously attributed to Niccolò Pisano, who, in fact, died before the commencement of the building, and subsequently to Giovanni Pisano, and to others of Niccolò's pupils. It seems impossible now, however, to settle the part taken by various artists in a church which was so great a centre of interest at the time that no less than forty artists of various types came and settled at Orvieto to take part in the work.

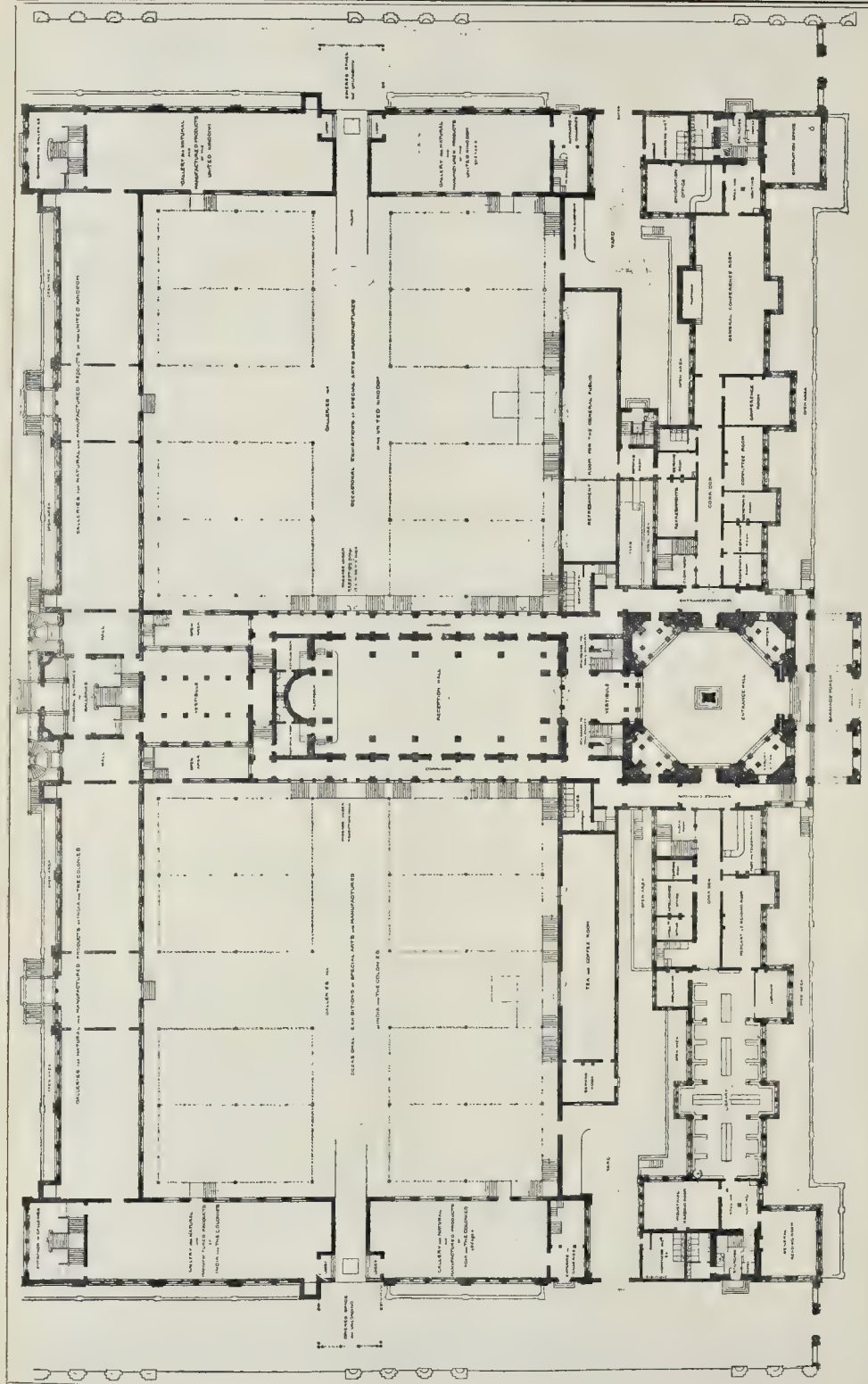
Of the two panels shown, consisting of small subjects in relief divided by vine branches, the left-hand one represents scenes from the Creation and the earliest Biblical history. The second one commences with Abraham, and gives the genealogy and descent of the Virgin. The figures in these sculptures, those on the left side of the door especially, though somewhat childlike in modelling, in their large heads and naïve action, are full of expression and feeling. Over the four panels are the emblems of the Evangelists, those of Matthew and Mark being seen in our illustration.

**The Metropolitan Board of Works and the Sale of Surplus Lands.**—The Metropolitan Board of Works, at its meeting on Friday last, after a long discussion, passed the following resolution by 24 to 20, viz.:

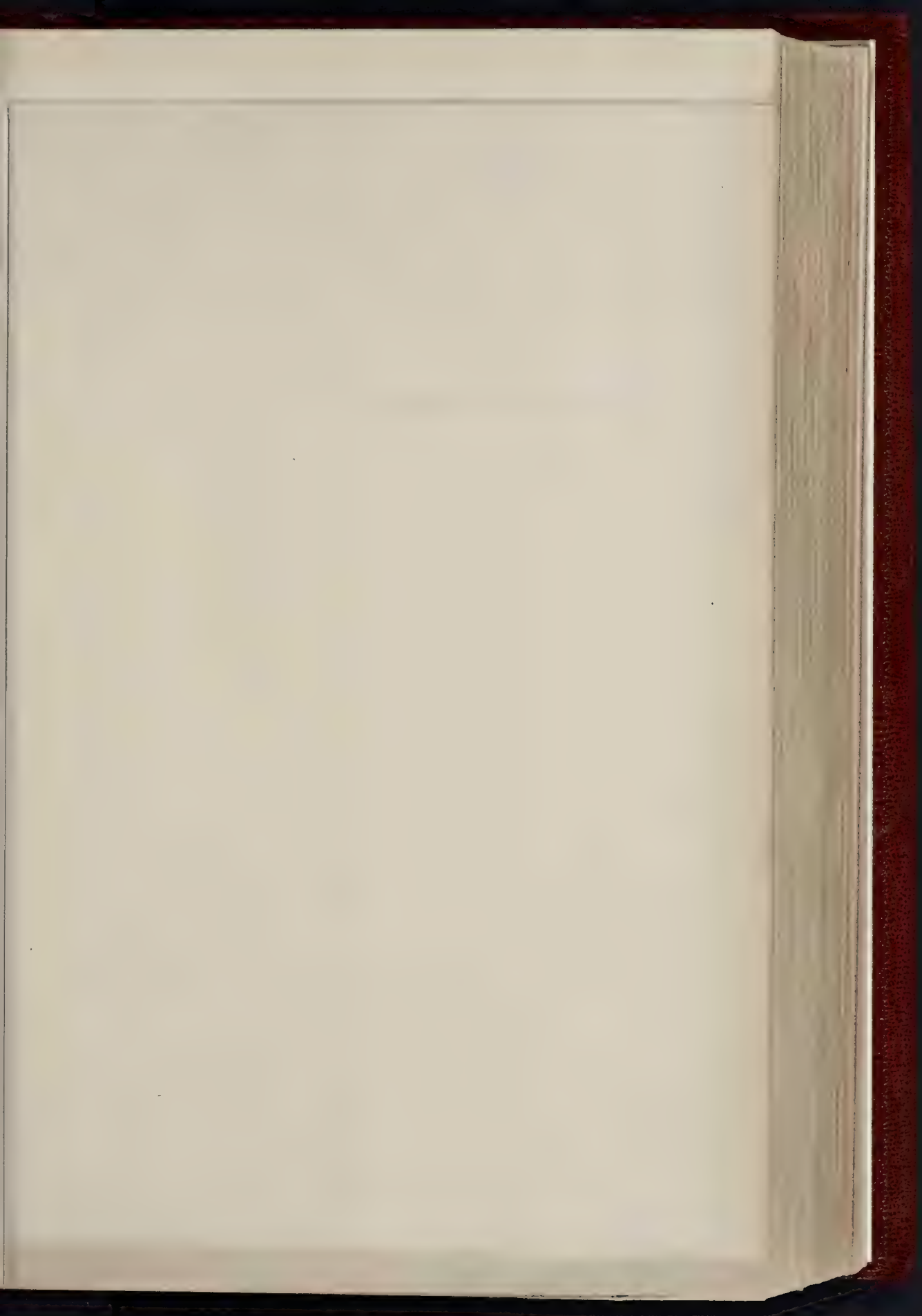
"That this Board is of opinion that none of its officers should be interested in the financial success of any dealings with the Board's properties, and considers that Mr. Robertson's admitted financial connexion with his brothers, under the assumed name of Grey, in such dealings, and especially the unauthorised substitution of one of his brothers for Mr. Foster, a tenant appointed by the Board, as most improper and deserving of censure."

The transaction mentioned in the resolution was referred to in our "Notes" last week (p. 87), and the Board, at its meeting this Friday, the 22nd, will consider the course to be taken in giving effect to the resolution.



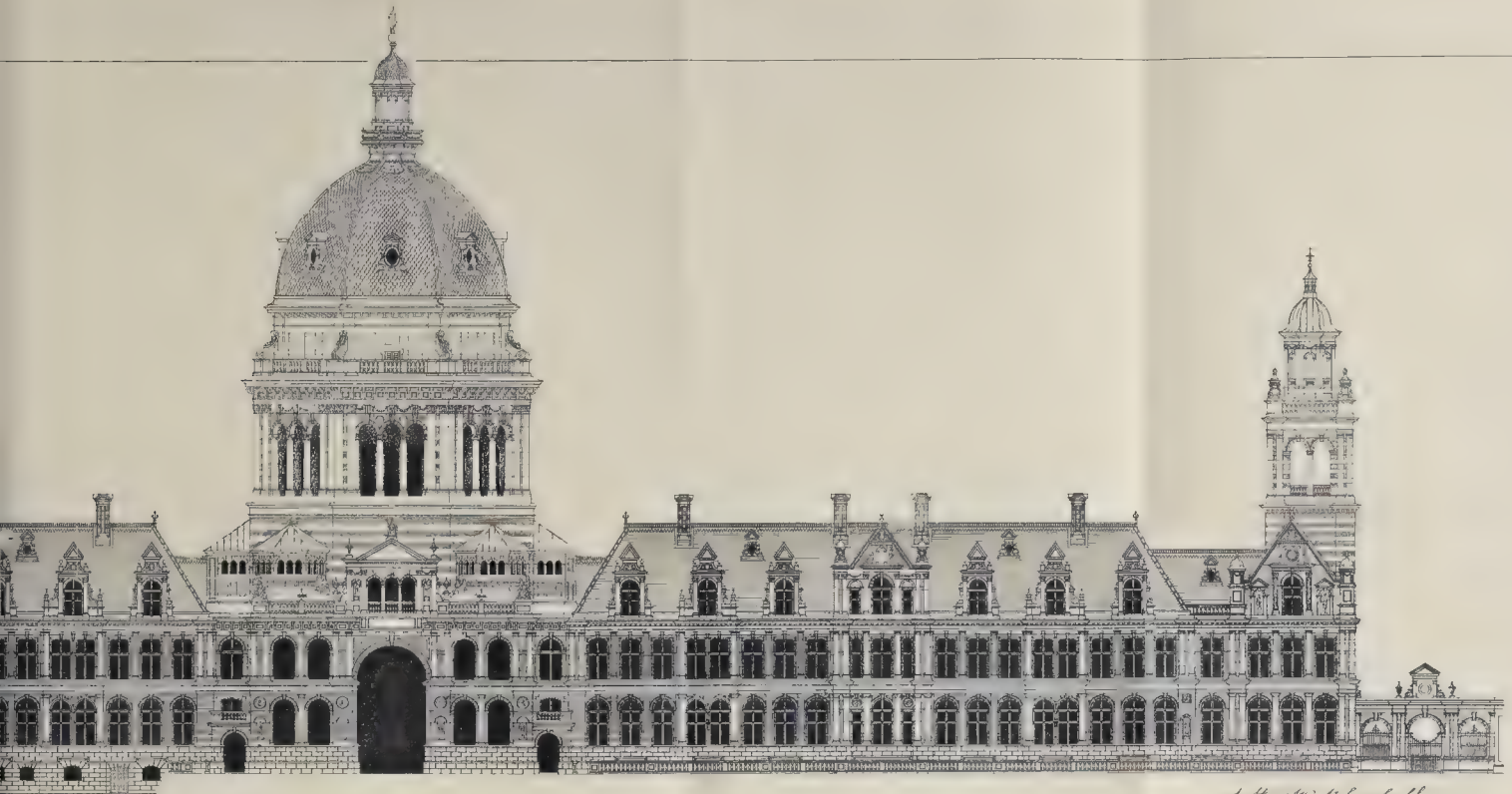


Plan of Design for Imperial Institute by Mr. A. W. Blomfield.









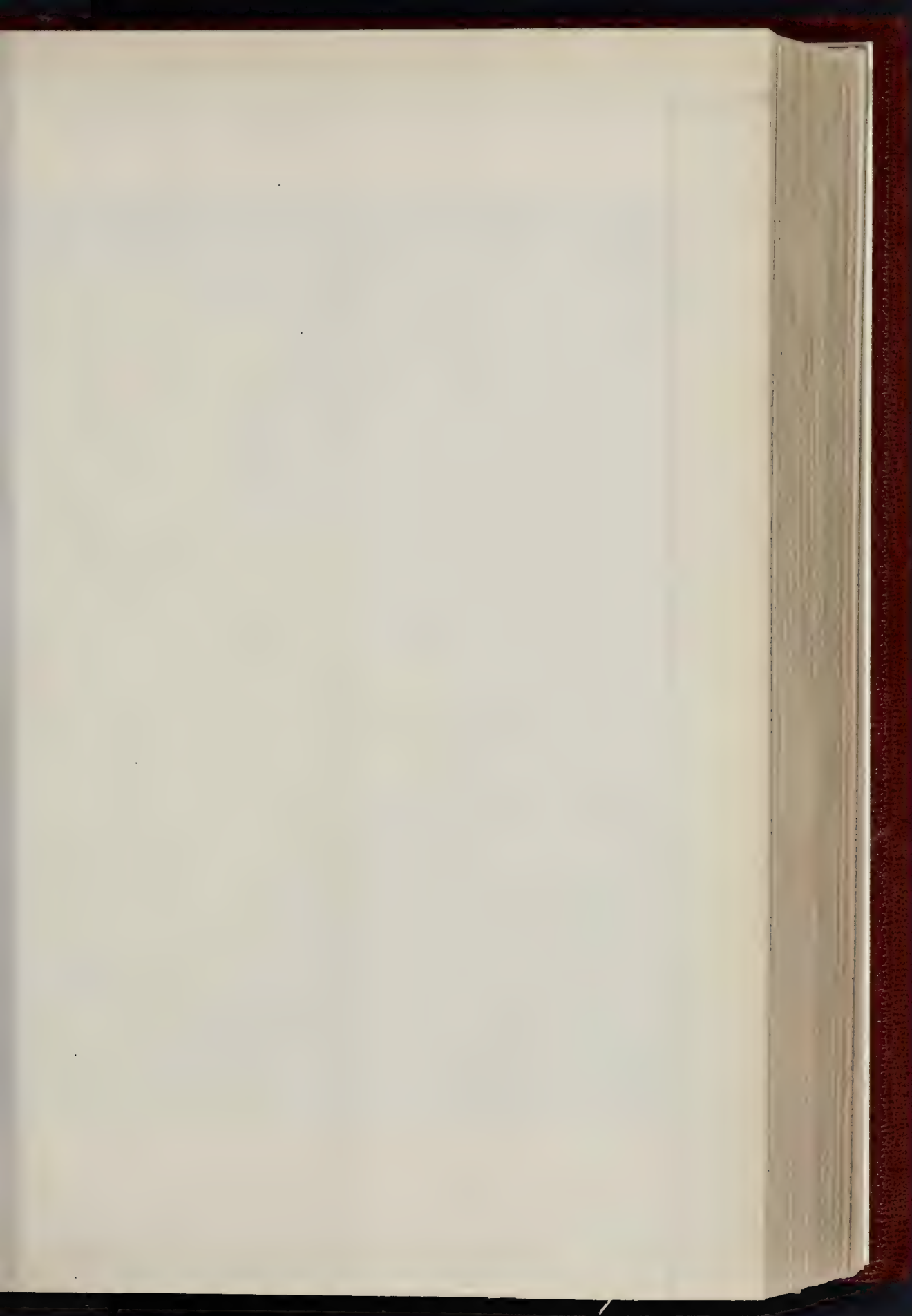
DESIGN BY MR A. W. BLOMFIELD, M.A. F.S.A.  
FRONT ELEVATION



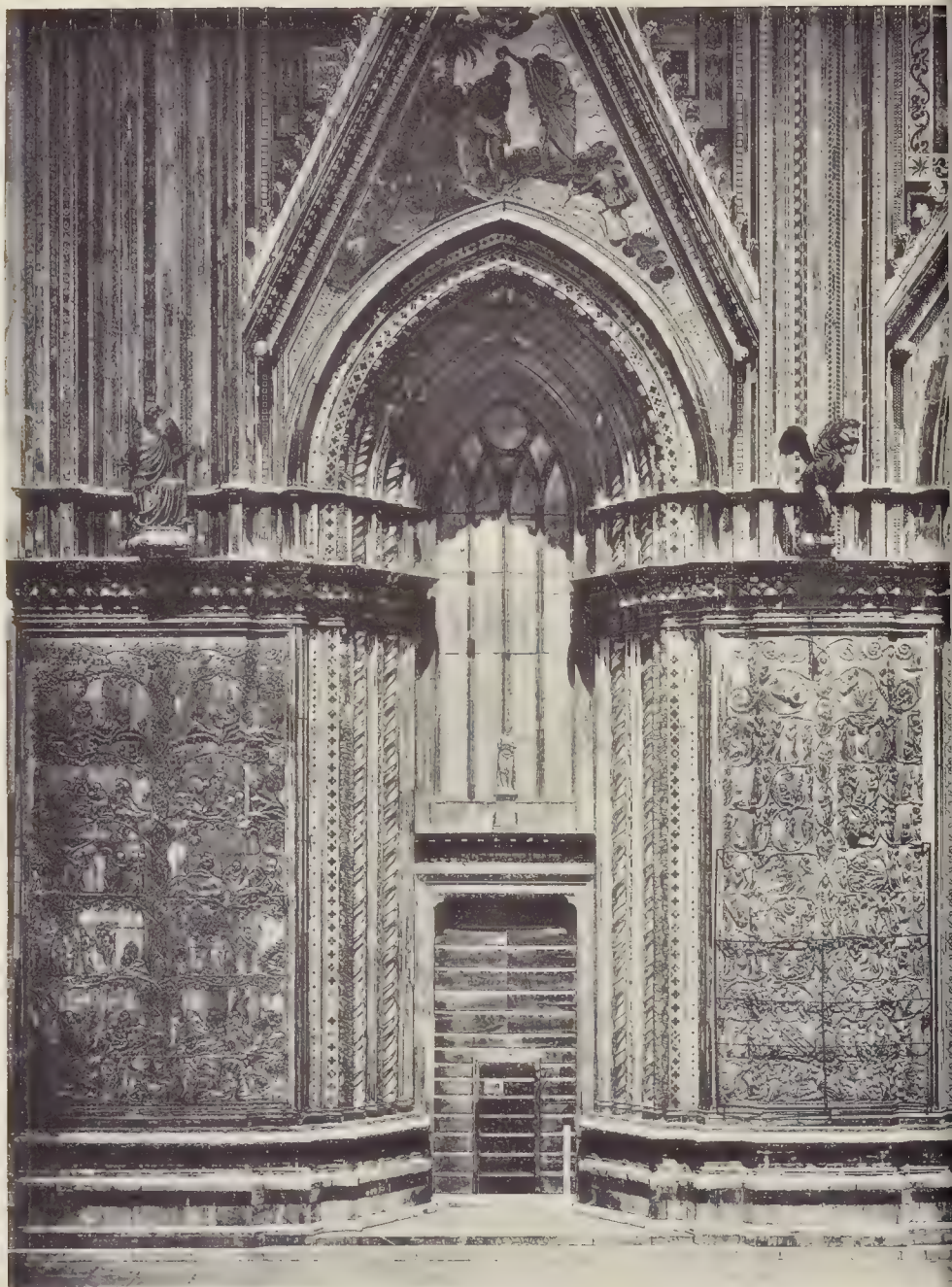
DESIGN BY DR ROWAND ANDERSON, PERSPECTIVE VIEW











NORTH WEST DOORWAY. ORVIETO.

THE LINDSAY CO., 40, STRAND, LONDON.



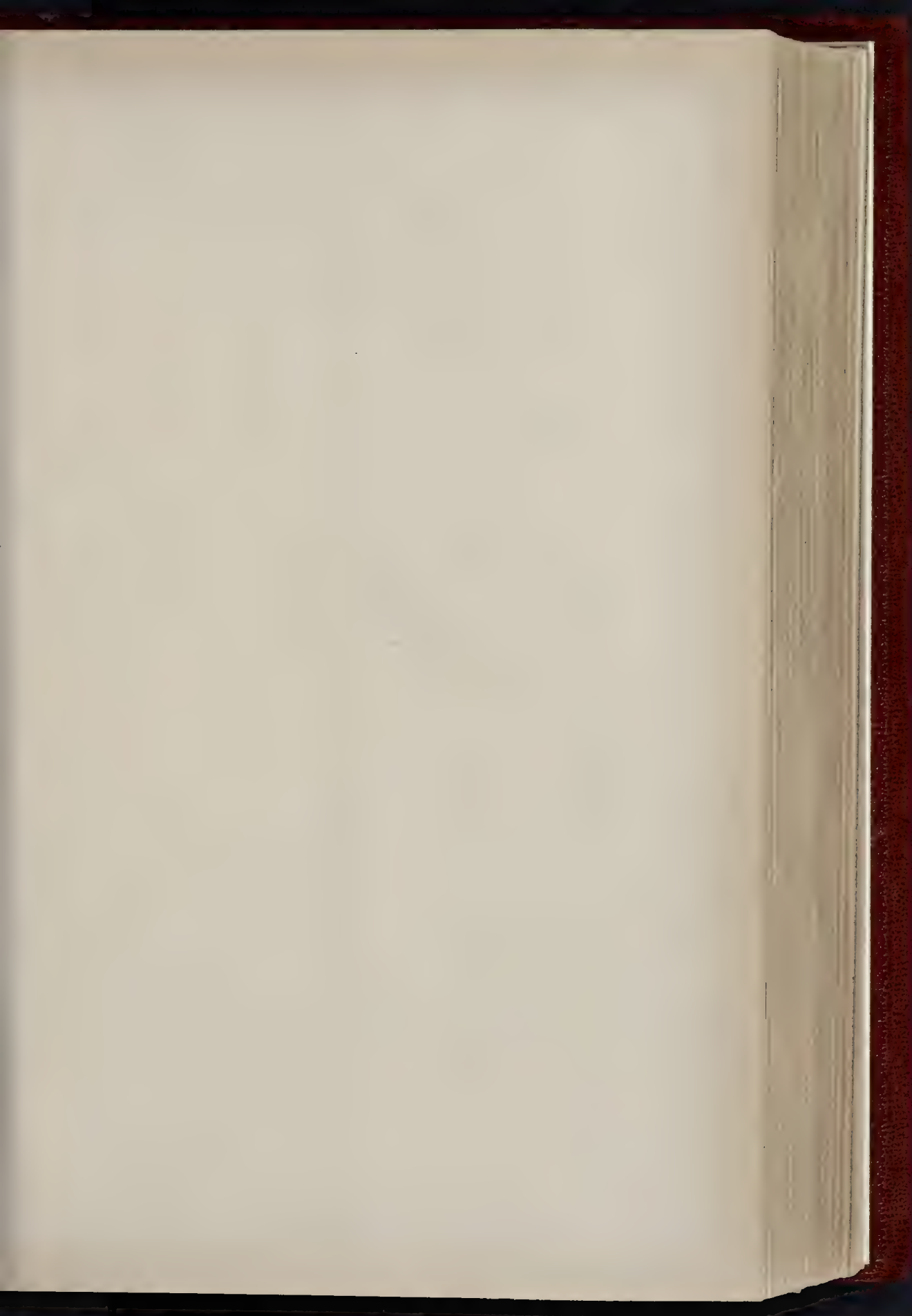


WEST FRONT, ORVIETO.

The Phototype Co., '00, Strand, London











COMPETITIVE DESIGNS

DESIGN BY MR. A.

TRAN



PHOTOGRAPH BY MR. J. H. B. & CO. 22, MARTIN LANE, LONDON E.C.

THE IMPERIAL INSTITUTE.

FIELD, M.A., F.S.A.

SECTION.





# SANITARY INSTITUTE OF GREAT BRITAIN.

THE anniversary meeting of the Sanitary Institute was held on Thursday, the 14th inst., at 74A, Margaret-street. The chair was occupied by Sir Douglas Galton, F.R.S., who presented the supplementary report of the judges on the exhibits at last year's Exhibition at York, deferred for further practical trial. The judges recommend that medals should be awarded to the undermentioned exhibitors:—

Doulton & Co., Lambeth, for Self-adjusting Joint for Stoneware Pipes.  
White, W. P., & Co., London, for Nicholls' Soot and Salt Closet.  
Wragg, T., & Son, Burton-on-Trent, for Hassall's Joint for Stoneware Pipes.

They also recommend that certificates of merit should be awarded to the undermentioned exhibitors:—

Burn & Baillie, London, for Combination Bath Fittings.  
Calvert, F. O., & Co., Manchester, for Boro-Phenol.  
The Stanhope Co. (Limited), London, for Electro-Magnetic Telephones.  
Woolley, James, & Co., Manchester, for Sanitary Rose Powder.  
Broad & Co., Paddington, for Rock Buff Facing Bricks.

The judges have not yet had sufficient opportunity of testing several other exhibits, which are therefore of necessity deferred for a future report. They regret that they are unable to recommend the award of the Richardson Medal. Their report is signed, "W. H. Corfield, Chairman; A. Wynter Blyth, W. Essie, Rogers Field, Henry Law, J. Wallace Peggs, H. Saxon Snell, Ernest Turner."

Dr. G. V. Poore next gave an address "On the Shortcomings of some Modern Sanitary Methods." It was an attack on the practice of mixing putrescible matter with water, or, in other words, on the method of dealing with excrement by means of water-carriage. The following is an abstract of the paper:—Recent investigations have shown that the decomposition of organic matter depends upon the growth of microbes. When organic matter is buried not so deeply in the soil the microbes are of a kind which cause oxidation and nitrification, and prepare the organic matters for absorption by the roots of plants. When mixed with water the microbes produced are different, and these offensive changes are caused which are known as putrefactive, and ammonia and carburetted hydrogen are formed, and oxidation is prevented. The mixing with water prevents and delays the only natural use of organic refuse, viz., that of forming food for plants. This practice, therefore, may be regarded as one which is antagonistic to natural law, and it is evident that such an antagonism is worse than hopeless. The mixing of organic refuse with water in cesspools and sewers causes putrefaction of it, and these putrefactive changes are not only most repellant to our senses, but are a great and universally acknowledged cause of diseases of various kinds. Further, many diseases of the zymotic class have of late years been shown to depend upon living organic particles, which possibly multiply in putrefying liquids, and most certainly are disseminated in the most perfect manner possible when organic matter containing them is mixed with water and allowed to flow to rivers or wells. In connexion with this aspect of the case, it must be remembered that no method of "sewage treatment" can be considered as reliable for the removing or rendering innocuous of zymotic organisms. This practice of mixing with water involves a neglect of the great principle of "resisting the beginnings," and as an illustration of this the lecturer alluded to the cholera epidemic of 1866, when the excrement from the house finding its way into the River Lea, presumably caused the death of 4,000 persons, and he pointed out that if this matter had been buried or burned, instead of being mixed with water, many or all of these lives would have been saved. The "Water System" inevitably produces a fouling of our rivers. Of this fact the Thames, the chief source of our water supply, is a glaring example. With increase of water-carried sewage pure water is getting daily more difficult to obtain. This is of importance, not only to us, but to our animals, and it must be remembered that the health of animals and of human beings has been shown in many instances to be very intimately connected. The financial and economical results of the water-carriage system have been disastrous.

\* This was exhibited at Leicester, but the testing was not completed in time for the last report.

Sewers which cost millions cost thousands to keep in repair, and the "treatment" of the sewage must be a permanent charge and never a source of profit, because the mixing with water arrests nitrification. The ratepayer is being crippled and the land exhausted. The farmers are crying out for "protection," and they most certainly ought to be protected from the impoverishing effects of sewers. The lecturer contended that we have no right to borrow money for sewers, because they must be a source of expense and never a source of profit to those who come after us. The results of co-operation were most disastrous when persons co-operated to commit a blunder, and each generation ought to be at the sole charge of its own sanitary experiments. It was pointed out that water carriage, by enabling houses to be built without any curtilage whatsoever, was a great cause of overcrowding, the greatest of all sanitary evils. It was to be remembered that this system of "water carriage" was not limited to towns, but was common in country districts where there was no possible excuse for it. The lecturer said he was a strong advocate for the dissemination of sanitary knowledge, but he was no advocate for legislation, by means of which blunders were often stereotyped. He advocated the encouragement of independence by householders, and he contended that those who did not use the sewers should not be compelled to pay for them. Our present method of levying rates was a distinct premium on jerry-building and overcrowding, and must produce mischief. If an equitable adjustment of sanitary rates were instituted, and the Pollution of Rivers Act were enforced against individuals, and if water were supplied by meter, sewage schemes in such places as the Thames Valley would very quickly become unnecessary, and people would resort to rational methods of treating organic refuse, i.e., they would subject it to immediate burial. The outcry for allotments was good, and if the allotments were near the houses so much the better. Sewage farmers advocated an acre to every 100 persons, but it was clearly better to let the 100 persons live on the acre of ground, and thus save the expense of sewers, and reap the benefit of the produce. If every cottage (for the average five persons) had 1-20th of an acre of ground, the sewage difficulty would disappear, and there would be an increase of health and contentment. A "Workmen's City" built on this plan would accommodate 64,000 persons to the square mile, or, making allowance for roads, 50,000 to the square mile. With an equitable adjustment of sanitary rates, the lecturer felt sure that this plan would be very generally adopted. The change would be very gradual, but he considered that the great failing of the present day was the constant attempts which we make to hurry when hurry is not possible.

In the discussion which followed, The Chairman (Sir Douglas Galton) said he had been extremely delighted in listening to Dr. Poore's charming paper, which contained so many points of interest, and gave rise to many thoughts as to the various problems of sanitation. One of those problems was that of the overcrowded state of the metropolis, which was a matter of the most serious moment, every vacant space being built over without the slightest remorse. It would be in the recollection of some who were present that after the Health Exhibition a proposal was made to build a sanitary house, and that the Duke of Westminster offered a site for it. The ground-rent, of course, had to be paid, and there was also the interest on the cost of the building; but the scheme fell through because it was found to be impossible to build a sanitary house on the site allotted to it, so as to meet those charges. That was the case with London houses, and until the public insisted on having a sufficient area upon which to build, they would not get really healthy houses in the metropolis.

Mr. Baldwin Latham, M. Inst. C.E., proposed a vote of thanks to Dr. Poore, and added that although he agreed in the main with the tone of the paper, there were many matters in it which might be subject to dispute. He had constructed many drains and sewers in his time, but he was afraid that if Dr. Poore was right in his contentions, he had made a great mistake. At the same time, if a comparison were made between the death-rates of former generations and those of the present time,

things came out much more strongly in favour of modern sanitation. No one could have listened to Dr. Poore without having his mind awakened to the many points which required further elucidation, and there was no doubt that a vast amount of good might be done by following the advice that had been given. A great amount of evil occurred through the want of proper scavenging, and the leaving of organic putrefying matter in the immediate vicinity of houses. From the fluctuations that took place under ordinary climatic conditions, there was much to be done in future, and as long as they could not maintain a general good average death-rate, not subject to violent fluctuations, they had not succeeded in doing their duty as sanitarians.

Mr. E. C. Robins seconded the vote of thanks. Dr. Poore, he said, had taken them to the state of things which existed before sanitation was understood, and he did not seem to say that sanitation had failed, or that the death-rate had become greater, but rather that there were conditions of things under which the old systems were more suitable than the modern ones. If, therefore, they were anxious to have everything done on the selfsame lines they would soon find themselves in an evil case.

The resolution was then put and carried by acclamation.

Dr. Poore, in replying, remarked that he had commenced his paper by saying it contained a good deal of debatable matter. It had been his great desire to find the best principle of dealing with the question, and having found the scientific principle along which they should move, they must see whether it was practicable to put it into force. He believed the principle he advocated was the true and proper one, and he was exceedingly obliged to Mr. Baldwin Latham for the gentle way in which he had been handled. To Mr. Latham, and sanitarians like him, a great debt was due for the manner in which they had carried out a principle of sanitation which, however imperfect it might be, was unavoidable in a great overgrown city like London.

On the motion of Mr. Symons, seconded by Mr. Kingdon, a cordial vote of thanks was passed to the Chairman, and the proceedings terminated.

## ANNUAL DINNER.

The anniversary dinner of the Institute was held on the evening of the same day, at the Holborn Restaurant. The chair was occupied by Professor W. H. Corfield, who was supported by, among others, Sir Douglas Galton, Dr. Mackellar, Mr. H. C. Cunningham, Mr. Baldwin Latham, Prof. T. Hayter Lewis, Major Flower, Mr. E. C. Robins, Mr. H. H. Collins, Mr. H. Saxon Snell, Mr. James Doulton, and Mr. E. White Wallis (Secretary).

The Chairman proposed the usual loyal and patriotic toasts.

Sir Douglas Galton, in proposing the toast of the evening, "Success to the Sanitary Institute," said that with her Majesty's reign began the systematic registration of births and deaths, and, as far as they had them at present, the causes of death; and that sanitary legislation which culminated in the Acts of Parliament of 1875, and those which now prevailed. It was felt, some ten or fifteen years ago, that sanitary science would never be thoroughly appreciated in this country unless the public were educated in it, and unless there was a means by which it could be generally diffused over the whole land. For that purpose the Sanitary Institute was formed, and that had been its mission.

The Chairman, in responding, said it was necessary to show good reason for the existence of the Institute in order to encourage others to assist in the work they had in hand. The Institute had been in existence for ten years, during which time nine Congresses had been held in different parts of the country, and by this means a great many people had learnt something about sanitary work. Besides this, the Institute issued a volume of Transactions containing the papers read at the Congresses, with abstracts of the discussions and various other matters connected with the work of the Institute. Those volumes would be found to contain a mass of valuable and interesting matter bearing upon practical sanitary work. The Institute had also issued two volumes, one consisting of a most important epitome of the works of Dr. William Farr and another of the works of Sir John Simon, whom they congratulated with Sir Douglas Galton on the honour



her Majesty had done them. At each Congress they had exhibitions of sanitary appliances and apparatus, the number of exhibitors at each exhibition being now 130, with about 900 exhibits, while the average number of visitors at the three last exhibitions had been no fewer than 34,000. At these exhibitions judges were appointed to examine the exhibits, and that was done so carefully that the public might take it as certain that the exhibits to which medals and certificates had been awarded by the Sanitary Institute, were exhibits worthy of attention. Then, again, they had held examinations for surveyors and inspectors of nuisances in sanitary science, and these had been a decided success. At the first examination, in October, 1877, only ten candidates presented themselves, while at the examination in June, 1887, there were no fewer than seventy-seven candidates, forty-eight of whom passed. It was, therefore, clear that those examinations had met a public want. He was glad to say that the Council had decided to invite the International Hygienic Congress to hold its meeting in London in 1889, and it should be a meeting to be talked of for many years to come.

Professor Hayter Lewis gave the toast of "The Visitors," coupling it with the names of Mr. Justice Cunningham, who had done so much in connexion with sanitary works in Calcutta; of Dr. Mackellar, who was connected with the Sydney Board of Health; and of Dr. Sargeant and Alderman Taylor, of Bolton, the latter being Chairman of the Committee that had built the admirable Fever Hospital in that town.

Mr. Justice Cunningham replied, and referred to the work being carried on by the kindred society in Calcutta. The difficulties were enormous, and the wildest flight of their imagination was at some distant date to be able to rival the condition of things that had been arrived at in England.

Dr. Mackellar, in responding, said that in Australia they had perhaps the most salubrious climate in the world, and yet the true Briton had done everything in his power to pollute it. In Sydney the water supply had been fouled for no reason whatever, and the result had been that the zymotic mortality was very much greater than in England, although there was none of the poverty and squalor so common in this country. They had now, however, woken up to the necessity for some health laws, and there would not be much difficulty in drawing them up from the mass of wealth contained in the English Health Act of 1875.

Mr. Alderman Taylor also replied, and expressed the hope that the Bolton Congress would be the best the Institute had yet held.

Mr. H. H. Collins gave "The Successful Exhibitors" coupled with the name of Mr. James Donlton, who, in responding, bore testimony to the thorough care and impartiality with which the judges had discharged their duties.

The other toasts on the list were "The Press" and "The Officers of the Institute."

#### INSANITARY CONDITIONS AT MARGATE.

We have just received from the Local Government Board Dr. Page's report to the Board "on the general sanitary condition of Margate in relation to the continued existence of typhoid fever in the borough." The report, though somewhat belated,\* will come opportunely enough to warn intending sojourners at Margate of the risks they are likely to run. What those risks are will be seen by the extracts from Dr. Page's report, which we append. If the town suffers this season and next from a comparative dearth of visitors, its inhabitants will hardly thank the local authorities for their apparent apinence in regard to sanitary matters. The braising air of Margate has long and deservedly had a perennial attraction for Londoners, many of whom must have been quite ignorant of the facts disclosed in Dr. Page's report, from which the following paragraphs are extracted:—

"*Water Supply.*—The water supply of Margate is obtained from waterworks constructed in 1859 by a private company, and purchased in 1880 by the

\* It is dated "May 28, 1887," and is countersigned "George Buchanan, Medical Department, June 11, 1887," and yet we only receive it "with the Secretary's compliments, 11th July, 1887." Surely the issue of documents of such public importance should be, and could be, greatly accelerated?

Corporation for a sum of 60,000*l.* The water is pumped from the well at Tivoli on the south-west inland boundary of the town, sunk in the chalk to a depth of 63 ft. This well is 10 ft. in diameter, and at the bottom adits or headings extend, I am informed, to an aggregate length of 700 ft. From the well the water is conveyed by a single rising main to covered reservoirs in the town, one of which, with a storage capacity of 200,000 gallons, supplies the higher parts, including the Port and Cliftonville districts, Milton, Byron and St. Peter's road, Westbrook, and Garlinge (the last named extra urban), 1,350 houses altogether, while the rest of the town, comprising some 1,900 houses, is supplied from a low service reservoir, holding 450,000 gallons. In the intervals of charging these reservoirs, the whole town is provided directly from the mains. The service is constant, and distributed to the houses without the intervention of storage cisterns. A supplementary source of water supply from a chalk well in the Dane Valley, worked by a windmill, is no longer in use. Formerly, houses in the lower part of the town drew their water from shallow wells sunk in the alluvium, but at the instance of the Medical Officer of Health these have, from time to time, on chemical evidence of impurity, been closed, until they have ceased to exist or have been made into cesspools. From doubts as to the capability of the Tivoli pumping station continuing to meet the requirements of the borough, additional works of water supply are now engaging the attention of the Sanitary Authority, for the construction of which the Board sanctioned, in April of last year, a loan of 6,500*l.* The new well is sunk in the Dane Valley, near the windmill site, into the chalk for 68 ft., and is 12 ft. in diameter, with three adits at the bottom carried into the chalk in different directions for some 300 ft. at the present time. In March last the whole of the borough was supplied for about ten days from this source, but the service is now interrupted, pending further structural works, chief of which is the extension of one of the adits for 1,000 ft. across the valley, with the view of intercepting the flow of underground water, believed on geological evidence as to the coincidence of the valley with the direction N.W. and S.W. of the chief vertical joint planes in the chalk to take place in this direction.

With regard to the quality of the present supply from the Tivoli well, there is every reason to regard it with the gravest suspicion, as may be judged from the following account of the surroundings:—

"The well itself is sunk in the chalk, near the edge of a strip of grassy marsh land extending from this point to the sea, about half a mile distant, and known as the 'Brooks.' This marsh has proved, on examination, to consist of the usual silt, sand, clay, and the like, deposited in shallow arms of the sea, and highly permeable by water, which stands within a foot of the surface, the latter being only some 6 ft. above Ordnance datum. A foul stream, little else than a stagnant ditch, extends, one cannot speak of it as flowing,—the length of the marsh, and receives at the lower part of its course drainage from various premises, including a steam laundry, stables, dungheils, and an unknown number of cesspools, behind Marine-terrace. At the time of my inspection a peristyle, thrown across the stream towards the Tivoli well was explained to me as designed to prevent a backflow, which on occasion had been observed in that direction.

About half a mile or less beyond the pumping station is the cemetery, situated on higher ground in the chalk, and according to the evidence of Mr. Whitaker, of Her Majesty's Geological Survey, in his report on the Margate area, 'more or less on the line of underground flow towards the pumping station.'

Lastly, a populous neighbourhood, entirely dependent upon drainage into cesspools, is growing up in the vicinity of this well, and, incredible as the statement may read to those who know the dangers of contaminated water, I have to state that during the present year a row of a dozen houses has been built within 70 ft. of the pumping well, the houses having no other means of excrement disposal than into separate cesspools sunk into the chalk for a depth of 20 ft. These cesspools had been made with the assent of the Sanitary Authority, who had required that these receptacles should be cemented. There is ground for suspicion that one of the adits of the well approaches to within a few feet of these premises.

As regards risk of contamination of the water-supply in the course of its distribution through the town, this appeared to me to exist to a very serious extent in the presence, especially in the poorer neighbourhoods, of numerous water-closets, and in direct communication, by means of screw-down taps, with the mains. I am told that the matter has been brought pointedly to the notice of the Sanitary Committee without adequate result. As local interruptions of the water-supply for an hour or more at a time are of frequent occurrence, and that the alteration or repair, involving in some cases, in consequence of insufficiency of valves, considerable length of main, the danger to which the public health is subjected by the suction of possibly infected excremental matters into the pipes from some one of 200 or more of such water-closets, demands immediate appreciation and remedy by the authority responsible for its continuance.

As to the chemical evidence of contamination of the Tivoli water supply, I learn, from a joint report made in December last to the Sanitary Committee by the Medical Officer of Health and the Borough Surveyor, that in September of the same year the Borough Analyst, commenting upon certain analyses made by him, reported to this effect:—"The results pointed distinctly to sewage percolation, and to a considerable admixture of sea water, very objectionable features of a public water-supply, and calling for speedy remedy."

*Sewerage.*—Margate is a cesspool town. The large majority of houses of all sorts have no other means of drainage than into cesspools. The Margate cesspool is a receptacle dug to a depth varying from 20 to 40 ft. into the chalk, usually of conical shape, 10 to 12 ft. in width at the base, narrowing to 3 ft. or thereabouts at the entrance, which is domed or flagged over, and covered with the soil of the back yard or basement. Disused wells serve their turn frequently for cesspools. There is no pretence at making them water-tight, the object had in view being to expose as large a surface as possible of absorbent chalk, and so promote soakage in every direction in the hope of postponing indefinitely the day when a cesspool may require to be cleaned, a necessity which is only recognised by the choking of house-drains or the welling up of the contents upon the surface. Even then, as the cost of emptying may amount to 5*l.* or 10*l.*, the duty is sought to be evaded, and tenants will leave a house rather than perform it, or, in other instances, limit the use of perhaps an already overflowing cesspool by throwing their slop water elsewhere than down the house drain. This state of things was found in existence on Dr. Gwynne Harries's inspection of the borough. Then, as now, tenants in Marine-terrace were throwing 'their slops out through their back doors in order to lessen the pressure on their pits.'

In houses of the larger and newer sort the cesspools are ventilated by means of 3-in. pipes carried up the houses. Ventilation by the same means has recently been provided in some of the poorer dwellings, where outbreaks of fever have drawn attention to defects.

In the matter of house drainage, considerable progress has been made in cutting off sinks and other waste pipes from the outside drains, and the ventilation of water-closet soil-pipes, but in the poorer class of houses drainage defects are still numerous, those most commonly met with being a loose bell-trap, almost constantly displaced from the head of a sink-pipe, going directly into the cesspool, and thereby allowing indraught of the foul and, on occasion, infected air of the latter under the influence of the fires and warmer atmosphere of the dwelling. Several instances of this kind were noted in the course of my inquiry. In a large number of houses of the better class, the 3 in. ventilating pipes from cesspools and water-closets were noticed to be so zigzagged with angles as to destroy any efficiency they might otherwise have possessed for their intended purpose.

Some fragmentary sewerage exists in localities next the sea front. The so-called 'town drain' is the property of the Corporation, and begins at a trappegully and catchpit in the town yard, King-street, whence its course is by the bank of that street, Love-lane, corner of the Townhall, Broad-street, Bridge-street and Bankside, to its outfall at low water mark seaward and within the jetty extension.

With a view to remedying certain grave defects formerly a source of great nuisance, this drain had been relaid for some 370 ft. with 15 in. pipes, and furnished with a flushing-tank in the first part of its course, and at the outfall for some 500 ft. with 2 ft. iron pipes. It has also been provided with manholes and valves, with the object of preventing the tide driving back and forcing out the contents upon the surface, and a storm overflow of 15 in. pipes into the harbour. In its course this 'town drain' receives antiquated drains from High-street and Market-street, the latter having previously been joined by a drain of modern construction from Marine Drive conveying sewage from some twenty-five or thirty houses which formerly drained directly into the harbour. But as the old section below this point in Broad-street is only of brickwork, some feet in diameter, it becomes choked at times of heavy rain fall at high tide, when flooding of basements and streets to the neighbourhood results. The stream from the 'Brooks,' already mentioned, serves an irregular function of sewerage to houses behind Marine-terrace, under which it is conveyed in an unknown mode by what is spoken of as the 'trunk,' and thence upon the sands, where its point of outfall is shown not far from the Promenade. At the time of Mr. Harries's inspection, there was on the present occasion no perceptible discharge from the outlet. On the west side of the town, a dozen houses in Royal Crescent, some eighty houses of modern construction in Westbrook, and the 8 Bathing Infirmary are drained by separate outlets upon the beach above low-water mark. Saving 7 or three 6-in. ventilating shafts in the upper part of the 'town drain,' none of these sewers are ventilated. With the above noted exceptions the town is unsewered.

In addition to cesspools there are upwards of 70 privies discharging into pits excavated in the chalk from 6 to 10 ft. deep, in the poor localities of the borough, in many cases in close proximity to the dwellings, and often actually against them.



val of the vast accumulations of filth in these pits is left to the householder, and takes place twice a year. In one case met with in the course of my inquiry, the cesspit had not been cleared for two years.

**Sanitary Administration.**—Mr. Knight Treves, C.S., is Medical Officer of Health, at a salary of £2,100s., no part of which is repaid from the sanitary grant. Mr. Treves is in busy private life, and has but little time to devote to the duties of his office. Beyond a statistical account of births and deaths within the borough, there are no continuous records of the sanitary circumstances or other books in his department. But outbreaks of infectious diseases have been promptly dealt with in the removal of patients to the Fever Hospital, and the cleaning of houses and things. Mr. Treves has not failed to bring under the notice of the Sanitary Authority, in his annual and other reports, more serious defects requiring remedy at their hands. Thus, in his report for 1886, he advises the authority that the health of the town would be greatly improved by the erection of a public toilet, and the provision of an efficient system of drainage. And in the following year he recurs to the same subject in these terms:—

"The question of drainage is probably the most important that has ever occupied the attention of the Town Council. There is no doubt that in the manner in which work is carried out will depend the health and prosperity of the inhabitants of the borough. A good system of drainage would relieve us from the evils caused by present cesspools, and would, undoubtedly, raise the reputation of Margate in the estimation of the visitors. It would remedy the serious and noxious condition of the lower level of the town, and especially remove that which is so much to the discredit of the town, the drain. There is also every reason to think that efficient sewerage would diminish our mortality, and throughout the moderate drainage of the year, has in previous years formed a very serious source of our general mortality."

In his next report, Mr. Treves points out the danger of water-closets in direct connexion with the main, and urges the Authority to enforce the erection of flushing cisterns, repeating his recommendation in 1883. Last year Mr. Treves mentioned upon the risks of pollution to which the main water supply of the borough was exposed by the surroundings of the Tivoli well.

There is no Inspector of Nuisances giving him the time to work, the duties of the office being performed by the Borough Surveyor, Mr. Albert Latham, C.E., who receives for the combined position of a salary of £400l. a year. Mr. Latham's duties as Engineer to the Corporation, including plans and supervision of important public works, are abundant and responsible enough without the addition of work which requires for its efficiency constant and systematic attention. The circumstances of Margate urgently demand the provision of an adequate staff for the remedy of defects and the removal of sanitary neglect, which must be sought without waiting for complaints or outbreak of disease to bring them under the notice of the authority.

In 1877 a comprehensive scheme for the sewerage and sewage disposal of the borough was prepared by the present Surveyor, Mr. Albert Latham, C.E., and in the following year a loan of £2,000l. was obtained by the Local Government Board for carrying out the works. Of this loan none has been borrowed, and the Town Council continues in default in not providing for these pressing requirements of their district."

Mr. Page concludes his report by saying that there has now become, even more urgently than before, a matter of the gravest possible concern to Margate that the Town Council should take immediate steps to improve the sanitary condition of the town, in the abolition of cesspits, cesspools, and the provision of an efficient system of sewerage and sewage disposal. With these essential works all other improvements of a superficial sort will prove of little value."

#### WINDOW AT ST. JOHN'S, CHESTER.

It is in a notice in the current number of the *Builder*, taken from a Manchester paper, concerning the great west window of St. John's, Chester, that the Duke of Westminster has commissioned me to design and execute as a Jubilee memorial, — you the subjects are to be taken from the life of St. John. Permit me to say, that is not so.

The subjects to be depicted will be the history of St. John's from the early Saxon days; and the story of Chester and the Rectory of St. John's, the Cooper Scotts, are now engaged in kindly looking up old Latin manuscripts, in order to furnish me with sufficient antiquarian data wherewith to design an expressive history of the old Church of St. John Baptist.

EDWARD FRAMPTON.

The local paper from which we took the notice is responsible for the error.

It was intended to appear in our last, but was dropped. Since it was in type the whole of the medical and surgical practitioners in Margate have written papers to certify that they have not at the present any case of typhoid fever under their care in the parish of Margate, and that, to the best of their belief, knowledge, there is not a single person suffering from typhoid fever within its radius. This declaration, however, does not traverse the very serious statement of facts contained in Dr. Page's report.

#### GOLDSMITH'S TOMB.

SIR,—Referring to your "Note" about Goldsmith's grave (p. 89, ante), I believe that the exact spot of Goldsmith's burial is not known. He was buried on the evening of Saturday, April 9th, 1774, in the graveyard to the north and east of the church (albeit, possibly in the new Master's Garden).

Forster's "Life," sixth edition, 1875, says, "No memorial indicates the grave to the pilgrim or the stranger, nor is it possible any longer to identify the spot which received all that was mortal of this delightful writer."

But I think you will find, on inquiry, that the stone whereof the "Note" speaks was laid in 1860.

I have a note that in 1855 the "sexton," or other official, told me that some years ago Goldsmith's coffin was found. He could give me no particulars. I have failed to see him again, or any one who could confirm or extend his statement.

Cyrus Redding writes thus in his "Recollections":—"Colonel Lawrence first showed me Goldsmith's tomb in the Temple churchyard. It was a table-tomb in the north-east corner, since ruthlessly removed altogether. A fire had occurred in a printing-office two or three years before, and the flagstone with the inscription had been cracked by the fall of some bricks, but the inscription was perfectly legible. The ground is now (1857) levelled." This ground belongs to the Middle Temple.

Cunningham, 2nd edition, 1850, says:—"The place [of burial] is undistinguished; but a tablet recently erected in a recess on the north side of the choir commemorates the circumstance." This tablet is now in the triforium of the (round) church. It was erected by the Inner Temple Benchers, 1837, and records that Goldsmith "was buried in the adjoining churchyard."

Penman is silent on the point. Geo. Godwin, "Churches of London, 1833," does not mention the tablet, or interment; but the church's interior has been modified since that time.

Timbs (1855) mentions the tablet as then in the vestry beneath the organ-gallery. He says Goldsmith was buried to the east of the choir, thus placing the grave where it is known many burials were made, &c., in the Master's Garden.

I have consulted other authorities, but find nothing to determine the actual position of Goldsmith's grave. W. E. M.

SIR,—In this week's *Builder* I notice that you refer to the state of Goldsmith's tomb.

I may say that some years ago I offered to re-cut the inscription at my own expense, and was recommended to apply to the Treasurer of the Inner Temple for leave to do so. That gentleman, however, referred me to the Treasurer of the Middle Temple, who referred me to Dr. Vaughan, but without success, the Doctor writing to say that, "although appreciating my motives, he was a little afraid to interfere." The matter thus dropped. I wonder that nothing has been done before now.

G. W. UPCOTT.

#### "ARCADIA" AT THE AGRICULTURAL HALL.

SIR,—Whilst thanking you for your kind notice of "Arcadia" in last Friday's *Builder* [p. 88], there is one point on which I should like to make a few remarks. I express an opinion that the plateaux and steps leading thereto are perhaps not sufficiently strong to bear the mass of people that may congregate thereon. I should like to point out to you that these plateaux and all the approaches have been erected under the most careful supervision, and have all been approved by the District Surveyor, after a careful examination. I have had them all fully tested, and after last Saturday, when there were upwards of 18,000 people in the building, I think that there can be but little doubt that they are absolutely safe.

HARRY ETHERINGTON.

Agricultural Hall, July 17, 1887.

**The City Architectship.**—The *City Press* says that it is not intended to appoint a successor to the late Sir Horace Jones, the City Architect. In his place the Corporation will, on the recommendation of the committee, elect a City Surveyor, whose duty it will be to manage the City landed property.

**Humberstone and Evington Drainage.**—An inquiry was held on Thursday, the 14th inst., at Leicester, by Major Tulloch, R.E., relative to an application by the Billesdon Rural Sanitary Authority for a loan of 15,000l. for works of sewerage for the parishes of Humberstone and Evington, two of the rapidly-growing suburbs of Leicester. The only opposition was in connexion with the area of the contributory districts, but this was ruled by the Inspector as foreign to the inquiry. The scheme was explained by the Engineer, Mr. J. B. Everard, M. Inst. C.E., Leicester, and favourably commented upon by the Inspector.

#### The Student's Column.

##### LAND SURVEYING AND LEVELLING.

###### IV.—BASE LINES.

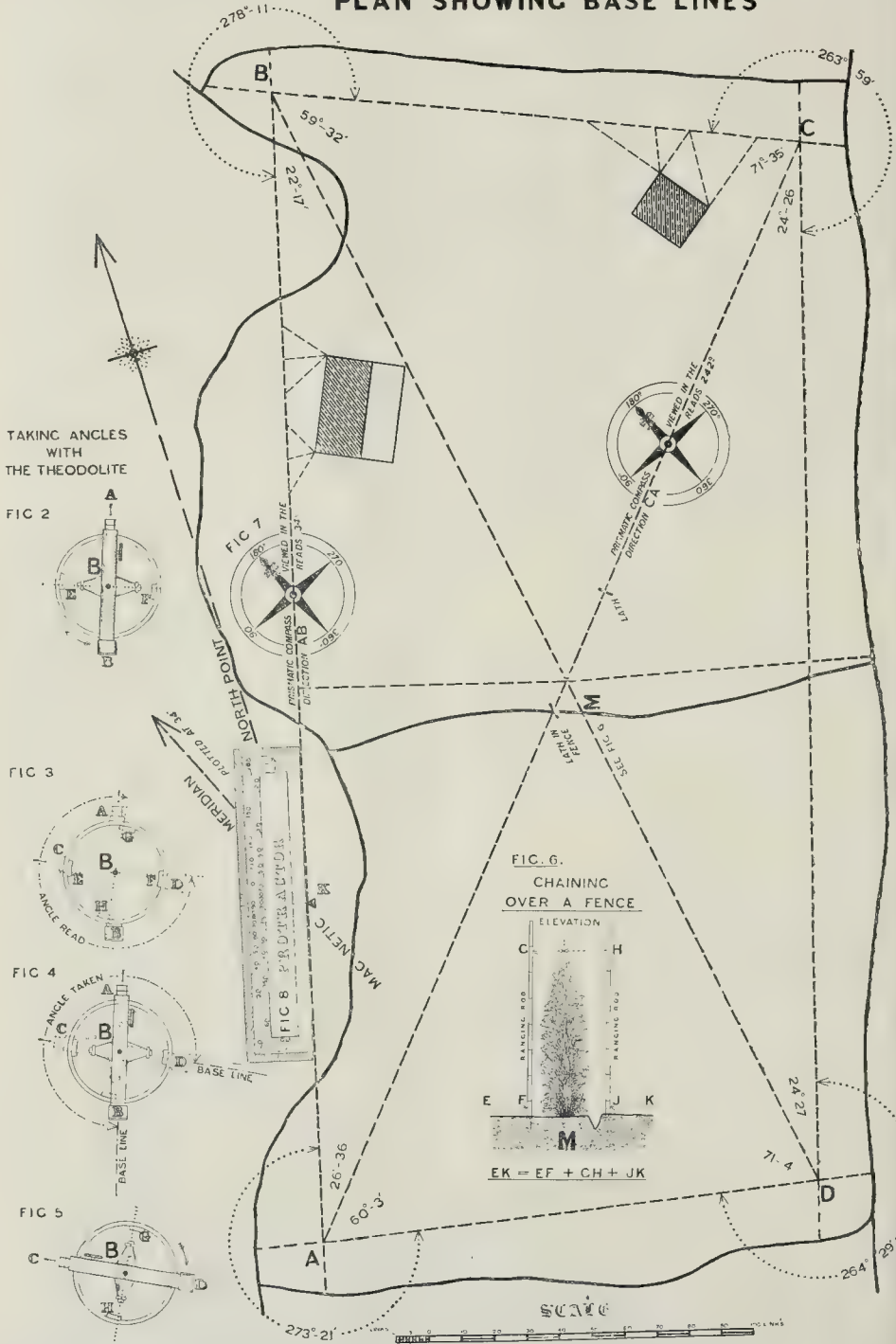
IN open country the relative position of survey lines can be best fixed by chain measurements. In laying out base-lines it must be remembered that the triangle is the only geometrical figure which is incapable of change of form without altering the lengths of the sides, and that when the position of the sides is proved by tie-lines, it shows that the lengths of the base-lines have been correctly measured. We shall allude to this more in detail when describing the means adopted for plotting a survey in a future article. A four-sided figure, like the frame of a slate with the slate out, can assume a variety of shapes without altering the lengths of the sides, but as soon as the corners are diagonally tied together, triangles are formed, and the positions of the sides are fixed. In making a survey it is better to work from the whole to a part, than from a part to the whole, not adding field to field and acre to acre, but to embrace the whole survey in one grand system of triangulation. The longest base-line should if possible extend throughout the whole length of the survey, and the exterior boundary measured by offsets from base-lines, which should be connected by triangulation to the longest line. The interior details can then be obtained by the formation of subsidiary triangles, and the measurements taken are recorded in a manner which we shall describe under the head of Field Book.

The surveyor will require the assistance of at least three men, two at the chain, and one at hold the tape and to look after the poles or ranging-rods. It is a great mistake to work short-handed, as it leads to a waste of the surveyor's time in running about. He should so train his men at the outset that in order to keep his field-book clean, it may not be necessary for him to handle the chain while at work, but he must observe that the leader of the chain always holds the arrow denoting the measurement upon the ground perpendicularly, and in a right line with the object of direction, otherwise the line will not measure the true total length between the stations. In our illustration this week the fences are shown by full lines, and the base lines are indicated by dotted lines. The lines from which offsets are to be measured, should pass near to or intersect the fences and boundaries. Straight fences or walls may be taken up by a process termed "sighting," which consists in taking offsets for plotting, to each end of their line of direction. In this case the position of the extremities must be very accurately determined by more than one measurement from the chain, as indicated by the triangulation off the base-line shown at the intersection of the fences marked J in fig. 8 of our last article (*Builder*, July 16th, p. 119), and in the measurements indicated by the lines off the base-lines A B and B C, to the out-buildings shown upon the accompanying plan. Wherever the slightest bend appears to exist in a boundary, an offset should be taken to it from the chain, in order to show the actual outline upon the plan, as indicated at the points marked E, F, G, and H, in fig. 8. The offsets are measured from either side of each chain's length, simultaneously with the chaining of the base-line, while the chain lies between two arrows upon the base-line. So long as the total length of the chainage of a line is correct, it does not matter to the precise length of a link where the offset is taken, and therefore the chain is allowed to lie slack, but straight, without being kept tight, as it is impossible with the use of an ordinary scale to plot to single links. In chaining the line from station C to station A, if a lath is laid upon the line at 150 links, and another lath placed at the intersection of the hedge at 190 links, it will be unnecessary to re-set out this line when measuring the line D B, in order to determine, if desired, the intersection of the two diagonal lines, as the tape stretched from one lath to the other would cross the chain upon the line D B at 30 links from the first lath in the line C A, showing the intersection of the two tie-lines to be at 180 links from C. In continuing the measurement of a base-line through a hedge, the chain should, if possible, be pulled through, or if the hedge be too thick, as supposed to be the case at M in the line D B, the process illustrated by fig. 6 is adopted, care



FIGURE I

PLAN SHOWING BASE LINES



ing taken to place the two poles accurately line and vertical, chaining forward from the first, taking the distance between the poles, then the hedge, and then adding the measurement to E F, and placing the proper k at G to indicate the amount so determined for continuing the measurement to H. The magnetic bearing of one of the base lines which the relative position of the north of the survey is arrived at, may be taken with a theodolite which contains a compass, or with a prismatic compass. If the prismatic compass is used in the line A B reads  $34^{\circ}$ , as shown upon the plan, the bearing can be plotted with a protractor, as shown in fig. 8, allowance being made for the deviation of the true north from the magnetic north (see *Builder*, Feb. 5th, 1887). If the prismatic compass be held on the line C A, and viewed in the direction from C to A it would read  $242^{\circ}$ . We refer our readers to the *Builder*, dated January 1st, p. 203, for explanation of the prismatic compass, and to the *Builder*, dated March 1st, p. 370, for explanation of the construction of a theodolite.

## RECENT PATENTS.

## ABSTRACTS OF SPECIFICATIONS.

10,384, Improved Door Lock. G. Nobes.

The subject of this patent is a slam lock for single swing doors. The end of the bolt which is nearest the door-frame is made cylindrical in shape, the nozzle is of a semi-globular or rounded form. The part of the bolt inside the lock-case is rectangular in form, and it is controlled by springs. Its invention is chiefly designed as a mortise lock, but guide-pins are therefore fitted to a detachable screw screwed to the back end of the case.

10,683, Checking Workmen's Time. P. Perret.

This invention relates to an apparatus combined with a clock or other suitable mechanism and printing or stamping mechanism so arranged that the workman on entering his employment, by pushing pulling a drawer or slide, obtains a card or ticket which the date is stamped, or the time or particulars of his work.

10,453, Improvements in Flushing Cisterns. B. Evered.

This invention refers to a syphon, the long leg of which extends below the bottom of the tank; the short leg is enlarged at its extremity, and has a finger working in it. The plunger is pivoted on a pin. When the tank is full of water, and the finger is near the bottom end of the short leg of the syphon, the latter is also nearly full of water. The upward movement of the plunger lifts the water lying above the same, and causes it to flow over the bend of the syphon, whereby the latter is emptied. The flow continues until the water reaches the level of the short leg of the syphon, the valve the plunger permitting the free passage of the water.

5,762, Improvements in Saws. S. Taylor.

The object of this invention is to construct an improved saw, which can be used in positions where it is inconvenient to get in the hand of the user, or where it is a skirting, or in the case of a plug saw in the wall, and which requires to be cut off with the wall, or in similar positions where the use of the hand is limited. The handle of the saw is made with a hinged joint, which can be used in any position, and fixed there by a bolt. Sometimes the blade of the saw is hinged for a similar purpose.

6,283, Bricks, &c. A. Murray.

With the object of giving to bricks, mouldings, &c., a sharply-defined edge, a thin shaving of clay proposed by this invention to be taken off after the goods are dried. It is also claimed that the process improves the colour of the bricks.

## NEW APPLICATIONS FOR PATENTS.

July 8.—9,618, S. Washington, Compound for painting or varnishing ironwork.—9,622, J. Jones, concrete Pavements, Floors, &c.—9,627, F. Pilkington, Fireproofing Columns, Stanchions, Girders, Sillings, Walls, Floors, &c.—9,635, J. Lindley, Improved Door Latches.

July 9.—9,666, W. and N. Haigh, Flooring compound.

July 11.—9,694, F. Stokes, Manufacture and setting of Cement.—9,695, W. Wise, Windows.—16, J. Hirschfeld, Fastenings for Doors.

July 12.—9,757, J. Turner, Explosive Alarm for Protection of Doors, Windows, &c.—9,769, W. Weston, Water-tap.—9,783, A. Beyer and C. Mott, Camp for Flooring and other Woodwork.—9,800, R. Boulton, Window-fasteners.—9,817, O. Murray, Material for Covering Walls, &c.

July 13.—9,846, F. Bishop, Fastening Windows.

July 14.—9,888, J. Savage, Fastening Windows, Doors, Cements, and Doors.—9,908, H. Henry, Chimney-cap.

## PROVISIONAL SPECIFICATIONS ACCEPTED.

7,571, J. Tuckett and G. Foster, Mortise Lock.—8,563, W. Bradley and Others, Floor Cramp, Lifting Jack, &c.—8,765, E. Emanuel, Finishing and Trapping Overflows to Water-closets.—9,039, F. Naumann, Faced Bricks.—9,140, S. Hazelaed, Wood Planing Machines.—8,266, W. Cliff and B. Peto, Brick or Building Block.—9,034, R. Whiston, Combined Sash Lift and Automatic Sash Fastener.—9,036, W. Dennison, Water Waste Preventing Cisterns.—9,452, W. Goulten, Sliding Window Sashes.

## COMPLETE SPECIFICATIONS ACCEPTED.

## Open to Opposition for Two Months.

11,280, T. Easley, Attaching Door Knobs to Spindles.—11,502, G. and S. Jennings, Water-closets.—11,809, W. Wright, Regulating Water Waste Preventer.—14,837, H. Bromhead, Skylight or Fanlight Opener.—479, J. Shaw, Gullies and Sinks.—8,023, C. Webb, Automatic Dry Closet.—8,383, B. Roull, Plates or Panels for Decorative Purposes.—11,247, B. B. Ludwig, Decoration of Wood, &c.—12,099, E. Gillis, Ventilator for Rooms fitted with Sash Windows.—8,445, G. Goodhue, Timber Structures for Mines.—7,251, H. Lake, Fastener for Window Sashes, Casements, &c.—8,559, H. Lake, Opening and Closing Windows.

## RECENT SALES OF PROPERTY.

## ESTATE EXCHANGE REPORT.

JULY 11.

By WALKER & RUNTZ (by Tender).  
Old Kent-road—Peckham Birkbeck Schools, area 64,900 ft. freehold..... £4,500

By J. WILCOX.  
Notting-hill—6 to 9, Bolton-mews, 66 years, ground-rent 16l..... 450

By NORMAN & SON.  
Keston-road—12, Mableton-place, 19 years, ground-rent 25l..... 60

By CHINMOCK, GALSORTHY, & CO.  
Putney-hill—The Grange, 78 years, ground-rent 37l..... 2,750

North Kensington—15, Wornington-road, 88 years, ground-rent 7l 10s..... 275

138 to 142, Wornington-road, 89 years, ground-rent 15l..... 563

Notting-hill—92 and 94, Bramley-road, and 28 to 31 odd, Blechyden-road, 77 years, ground-rent 40l..... 500

Tottenham, Northumberland Park—The Limes, freehold..... 740

By E. RICHARDS & CO.  
Wandsworth-common, St. James's-road—Hampton Villa, freehold..... 1,030

By DEREHAM, TAYSON, & CO.  
Bethnal-green—Freehold ground-rent of 90l a year, reversion in 8 years..... 5,000

Chester-square—104, Ebury street and stabling, 35 years, ground-rent 12l..... 2,550

By H. RUTLEY.  
Hampstead-road—12, Rutland-street, 39 years, ground-rent 5l 5s..... 670

Regent's Park—3, Albert-street, 39 years, ground-rent 4l 10s..... 525

Sandbury, Llanover-road—Montague Cottage, freehold..... 385

Six plots of freehold land..... 170

JULY 13.

By R. A. NOTLEY.  
Mile End—73 and 75, Harford-street, 21 years, ground-rent 5l..... 280

By M. MILES.  
Holborn—The Red Lion and Ball public-house, freehold..... 3,770

By W. R. SMITH.  
Drury-lane—23, Maclean-street, freehold..... 4,970

By HOBSON, RICHARDS, & CO.  
Dalston—171, Queen's-road, 33 years, ground-rent 4l 10s..... 305

Hackney—Improved ground-rent of 22l, term 5 years..... 85

Brixton-hill—An improved ground-rent of 176l 1s, term 4 years..... 401

By W. HALL.  
North Kensington—112, Wornington-road, 87 years, ground-rent 7l 10s..... 300

Ealing—6, Oxford-road, 76 years, ground-rent 7l..... 250

16, Oxford-road, 76 years, ground-rent 7l..... 350

JULY 14.

Lewisham—29, Wistaria-road, 80 years, ground-rent 4l..... 220

By BRADLE & CO.  
Enfield—The residence, Fir Tree House, and 2a, 3r, 32p, freehold..... 2,800

Silver-street—A plot of freehold land..... 370

Churchbury-lane—A block of freehold land, 2a, 2r, 26p..... 1,600

Silver-street—Detached freehold residence..... 1,300

By DEREHAM, TAYSON, & CO.  
Horton—The Unicorn public-house, and 1 to 6, Land of Promise, freehold..... 2,680

By C. C. & T. M. MOORE.  
Mile End—18, Hawkins-street, 13 years, ground-rent 2l 8s..... 115

Poplar—4 and 6, Pennyfields, and 61 and 63, West India Dock, 9 years, ground-rent 31l 10s..... 128

61 and 63, Pennyfields, copyhold..... 253

Woodford Wells, Morningside-road—A plot of copyhold land..... 221

By FAREBROTHER, ELLIS, & CO.  
Stanmore, Middlesex—The mansion called Canons, the residences, North Lodge and South Lodge, in all 44a, 1r, 4p..... 40,000

A plot of freehold land, 0a, 2r, 14p..... 165

Stone Grove House, Stone Grove Lodge, and Stone Grove Cottage, freehold..... £2,540

Ground-rent of 7l, reversion in 35 years..... 670

Strand—No. 205, Carr's Tavern, freehold..... 3,900

Finsbury—67, Cambridge-street, 39 years, ground-rent 12l 12s, with short reversion..... 900

Strand—No. 285, Angel and San public-house, 3 years, ground-rent 16l 8s, 6d..... 200

By E. SIMSON.  
New Cross-road—Nos. 189 and 191, Edward-street West, 70 years, ground-rent 19l, and a ground-rent of 9l 10s, same term..... 420

Lewisham—10, 11, and 15, Terrard-street, 76 years, ground-rent 7l 10s..... 750

Peckham—1, 3, and 3, Alfred-place, freehold..... 310

Camberwell—141, Grove-lane, 36 years, ground-rent 18l 10s..... 110

By ELIAS & SON.  
Islington—20, Theberton-street, 31 years, ground-rent 8l..... 405

By D. WATWAY & SONS.  
Wandsworth—33, West-hill, freehold..... 1,060

4, 8, and 8, Putney Bridge-road, 20 years, ground-rent 5l..... 285

1 and 2, Adelaide-cottages, 60 years, ground-rent..... 200

Crawley, Sussex—The residence called Deerwood, and 32a, 2r, 27p, freehold..... 3,850

Freehold cottage, and 5a, 2r, 28p..... 600

An enclosure of freehold land, 4a, 3r, 3p..... 205

By DYER, SON, & HUTTON (on the Premises).  
Blackheath—62, Vanbrugh Park, 74 years, ground-rent 8l 3s..... 600

JULY 15.

By MURRELL & SCOBELL.  
Gray's Inn-road—Nos. 59 and 71, and 6 and 7, North Mews, freehold..... 3,540

Homerton—No. 2, St. John's Church-road, freehold..... 446

21, College-avenue, freehold..... 345

By B. RARD.  
Oxford-street, 51, Castle-street, 33 years, ground-rent 50l..... 500

Regent's Park—31, Upper Baker-street, 14 years, ground-rent 8l 6s..... 560

An improved ground-rent of 25l 4s, term 14 years..... 223

By C. R. CROSS.  
Uxbridge-road—1 to 5, Blomfield-pavement, 69 years, ground-rent 70l..... 3,945

Shepherd's Bush-road—No. 8, freehold..... 570

By BAKER & SONS.  
Kensington—Six freehold houses called Bellina Villa..... 3,900

Kensington, Edwardes-terrace—Profit rentals of 363l 6s, term 23 years..... 4,160

Ealing—The freehold residence Castlebar Court, and 4a, 1r, 3p..... 2,210

By W. & F. HOGGARTH.  
Stoke Newington—100, Farleigh-road, 77 years, ground-rent 8l..... 545

Walthamstow, Granville-road—Yew Villa, freehold..... 210

The Copeland Arms beerhouse, freehold..... 970

Grove-road—Two plots of freehold land..... 180

Leyton—1 to 6, Capworth villa, freehold..... 1,100

Besant-road—Two freehold houses and plot of land..... 310

7, High-street, freehold..... 300

Manor Park—1, 4, and 5, Carlyle-terrace, freehold..... 750

## MEETINGS.

THURSDAY, JULY 26.

Glasgow Architectural Association—Visit to the Commercial Bank, Buchanan-street, 515 p.m.

SATURDAY, JULY 30.

Architectural Association—Visit to Streatham Churches. (See Advt. on p. xiv.)

Liverpool Engineering Society—Visit to the Forth Bridge Works, at Queensferry. Train from Lime-street Station, Liverpool, at 2 p.m.

## Miscellaneous.

**Liverpool Engineering Society.**—On Saturday last the members of this Society visited the Park Extension of the Mersey Railway, the Wirral Railway Works, and the Bidston Observatory. Arriving at Birkenhead at about 2.15 p.m., the party were met by Mr. E. S. Wilcox, the resident engineer of the Mersey Railway, who conducted them by way of Market-street and Beckwith-street to the site of the New Park Station, pointing out on the way the damage sustained by subsidence to the buildings along the route of the tunnel. From the Park Station the party proceeded to inspect the work underground, after which, under the guidance of Mr. R. Freebairn, the Wirral Railway Works were examined, much interest being taken in the working of the "steam navy" in the cutting. The members having visited the railway works then proceeded to the Observatory at Bidston, when Mr. Hartnup gave an interesting description of the various instruments for obtaining the daily records of the atmospheric changes, and also exhibited diagrams showing the wind pressures and barometric changes experienced during some of the more severe storms that had visited the district.

**Lifts.**—We have received a letter from Messrs. Archibald Smith & Stevens in reply to Mr. Gibson's last letter, but cannot spare space to continue the discussion.



**Opening of New Public Baths at Balham.** The extensive building operations and consequent increase of population at Balham during the last three or four years has led to the erection of new public baths, which were formally opened on Thursday. The site of the baths is on the east side of the Balham main high road, not far from the London and Brighton railway station. The building has a frontage 43 ft. in length, with a depth of 240 ft., the structure thus covering a ground area of about 10,400 ft. The elevation is 50 ft. in height, and contains four floors, having an arched central entrance 10 ft. in width, leading to the private and swimming baths in the rear. Those portions of the ground-floor on each side of the central entrance are intended to be let off as shops. The frontage is faced with red Suffolk brick, the windows of the several floors having red gauged brick arches. Immediately over the central entrance to the baths there is an ornamental oriel window at the first floor. The walls of the entrance are faced with enamelled brick in varied colours, and the floor is laid with encaustic tiles. About midway along the entrance corridor, on each side, are the men's and women's private baths and dressing-rooms, and beyond these is the public swimming-bath, 100 ft. in length, and 30 ft. in width, with platforms on each side, and upwards of forty dressing-boxes. The walls of the bath, which is 6 ft. in depth at one end, and 3 ft. 6 in. at the opposite end, are faced with white enamelled brick. At the extreme rear is a boiler-house and laundry, in connexion with the baths. The roof of the swimming bath, which has a lantern light, rests on ornamental iron girders. During the winter months the swimming bath is intended to be utilised as a public hall, for meetings, lectures, and entertainments of a miscellaneous character. Mr. J. Dickson, of Battersea, is the architect, and the building has been erected by the owner's workmen, under the superintendence of Mr. Alfred Wallis, as foreman.

**Composition of Antique Metals.**—The well-known Paris chemist, M. Berthelot, has recently made some discoveries on the above subject, which are considered to have both scientific and historical importance. M. Place discovered in 1854, under the ruins of the palace of King Sargon, a stone coffin containing several metal plates covered with cuneiform inscriptions, recording the erection of the building (B.C. 760); the fact being likewise recorded that three of the tablets were respectively of gold, silver, and copper, while the fourth was composed of various substances. M. Berthelot's researches (described in the *Illustrirte Zeitung für Blech Industrie*) confirm the correctness of the inscriptions as to the first two plates, but the third he found to be bronze instead of copper, containing 85 parts of copper to 10 of tin. The fourth plate was found to consist of crystallised magnesium limestone (carbonate of magnesium), a very rare mineral, unknown to scientific men at the commencement of the present century. Some fragments from Tello were likewise analysed by M. Berthelot, with the result that a vase was found to be composed of pure antimony, which metal has always been regarded as unknown to the ancients and as having been discovered only in the fifteenth century. Tello has been deserted since the time of the Parthians, so that the remains of the oldest Chaldean culture are found there. Virohow has also recorded the discovery of antimony ornaments in a Trans-Caucasian necropolis. A statuette was found by M. Berthelot to be of pure copper.

**Sale of Property.**—The sale of Canons, in Middlesex, described in our columns of June 25 last, was effected at the Mart on Thursday last. Sir J. W. Ellis was auctioneer. The house and grounds of about 460 acres were bought for 40,000l. Other lots of 65 acres and 38 acres were sold for 7,000l. and 5,400l. respectively. The whole nine lots, comprising all the estate, realised 55,300l.

**The Tay and Forth Bridges.**—Referring to the account given in our last (p. 116) of the Tay Bridge, Mr. Joseph Hamblet, of West Bromwich, writes to say that the blue bricks mentioned were supplied by him, and also that he is now supplying all that are being used in the construction of the Forth Bridge.

**Total Destruction by Fire of a Swedish Town.**—The town of Luleå, in the North of Sweden, was recently entirely destroyed by fire. The church, the Town-hall, as well as other public buildings, were burnt down.

## PRICES CURRENT OF MATERIALS.

TIMBER.		£. s. d.	£. s. d.
Greenheart, B.G.	ton	5 10 0	7 10 0
Teak, B.I.	load	8 0 0	12 0 0
Sesqui, U.S.	load	0 2 3	0 3 0
Ash, Canada	load	3 0 0	4 10 0
Birch	load	2 0 0	3 10 0
Elm	load	3 10 0	4 10 0
Fir, Danisco, &c.	load	1 10 0	4 0 0
Oak	load	2 10 0	4 10 0
Canada	load	3 0 0	6 0 0
Pine, Canada red	load	2 0 0	3 10 0
" yellow	load	2 10 0	4 10 0
Lath, Danisco	fathom	3 0 0	6 0 0
St. Petersburg	load	4 0 0	5 10 0
Wainscot, Riga	log	0 0 0	0 0 0
Odessa, crown	log	2 10 0	3 0 0
Deals, Finland, 2nd and 1st	std. 100	7 0 0	8 0 0
" 4th and 3rd	std. 100	5 10 0	6 10 0
Riga	std. 100	6 10 0	7 0 0
St. Petersburg, 1st yellow	std. 100	8 0 0	13 0 0
2nd	std. 100	7 0 0	8 0 0
Swedish	std. 100	6 10 0	8 10 0
White Sea	std. 100	0 0 0	0 0 0
Canada, Pine, 1st	std. 100	16 0 0	24 0 0
" 2nd	std. 100	10 0 0	16 0 0
" 3rd, &c.	std. 100	8 0 0	9 0 0
Spruce, 1st	std. 100	8 0 0	9 0 0
" 3rd and 2nd	std. 100	5 0 0	7 0 0
New Brunswick	std. 100	5 0 0	6 10 0
Battens, all kinds	std. 100	4 0 0	10 10 0
Flooring Boards, sq., 1 in. prepared, First	std. 100	0 8 0	0 11 0
Second	std. 100	0 6 0	0 7 6
Other qualities	std. 100	0 4 0	0 6 0
Cedar, Cuba	std. 100	0 0 32	0 0 34
Honduras, &c.	std. 100	0 0 3	0 0 34
Australian	std. 100	0 0 2	0 0 8
Mahogany, Cuba	std. 100	0 0 4	0 0 7
St. Domingo, cargo average	std. 100	0 0 4	0 0 6
Mahogany, Mexican, cargo av.	std. 100	0 0 34	0 0 6
Tobacco	std. 100	0 0 2	0 0 64
Honduras	std. 100	0 0 33	0 0 64
Maple, Bird's-eye	std. 100	0 0 5	0 0 6
Rosa, Rio	std. 100	8 0 0	11 0 0
Bat.	std. 100	7 0 0	9 0 0

## TIMBER (continued).

	£. s. d.	£. s. d.
Box, Turkey	ton	4 0 0
Sawn, St. Domingo	ton	0 0 0
Puerto Rico	ton	0 0 0
Walnut, Italian	ton	0 0 34

## METALS.

Iron—Bar, Welsh, in London	ton	4 7 6	4 16 0
" in Wales	ton	4 2 6	4 7 0
Staffordshire, London	ton	8 10 0	8 0 0
Sheets, single, in London	ton	6 16 0	6 10 0
Hoops	ton	8 0 0	8 0 0
Nail-roads	ton	5 15 0	7 10 0

## COPPER.

British, cake and ingot	ton	43 0 0	44 0 0
Best selected	ton	44 10 0	45 0 0
Sheets, strong	ton	39 15 0	42 8 0
Chili, bars	ton	0 0 0	0 0 0
Yellow Metal	lb.	0 0 0	0 0 0

## LEAD.

Pig, Spanish	ton	11 16 8	0 0 0
English, common brands	ton	12 0 0	0 0 0
Sheet, English	ton	13 1 3	13 6 8

## SPECIAL.

Silesian, special	ton	14 12 6	14 12 6
Ordinary brands	ton	14 10 0	14 12 6

## TIN.

Straits	ton	103 17 6	0 0 0
English ingots	ton	104 10 0	0 0 0
English sheet	ton	107 0 0	0 0 0

## ZINC.

English sheet	ton	0 0 0	0 0 0
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## OILS.

Linseed	ton	21 7 6	22 12 8
Cocanut, Cochín	ton	24 0 0	0 0 0
Palm, Lagos	ton	21 0 0	0 0 0
Rapeseed, English pale	ton	23 10 0	0 0 0
" brown	ton	22 0 0	0 0 0
Cottonseed, refined	ton	21 0 0	21 10 0
Tallow and Oleine	ton	25 0 0	45 0 0
Lubricating, U.S.	ton	6 0 0	6 0 0
" refined	ton	6 0 0	13 0 0

## TURBINE.

American, in casks	cwt.	1 6 0	0 0 0
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## TAR.

Stockholm	barrel	0 14 0	0 14 6
Archangel	barrel	0 9 6	0 10 0

## COMPETITIONS, CONTRACTS, &amp; PUBLIC APPOINTMENTS.

Extrale of Advertisements in this Number.

## COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Laying-out Property, Isle of Man	.....	35l. and 15l.	Not stated	ii.

## CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Detached Infirmary, Llandaff	Draper's Company	C. Reilly	July 25th	ii.
Thames Ballast, Sand, and Cement	Paddington Vestry	Official	July 27th	ii.
Wooden Blocks for Paving	do.	do.	do.	ii.
Painting, Alterations, &c.	Wandsworth & Clapham Un	do.	do.	ii.
Painting Works	Brighton Town Council	P. C. Lockwood	July 25th	ii.
Construction of Railway (Bosston to Batley)	Great Northern Ry. Co.	J. Fraser & Sons	July 29th	ii.
Alterations to London Bridge Station	L. B. & S. C. Ry. Co.	F. D. Banister	July 30th	ix.
Enlargement of Parcel P. O., Ewter	Com. of H. M. Works.	Official	August 2nd	ix.
Kerbing, Draining, and Making-up Land	W. Dawson	J. A. Cossins	do.	ii.
Public Offices, Free Library, &c.	Darlington U. S. A.	F. H. Tulloch	do.	ii.
Tarpaving, Kerbing, and Channelling	Southend Local Board.	Official	do.	ii.
Making and Sewering Road	Bromley U. S. A.	do.	August 3rd	ix.
Paving Footways, &c.	Greenwich Bd. of Wks.	do.	do.	ix.
York Paving Stone	do.	do.	do.	ix.
Alterations to Mortuary	Met. Asylums Board	A. & C. Harston	August 8th	ix.
Sea Water Works, Storm Outfall, &c.	Bournemouth Councils	G. Andrews	do.	ix.
Construction of Railway, Redbury	Great Western Ry. Co.	Official	August 9th	ix.
Sewerage Works	E. Grinstead Local Bd.	E. S. Gordon	August 15th	ix.
Cast-Iron Water Mains, Sluice Valves, &c.	Wakefield U. R. S. A.	A. Fawcett	August 22nd	ix.
Dining-Hall, &c.	Gurdians, St. Matthew, Bethnal Green	A. & C. Harston	August 23rd	ix.
Painting, Limewhiting, &c., Birmingham	War Department	Official	Not stated	ix.
Public Hall, Isleworth	do.	S. Woodbridge, Junior	do.	ix.

## PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
District Surveyor, Plumstead	Met. Board of Works	Not stated	July 27th	xiv.

## TENDERS.

ABERTILLERY.—For alterations to Commercial Inn, Abertillery. Mr. T. Clarkson Waking, architect, Merthyr.	2176 0 0
T. Foster, Abercromby	144 4 0
W. Smith, Abertillery	128 0 0
J. Williams, Merthyr (accepted)	95 0 0
E. Miles, Abercromby	95 0 0
BETHNAL GREEN.—For pointing chimneys and repairs to roof, Bethnal-green Workhouse. Messrs. Tison and Wm. Stone, architects, 2, Great Winchester street.	2235 0 0
Steel Bros.	208 0 0
Thomson	183 0 0
Dabb	190 0 0
Salt	143 10 0
Knight	143 10 0
Edwards (accepted)	136 0 0
BEDFORD.—For building new school-room and removing old gallery (less allowance for old materials), for the Baptist Chapel, Bedford. Mr. F. T. Mercer, architect, Bedford.	5362 18 10
Laughton	5362 18 10
Watson & Walker	532 14 4
Coleman & Fisher	544 0 0
Whiting	543 0 0
Harrison	540 10 0
White	529 0 0
Warwick & Osborn	491 0 0
Melcombe Bros.	485 5 0
BURLEIGH.—For re-slating roof and general repairs to floors at the Burleigh Parish Church Schools.	2141 0 0
W. Cooke	138 0 0
A. Hall	138 0 0
W. Bennett	138 0 0
G. C. Dunn	120 18 0
G. & J. W. Carter (accepted)	112 0 0
A. Ward	110 0 0



**CHELSEA.**—For painting and other works at the Chelsea Infirmary, for the Guardians of Chelsea. Messrs. A. & C. Harston, architects, 15, Leadenhall-street. Quantities not supplied:—  
 H. J. Bond & Co. .... £738 0 0  
 W. F. Croxford ..... 644 2 6  
 Woolford & Son ..... 573 6 0  
 B. Bryon ..... 485 0 0  
 W. Eades ..... 425 0 0  
 A. W. Derby ..... 373 0 0  
 R. Proctor ..... 350 0 0  
 W. Wythe ..... 335 10 0  
 Newton & Ide, The Chase, Clapham (accepted) ..... 270 0 0

**CROYDON.**—For alterations and additions to Oak Crest, Park Hill-rise. Mr. T. Heygate Vernon, architect, 21, Abingdon-street, Westminster:—  
 E. Costar, Croydon ..... £250 0 0  
 E. Triggs, Clapham ..... 248 0 0  
 H. Inch, Addiscombe ..... 235 0 0  
 Smith & Bulled, Croydon ..... 229 0 0  
 Maides & Harper, Croydon ..... 223 0 0

**DOWLAIS.**—For erecting shop and house for Mr. Charnart, Dowlais. Mr. T. Clarkson Wakeling, architect, Merthyr:—  
 R. Lloyd, Cefn, near Merthyr ..... £290 0 0  
 E. Jones & Dowlais ..... 270 0 0  
 E. Lumley, Caerphilly, Merthyr ..... 275 0 0  
 J. Jones, Merthyr (accepted) ..... 280 0 0

**FAIRFIELD.**—For the erection of a house in the Fairfield-road, Fairfield, for Mr. Conlon Leachy. Mr. Charles Jones, architect, 161, Ebury-street, S.W.:—  
 H. Brown, Fairfield ..... £285 0 0  
 G. N. Street, Battersea (accepted) ..... 490 0 0

**EASTBOURNE.**—For the erection of new Infirmary at Eastbourne. Mr. Fredk. G. Cooke, A.M.C.E., architect, Trinity-chambers, Eastbourne. Quantities by Mr. J. Stanger, 21, Finsbury-pavement, London:—  
 Faulkner, London ..... £7,498 0 0  
 J. T. Chappell, London ..... 7,348 0 0  
 J. Peckles, Eastbourne ..... 7,129 0 0  
 Robson, Eastbourne ..... 6,749 0 0  
 Cornfort, Northam ..... 6,733 0 0  
 J. Longley, Crawley ..... 6,653 0 0  
 E. Cornish & Son, Eastbourne ..... 6,600 0 0  
 Peters, Horsham ..... 6,595 0 0  
 Holloway, Deptford ..... 6,590 0 0  
 Newman & Hart, Eastbourne ..... 6,576 10 8  
 M. Mansel, Eastbourne ..... 6,425 0 0  
 C. Tomkinson, Eastbourne ..... 6,375 0 0  
 J. Wood, Eastbourne ..... 6,334 0 0  
 Dore & Sons, Eastbourne ..... 6,123 0 0  
 J. Martin, Eastbourne (accepted) ..... 5,993 0 0

**EASTBOURNE.**—For additions to house, St. Leonard's-road, for Mr. J. Bedford Foster. Mr. Fredk. G. Cooke, architect, Newmarket:—  
 Dore & Sons ..... £420 0 0  
 M. Martin ..... 394 10 0  
 E. Cornwell ..... 387 7 6  
 Backhurst ..... 207 16 6

**EXNING (Suffolk).**—For re-erecting part of St. Martin's Church, Exning, Suffolk. Mr. John Flatman, architect, Newmarket:—  
 Simpson & Son ..... £295 0 0  
 Smith ..... 285 0 0  
 Linnell ..... 280 0 0  
 Hunt & Blythe ..... 248 10 0  
 Saint & Son ..... 227 0 0  
 Kerridge & Shaw ..... 185 0 0  
 Hook & Tebbitt ..... 175 10 0  
 Cowell & Son (accepted) ..... 135 0 0

**FINSBURY.**—For enclosing, levelling, draining, and re-erecting playgrounds and for playgrounds at Hurdell-street School, for the School Board for London. Mr. T. J. Bailey, architect:—  
 Cowley & Drake ..... £445 0 0  
 G. S. Kirkland & Son ..... 443 0 0  
 T. Bendon ..... 340 0 0  
 Recommended by the Works Committee for acceptance.

**HAMMERSMITH.**—For fittings, London and South Western Bn. Hammersmith. Messrs. Thos. and Wm. tone, architects, 3, Great Winchester-street:—  
 Bryan, Norwood ..... £628 0 0  
 Bright ..... 484 15 0  
 Gregar (accepted) ..... 457 0 0

**HAMPSTEAD.**—For building villa residence and conservatory in Fainton-road, West Hampstead, for Mr. F. Mathieson. Mr. G. H. Greenback, architect, 61, Moor-at-street:—  

	House.	Conservatory.
Nightingale	£1,846	£266 0 0
L. H. & R. Roberts	1,873	62 0 0
Mattcock Bros.	1,555	64 0 0
J. Grover & Sons*	1,544	64 0 0

 \* Accepted.

**HAMPSTEAD.**—For making new road, constructing sewer, gullies, &c., for the Agincourt Park Estate. Mr. G. Salter, architect and surveyor, 166, Osulton-street:—  
 C. Killingback, Camden-road (accepted) ..... £1,050 0 0

**HIGHAM (Hsex).**—For the erection of a cottage for Mr. Thomas S. Furniss. Mr. W. H. Atkin Berry, 35, Bedford-row, architect:—  
 Saunders & Son, Dedham (accepted) £365 0 0

**HORNSEY.**—For works in connexion with new roads, for the Hornsey Local Board. Mr. T. de Courcy Meade, engineer and surveyor:—

	Weston Park (Western Portion).	Birchington-road (Southern Portion).
Trickett & Son, Millbank	£1,970 0 0	£428 0 0
Pizzey, Hornsey	1,728 0 0	400 0 0
Adams, Finsbury	1,728 0 0	398 0 0
Bloomfield, Tottenham	1,680 0 0	384 0 0
Dunmore, Crouch End	1,672 0 0	438 0 0
Mowlem & Co., Westminster	1,596 0 0	394 0 0

 \* Accepted.

**ILFORD.**—For building a dwelling-house, stabling, and cow-shed, &c., for Mr. J. T. G. Price. Mr. P. Watkins, architect:—  
 Scrivenor & Co. .... £1,505 0 0  
 Holmes & Son ..... 1,365 0 0  
 W. Watson\* ..... 1,245 0 0  
 C. Barnes ..... 1,194 0 0  
 \* Accepted in part, for stabling and cow-shed, &c.

**ILFORD.**—For building a dwelling-house in Barkings-lane, for Mr. A. Hawkins. Mr. P. Watkins, architect:—  
 W. Watson ..... £565 0 0  
 H. Dyer & Sons (accepted) ..... 417 0 0  
 J. Bussell ..... 350 0 0

**KEW-GREEN (Surrey).**—For new Queen's Schools and offices, Kew-green, Surrey, for the Rev. W. H. Bliss, M.A., and Committee. Mr. Edwin Doby, architect. Quantities supplied by Mr. T. Marcus Houghton, Imperial-buildings, Ludgate-circus:—  
 Shillito & Son, Byrd-street ..... £3,650 0 0  
 Staines & Son ..... 2,894 0 0  
 W. Rhodes ..... 2,860 0 0  
 Newton & Ide ..... 2,843 0 0  
 Kirk Bros. & Co. .... 2,789 0 0  
 H. Knight ..... 2,745 0 0  
 Gould & Brand ..... 2,740 0 0  
 Kilby & Gayford ..... 2,738 0 0  
 Flett & Co. .... 2,730 0 0  
 D. Brown & Co. .... 2,690 0 0  
 Oldrey & Co. .... 2,687 0 0  
 Howall & Son ..... 2,646 0 0  
 B. B. Blashy ..... 2,644 0 0  
 F. & H. F. Higgs ..... 2,580 0 0  
 Puzey & Lumley (withdrawn) ..... 2,270 0 0  
 \* Error in cast, should have been 2,735.

**LAMBETH.**—For the enlargement of the Shillington-school (West Lambeth Bn.) by 400 places, for the School Board for London. Mr. T. J. Bailey, architect:—  
 King Bros. & Co. .... £6,049 0 0  
 W. Oldrey & Co. .... 5,311 0 0  
 J. Holloway ..... 5,084 0 0  
 C. W. Waller ..... 5,045 0 0  
 H. L. Holloway ..... 5,045 0 0  
 W. Johnson ..... 5,030 0 0  
 Stimpson & Co.\* ..... 4,994 0 0  
 \* Recommended by the Works Committee for acceptance.

**LONDON.**—For alterations and additions to the Tankard public-house, Kensington-road, for Mr. German. Messrs. Furniss & Thorpe, architects:—  
 Spencer & Co. .... £3,650 0 0  
 Manby ..... 3,594 0 0  
 Mills ..... 3,580 0 0  
 Scrivenor & Co. .... 3,529 0 0  
 Burman & Son ..... 3,468 0 0  
 Volter ..... 3,479 0 0  
 Gould & Brand ..... 3,389 0 0  
 Anley ..... 3,287 0 0  
 Jones ..... 3,209 0 0  
 J. Beale (accepted) ..... 2,900 0 0

**LONDON.**—For additions to billiard-room for the Committee of the Constitutional Club, West Norwood. Mr. J. Watt, A.R.I.B.A., architect, 19, York-buildings, Adelphi, W.C. Quantities supplied by Messrs. T. Marcus Houghton and Robert Henry Kerr, Imperial-buildings, Ludgate-circus, E.C.:—  
 Watson ..... £598 0 0  
 Puzey & Lumley ..... 552 0 0  
 Deacon & Co. .... 520 0 0  
 Hitchcock, Gipsy-hill, S.E.\* ..... 485 0 0  
 \* Accepted, subject to a reduction.

**LONDON.**—For painter's work at the St. John's Tavern, Junction-road, Upper Holloway, for Mr. L. Ascott. Mr. H. J. Newton, architect, 17, Queen Anne's-gate, Westminster:—  
 Edwards ..... £114 0 0  
 Saunders & Son ..... 108 0 0  
 Hellings ..... 97 10 0  
 Heath (accepted) ..... 97 0 0  
 For Gasfiter's Work.  
 Winn (accepted) ..... 159 0 0

**LONDON.**—For alteration of business premises in Walworth-road, for Mr. Litchfield Binckes:—  
 Kennard Bros., Lewisham (accepted) £700 0 0

**LONDON.**—For pulling down and rebuilding Long's Hotel, Bond-street, and Oldford-street, W., for Mr. E. Lebb. The building to be completed by May 1st, 1888. Mr. W. G. Bartlett, architect. Quantities by Messrs. Stinson & Sons:—

	A* £	B* £	C* £
Stimpson & Co. ....	31,984	—	—
S. G. Bird ..... 31,786	—	—	—
Colls & Sons ..... 31,642	—	—	—
Wall Bros. ....	31,350	431	1,327
Chappell ..... 31,158	—	—	—
Higgs & Hill ..... 29,980	—	—	1,000
Mansley ..... 29,927	—	—	750
Nightingale ..... 28,946	—	150	628
Corder ..... 28,895	—	200	300
Simpson & Sons ..... 28,120	—	—	—
Boyce ..... 27,640	—	143	250
Holland & Hannen ..... 27,681	—	150	245
Peto Bros. .... 27,498	—	—	—
Bywater ..... 27,356	—	203	556
Patman & Fotheringham ..... 26,943	—	900	400
Green & Lee ..... 26,691	—	150	400
Kirk & Randall ..... 26,440	—	600	358

 A\* Add if executed in less time.  
 B\* Deduct brickwork in mortar in lieu of cement.  
 C\* Deduct if plastering is executed in lime and hair in lieu of cement.

**LONDON.**—For new story to No. 11, Upper Brook-street, Park-lane (Grosvenor Estate). Mr. Mark H. Judge, architect, 5, Park Place-villas, W.:—  
 B.  
 Parkinson & Sons ..... £474  
 H. Salter Stephens ..... 447  
 W. King & Son (accepted) ..... 411

**LUTON.**—For alterations and additions to premises in Upper George-street, for Mr. C. Dillingham. Mr. W. J. Pearson, architect, Market-hill, Luton:—  
 Parkins ..... £385 0 0  
 Morgan & Evans, Postypool ..... 4,918 10 0  
 D. C. Jones & Co., Gloucester ..... 4,692 0 0  
 T. Foster, Abergavenny ..... 4,425 0 0  
 T. Rees, Merthyr Vale ..... 4,240 1 11  
 J. Williams, Keighton ..... 4,202 1 0  
 C. Burton, Cardiff ..... 4,180 14 5  
 T. Walkin & Jenkins, Swansea ..... 4,074 2 6  
 Shepard & Son, Cardiff ..... 3,787 13 6  
 Stephens & Eastow, Bristol ..... 3,740 0 0  
 E. Thomas, Neath ..... 3,524 15 0  
 Turner & Sons, Cardiff ..... 3,444 2 4  
 D. Jenkins, Merthyr ..... 3,380 0 0  
 J. Williams, Castle-street, Merthyr ..... 3,330 8 0  
 J. Jones, Glynant, Merthyr ..... 3,328 10 0  
 W. Bowers & Co., Hereford\* ..... 3,289 2 6  
 J. Gabe, Merthyr ..... 2,807 3 0  
 [All of Luton.]

**MERTHYR.**—For erecting the Merthyr General Hospital. Mr. T. Clarkson Wakeling, architect, Merthyr. Quantities supplied by the architect:—  
 E. Morgan, Tredegar ..... £5,101 7 71  
 Morgan & Evans, Postypool ..... 4,918 10 0  
 D. C. Jones & Co., Gloucester ..... 4,692 0 0  
 T. Foster, Abergavenny ..... 4,425 0 0  
 T. Rees, Merthyr Vale ..... 4,240 1 11  
 J. Williams, Keighton ..... 4,202 1 0  
 C. Burton, Cardiff ..... 4,180 14 5  
 T. Walkin & Jenkins, Swansea ..... 4,074 2 6  
 Shepard & Son, Cardiff ..... 3,787 13 6  
 Stephens & Eastow, Bristol ..... 3,740 0 0  
 E. Thomas, Neath ..... 3,524 15 0  
 Turner & Sons, Cardiff ..... 3,444 2 4  
 D. Jenkins, Merthyr ..... 3,380 0 0  
 J. Williams, Castle-street, Merthyr ..... 3,330 8 0  
 J. Jones, Glynant, Merthyr ..... 3,328 10 0  
 W. Bowers & Co., Hereford\* ..... 3,289 2 6  
 J. Gabe, Merthyr ..... 2,807 3 0  
 \* Accepted.

**MILLWALL.**—For the erection of new Wesleyan Chapel and School-room, &c., at the corner of Alpharoad and Charles-street, for the Trustees, Mr. James F. Wesley, architect, 277, Romford-road, Forest-gate:—  
 J. H. Johnson ..... £1,627 0 0  
 J. Curcove ..... 1,617 0 0  
 J. Holland ..... 1,499 0 0  
 F. Walker ..... 1,483 0 0  
 J. Walker ..... 1,396 0 0  
 G. Linn (accepted) ..... 1,350 0 0

**NEWMARKET.**—For new house and shop for Mr. Peachy, Newmarket. Mr. Jno. Flatman, architect, Newmarket:—  
 Blyth & Hunt ..... £210 0 0  
 Cowell & Son ..... 900 0 0  
 Kidman ..... 889 0 0  
 Hook & Tebbitt ..... 852 0 0  
 Linnell (accepted) ..... 836 0 0

**NORBITON.**—For the erection of additional stabling, for Messrs. Carter, Paterson, & Co., under the superintendence of Mr. William Eves, 10, Union-court, Old Broad-street, E.C.:—  
 Johnson ..... £719 0 0  
 Godfrey ..... 694 0 0  
 Stubbs ..... 684 0 0  
 Page ..... 655 0 0  
 Holland ..... 650 0 0  
 Harris & Wardrop ..... 624 0 0  
 Dobbs ..... 619 0 0  
 F. & F. H. Higgs, Station Works, Loughborough Junction (accepted) 698 0 0

**PADDINGTON.**—For the erection of laundry and receiving wards at the Workhouse, Harrow-road, for the Guardians of Paddington. Messrs. A. & C. Harston, architects, 15, Leadenhall-street. Quantities supplied:—  
 J. H. Johnson ..... £4,880 0 0  
 H. Ingram ..... 4,812 0 0  
 D. Brown & Co. .... 4,300 0 0  
 W. Johnson ..... 4,160 0 0  
 Leslie & Knight, No. 31, St. Mary Abbot's-terrace, Kensington-road (accepted) ..... 3,873 0 0

**PONTMORLAIS.**—For erecting seven shops and houses. Mr. T. Clarkson Wakeling, architect, Merthyr. Quantities by the architect:—  
 T. Foster, Abergavenny ..... £2,650 0 0  
 D. C. Jones, Gloucester ..... 2,384 0 0  
 I. Davis, Merthyr ..... 2,185 0 0  
 J. Jones, Glynant, Merthyr ..... 2,175 0 0  
 J. Williams, Castle-street, Merthyr ..... 2,076 0 0  
 W. Bowers & Co., Hereford\* ..... 2,100 0 0  
 \* Accepted.

**RHYMEY.**—For erecting public hall at Rhymey. Mr. T. Clarkson Wakeling, architect, Merthyr:—  
 T. Rees, Merthyr Vale ..... £1,376 0 0  
 D. Davis, Tredegar ..... 1,490 0 0  
 D. C. Jones, Gloucester ..... 1,245 0 0  
 T. Edwards, Tredegar ..... 1,200 0 0  
 T. Foster, Abergavenny ..... 1,185 0 0  
 R. Lloyd, Cefn, near Merthyr ..... 1,150 0 0  
 J. Williams, Castle-street, Merthyr (accepted) ..... 1,017 0 0

**SEVENOAKS.**—For the levelling, kerbing, and channeling of St. John's-road, and for other works, for the Sevenoaks Local Board. Mr. Jabez Mann, Town Surveyor:—  
 Mowlem & Co., Westminster ..... £805 2 2  
 J. Clarke, Thornton Heath ..... 723 3 3  
 G. Osenton, Erith ..... 674 0 0  
 H. Owen, Sevenoaks\* ..... 672 3 0  
 \* Accepted, as per schedule of prices.  
 [Surveyor's estimate, 638.]

**SOUTHWARK.**—For erecting a new house for the Schoolkeeper of the Hatfield-street School (Southwark A.), and for utilising the space occupied by his present rooms as additional accommodation for 54 infants; and, further, for providing covered playgrounds for the school, for the School Board for London. Mr. T. J. Bailey, architect:—  
 King Bros. & Co. .... £1,185 0 0  
 J. Mills ..... 1,165 0 0  
 W. Downs ..... 1,136 0 0  
 Altherton & Laith, ..... 1,119 0 0  
 W. A. Rhodes ..... 1,043 0 0  
 Locks & Hooker ..... 1,035 0 0  
 F. & F. H. Higgs ..... 1,023 0 0  
 H. L. Holloway ..... 994 0 0  
 S. J. Jerrard ..... 990 0 0  
 W. Johnson ..... 970 0 0  
 J. Holloway\* ..... 960 0 0  
 \* Recommended by the Works Committee for acceptance.



**SOUTHWARK.**—For the erection of a cookery centre on the Galleywall-road site (Southwark A.F.), for the School Board for London. Mr. T. J. Bailey, architect.—

J. W. Roy .....	£454 0 9
H. L. Holloway .....	398 0 0
W. Johnson .....	345 0 0

\* Recommended by the Works Committee for acceptance.

**STOKE-ON-TRENT.**—For erecting two semi-detached cottages at Wolstanton, Stoke-on-Trent, for Mr. A. Boulton.—

W. Grant .....	£250 0 0
J. Windsor .....	528 0 0
J. Bowden .....	480 0 0
W. Cooke (accepted) .....	434 0 0

**STOKE-ON-TRENT.**—For erecting six houses at Basford, Stoke-on-Trent, for Mr. W. W. Dobson.—

T. Godwin .....	£1,700 0 0
W. Cooke .....	880 0 0
J. J. Longdon (accepted) .....	875 0 0

**STOKE-ON-TRENT.**—For additions to the Bowling Green Inn, Bucknall, Stoke-on-Trent.—

T. Godwin .....	£225 0 0
W. Cooke .....	197 18 0
J. J. Longdon (accepted) .....	172 5 0

**TREDEGAR.**—For the erection of a drill-hall at Tredegar. Mr. T. Clarkson Wakling, architect.—

W. Leonard, Tredegar .....	£1,253 0 0
T. Edwards, Tredegar .....	1,010 0 0
T. Foster, Abergavenny .....	990 0 0
R. Lloyd, Cefn, near Merthyr .....	990 0 0
E. Morgan, Tredegar (accepted) .....	900 0 0
D. Morgan, Tredegar .....	880 0 0
J. Williams, Merthyr .....	808 4 8

**WALTHAM ABBEY (Essex).**—For the erection of a pair of semi-detached villas in the Sewardstone-road, Waltham Abbey, Essex, for Mr. C. H. Colvin. Mr. John Hudson, architect, 80, Leaman-street, E.C.—

W. Gardner, Waltham Abbey .....	£1,650 0 0
W. Gladding, Mile End, E.C. ....	1,398 0 0
L. & W. D. Patman, Kufield, N. ....	1,298 0 0
J. Bentley, Waltham Abbey* .....	1,282 0 0

\* Accepted.

\* **SPECIAL NOTICE.**—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than 12 Noon on THURSDAYS.

#### TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

C. H.—G. H.—G. W. N. (not within our scope).—W. C.—G. L. J.—J. C. W.—A. B. Oldham (Architects are not permitted to describe their own works as "of exquisite beauty," &c. in anonymous paragraphs forwarded for publication. We are very glad to have descriptions by architects of works carried out by them, but such descriptions must be confined to statements of fact.—T. S.—"Cathedral" (no examination is necessary at present).—R. H. R.—W. C. (should have sent amount).—R. F. (ditto).—C. Ross & Co. (see answer to W. C.—E. C. C. too late).

All statements of facts, lists of tenders, &c. must be accompanied by the names and addresses of the sender, not necessarily for publication. We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

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Registered Telegraphic Address, "THE BUILDER, LONDON."

THE INDEX and TITLE-PAGE for Volume LII (Jan. to June, 1887) was given as a Supplement with the Number for July 5.

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**SPECIAL.**—ALTERATIONS IN STANDING ADVERTISEMENTS OR ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY MORNINGS.

The Publisher cannot be responsible for DRAWINGS TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder," may have Replies addressed to the Office, 46, Catherine-street, Covent Garden, W.C., free of charge. Letters will be forwarded if addressed as above, and sent, together with sufficient stamps to cover the postage.

AN EDITION Printed on THIN PAPER, for FOREIGN CIRCULATION, is issued every week.

**MAP OF LONDON,** showing Boundaries of Surveyors' Districts, into which the City is divided, with the numbers of January 1st, 8th, 15th, and 22nd, if sent to the Office direct, or through any Newsgirl, can be MOUNTED on the following Terms, &c.—

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N.B.—In the case of "Strainers," if packed for rail or carrier, 1s. 3d. extra.

\* \* \* Omissions discovered since publication will be corrected before mounting.

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"THE BUILDER" is supplied direct from the Office to residents in any part of the United Kingdom at the rate of 12s. per annum.

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PICTOR & SONS, Box, Wilts. [ADVTE.]

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**Douling Free Stone** For prices, &c., address S. & J. STAPLE, HAM HILL STONE, Quarry Owners, Stone and Lime Merchants, Stoke-under-Ham, (Ground or Lump), Ilminster. [ADVTE.]

**Asphalte.**—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 88, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and mill-rooms, granaries, tun-rooms, and terraces. [ADVTE.]

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6 and 8, Hatton Garden.

GLASGOW:  
Petershill-road.

CYLINDERS FOR HOT-WATER CIRCULATION

# The Builder.

VOL. LIII. No. 2321

SATURDAY, JULY 30, 1887.

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### Historic Towns: Oxford.\*



THE history of Oxford is an extensive subject, and Mr. Boase must have found the 217 pages of his book none too many to render even moderate notice of many a weighty event, which in fairness to its importance demanded longer reference. Each of the pages before us is well filled, and the author does not take for granted that the reader is already conversant with the subject, which has been, to some extent, the case with the previous publications in this series. On the contrary, every point not likely to be known or understood by general readers is explained as we go along, even where the explanation may be of value only to one in fifty.

The history of Oxford is different from that of any of the other towns which have been already dealt with in this series, and it has been selected on account of its difference. While London stands as of right foremost as the capital of the country, and with a history in like manner different from that of other towns; while Exeter is remarkable for maintaining its existence unbroken in the midst of an agricultural country; and Bristol, on the other hand, shows what trade and enterprise have done for it; Oxford history indicates a state of things unlike any of them. The University of Oxford is the cause of this difference, and it is curious to trace in the book before us how completely the University has transformed the ordinary market town.

"The University of Oxford," says Mr. J. R. Green, "is so far from being older than the city that Oxford had already seen five centuries of borough life before a student appeared in its streets. The University found it a busy, prosperous borough, and reduced it to a cluster of lodging-houses. It found it among the first of English municipalities, and it so utterly crushed its freedom that the recovery of some of the commonest rights of self-government has only been brought about by recent Legislation." Not the least interesting portion of the book is the narration of the gradual encroachments of the power of the Universities upon that of the municipality, and we shall have occasion again to refer to the subject; but it is satisfactory to think that the principal victory over the latter was at a comparatively late period.

Mr. Boase does not treat of the architectural history of Oxford. Indeed, considering the importance of the buildings and of their artistic value, it is not a little remarkable that he has made so readable a book with such meagre reference to the chief glories of the city. There is ample compensation in the pages before us, but architectural readers will not find much. The archaeology of the city, in like manner, is only dwelt upon cursorily, as it arises in the narration of its history. No reference at all is made to the recent discoveries made during the erection of the new Examination Schools, which clearly indicate the existence of a pre-historic settlement at Oxford. The site was found to be covered with the remains of a hut village, the pits of the houses being excavated in the stiff bed of gravel which overlies the clay. They were so close together that the gravel was only left in some places as walls between hovel and hovel. There were beaten floors, with traces of fire.

These discoveries, so important in respect to the early history of the city, do not appear to have been followed up, or to have been investigated as minutely as they deserved. Still, they are amply sufficient to indicate that in pre-historic times the site of Oxford was known and occupied. The prosecution of further researches in this direction must be left to future times, and they will be materially helped from the circumstance that investigators will know what to look for, and where. The adjoining sites to the erected portion of the Examination Schools are as likely to be covered with traces of the settlement as the comparatively limited area which was examined.

The legends about Alfred "have been analysed so thoroughly by Mr. Parker that the work will not need doing again." In consequence, the history in the book before us opens with the year 912, when King Eadward took to himself Lundenbyrg and Oxenford, on the death of Æthelred, ealdorman of the Mercians, who had held the valley of the Thames, on the banks of which Oxford had risen. The importance of the place at this, apparently, the earliest authentic date recorded in history, is shown by its being "coupled with London as necessary to secure the obedience of Mercia, or Middle England"; and it is conjectured, with probability, that it was one of the places fortified by the "English" about this time, to guard the rivers which acted so well as the main arteries of communication from point to point, and by which the Danes penetrated into the heart of the country.

The streams of the Thames upland converge near Oxford, and in their windings their channels often pass through marshy and reedy clays, affording no sure bottom. Fords had to be sought for not merely at a place where there

was shallow water, but where there was either hard gravel or rock to afford a secure road. Such a state of things exists at Oxford, "not only at Folly Bridge, but also near Hincksey and Binsey." The derivation of the name of Oxford, which exists to this day, is obtained easily from the passage of oxen across the river. There are many similar derivations in England of Saxon origin, and Heortford,—the ford of harts,—is cited as a cognate instance, and these are accepted as matters of course. They are, however, open to the inquiry as to why there should only be harts in one place and oxen in another; and we are inclined to receive this class of ready definition with a certain amount of doubt. Still, some accidental circumstance or use of the site for the passage of oxen may have started the name; and does not the city shield display an ox in full field passing over a stream wavy, to this day, and what more ought there to be to gain-say the sceptic?

We may well assent to the suggestions made as to the condition of things at Oxford at the date which affords so good a starting-point. Its situation in relation to the stream made it almost a natural stronghold, "since it only needed to dig out a ditch on the northern side, somewhere near the line afterwards occupied by the northern wall," "to make the gravel ridge between the Thames and Cherwell into an island, protected by the many streams into which the rivers divide." "The earth thrown up from the ditch would provide material for the mound." The formation of the castle mound in Saxon times is thus, we think, correctly, suggested, and the plan of the town shows how completely its early site provided for the castle to be the head of the surrounding fortifications. Still, the low-lying position of the site of Oxford is peculiar to itself, and it is different in this respect to that of the three other towns of this series of volumes, although they are all of prehistoric origin.

As at Exeter, so here at Oxford, the evidence of numismatics plays an important part in the early history of the town, and thence we learn that there was a mint here, and that it issued coins of Alfred, Athelstan, Edmund, Canut, Harold, and others. A glimpse of still earlier times is afforded by the dedications of the churches, evidences which always demand attention, which have been much neglected, but which, in the future, must be taken into consideration. The names are almost all early ones; and two of them are those of Celtic saints,—St. Aldate and St. Budoc; "but we have no further help towards inferring any previous Celtic influence on the place." The relation of the Mercian kings with the Celts, or Romano-Britains as we prefer to call them, and the conversion of

\* Historic Towns. Edited by Ed. A. Freeman, D.C.L., and Rev. Wm. Hunt, M.A. Oxford: by C. W. Boase, Fellow of Exeter College. London: Longmans, 1887.



Mercia by Celtic missionaries, is plainly stated. It follows as an easy consequence that the earliest of the churches would be called after Celtic saints of repute, as readily as does the name of an old church,—Danesbourne,—point to a later Danish, and St. Frideswide and St. Mildred to a Saxon, element. At Oxford, as in the other towns which we have already passed in review, we find evidences of the existence in early times of a numerous group of churches. Of these, Domesday Book mentions four, incidentally as usual, when they are connected with the ownership of property. They are St. Mary, St. Michael, St. Ebbe, and St. Peter. From the cathedrals of Abingdon and other adjacent religious houses we obtain four more, St. Martin, St. George, St. Mary Magdalen, and St. Frideswide. This is not even a complete list, since a charter, ascribed to Henry I., in mentioning all the churches in which St. Frideswide held rights, names All Saints, St. Mildred, St. Peter-in-the-Castle, St. Michael, St. Aldate, St. Michael-at-South Gate, St. Edward, the Chapel of the Holy Trinity over East Gate, and St. Clement. These are seventeen in number, and they are shown to have been in existence very soon after the Conquest.

We are presented with interesting details, from Domesday Book, of the number of houses in the town, for the use of whose inhabitants this large number of churches was devoted, and we find that there were, before the Conquest, 721 houses. At the time of the survey there were, however, only 243 houses inside and out the wall that paid geld, and 478 unoccupied and ruined.

With so many empty houses, it is hardly likely that very many new churches would be founded during the early days of Norman rule, and we may therefore safely conclude that, at any rate, almost the whole of the seventeen churches named as existing *temp.* Henry I. were of Saxon or earlier foundation. We have arrived at similar conclusions, but on other local circumstances, with respect to the foundations of the remarkable groups of early churches of London, Exeter, and Bristol. The positions of some of these churches in relation to the four gates of the town are as curious as at London or Bristol. Thus, the two St. Michael's were by the north and south gates, the two St. Peter's by the east and west. St. Clement's, like St. Ewan's, in London, and others elsewhere, stood in the middle of the road, and St. George's was within the castle. One of the few architectural notices in the book relates to the tower of St. Michael's, and this, from its relation to the gate, is stated, as has been stated before, to be part of the town wall, and a tower for its defence serving as well for the church. We can but differ from these views. The tower is Saxon and not Norman, and it bears relation to the church in a way so like an ordinary tower to its church that its position with regard to the line of the wall may be taken as but an accidental circumstance; and beyond saying that the tower might serve for defence on an emergency, we see no reason for the belief that it was ever a portion of any other structure. In addition, we have no evidence that the early walls of Oxford were of stone. Had they been so, and even in early Norman times, it is reasonable to inquire why they should require such complete renewal as has been the case wherever they remain for us to examine them.

The town is laid out with its two principal roads meeting at right angles at a Carfax, where one of the churches is placed. The others about either upon the High-street at fairly equal distances, or are arranged more evenly than is the case in other towns in line to the left and to the right of the central High-street. Be the foundation of the churches of Saxon date or not, we find no evidence in the pages before us of the foundation of any other parish churches during the whole of the Medieval period. On the contrary, they become reduced in number instead of being increased. Religious houses, abbeys, and friaries were founded, but not parish churches.

Some of the most curious references of the first chapter are those to the presence of Jews in the town, which are ably summed up as

follows:—"But the Jews did more for Oxford than lend money or build stone houses, for with the Jewish settlement began the cultivation of physical science. Some students could learn Hebrew, and the Hebrew books which he found among the Rabbis were the means by which Roger Bacon penetrated to the older world of research." "A medical school which we find established in the twelfth century can hardly have been other than Jewish, and in the operation for the stone, which one of the stories in the 'Miracles of St. Frideswide' preserves for us, we trace the traditional surgery still common in the East." "At last, in 1290, Edward I. banished all Jews from the kingdom, and the expulsion was carried out with peculiar atrocity. Their return after nearly 400 years was due to the tolerance of Cromwell."

The keeping of lions, leopards, strange spotted beasts, and such like animals, within the park of Woodstock by Henry I. is pleasantly told, and the prosaic but doubtless true opinion is hazarded, that the leprosy of the Middle Ages, dire scourge as it was, was owing merely to the unclean mode of living, to men eating salt meat half the year, and having next to no vegetables. The Fellows of Oriel used to go to St. Bartholomew's Hospital on Ascension Day, hear a service, and then walk to a well,—Hickwell,—and sing hymns. Wax candles were offered at St. Edmund's Well until the practice was stopped by the Bishop of Lincoln in 1304. These are curious survivals of well-worship, and their notice is followed by reference to some aids to faith formerly at the hospital,—to wit, Edward the Confessor's comb, the bones of St. Stephen, and one of the ribs of St. Andrew. There are interesting references to the rise and progress of the corporate power,—as yet there were no colleges,—and to the existence of many guilds, particularly to that of their guild merchant in the charter of Henry II. given before 1161, and a distinction is made between thrift guilds and those for trade, the former being considered the earlier. "Later on, class privileges became themselves oppressive, and a hindrance to the progress of society; but there is a time for everything." The charter distinctly lays down the principle that the merchant guild had the exclusive right of regulating trade, except in specified cases, which is conclusive as to what was the governing body within the town, so to speak, originally.

We find the Barbers' Company being incorporated in 1348, but not by either mayor or external authority, but by order of the Vice-Chancellor, and there is a curious case cited 1530-31 in a dispute between city and university,—one of many,—as to the alleged unlawful incorporation of the Taylors, which is of no little interest in the history of guilds.

The Cooks were incorporated in 1480, by the Chancellor, but at this date the power of the universities had greatly encroached on that of the mayor and corporation. By the charter of Richard, the Mayor of Oxford had the curious privilege of being butler at the coronation feast of the Kings of England, which means that he should "assist the Lord Mayor of London, who assisted the chief butler."

Some curious local references to the old names of the streets are of interest, and Kapeharm's Twychen is explained, as everything is explained, as meaning *twy cina*—in old English, a meeting of two ways, "twitten and twichel" are still used in some places to mean a narrow alley." Our readers will be interested to know that the inhabitants copied those of London in more ways than in their municipal privileges; as, for instance, after the burning of 1190, the artisans "now began to follow the example of London in using stone, at least for the party-walls between the wooden houses," whereas they had been of wood and straw, they began to build with stone and slate, being afterwards described as stone or tiled halls, while glazed hall was used to distinguish houses with glass windows. The wall of Oxford, as in so many other cities, had a continuous street all round the town, just within the wall, by which direct communication could be obtained, and to the four gates, which latter were not removed until

1771. Medieval Oxford is summed up as follows, and again we must say prosaic but truthful:—"If any enthusiastic person could wish himself back in Medieval Oxford, he would probably not find it very inviting. The artisan stepped out of his mud hovel into a muddy street." "The unpaved lanes had a gutter running down the centre, into which much was thrown from the windows." "There was an absence of all due means of cleanliness and health." "In the houses, the charcoal fire escaped through an opening in the roof." "Candles were dear, nearly twopence a pound; that is, two shillings of our money at least." "People rose at five; the dinner-hour was at ten; late in the afternoon they supped, and went to bed early." The statutes of Magdalen ordered all students to leave the hall, where they lingered because of the fire, at curfew time, except on saints' days. "The dining-halls were strewn with rushes, into which all sorts of nastiness were thrown, and after about a fortnight they became unendurable."

It is not a little singular that, while the power of the university has been so great and the value of the colleges so considerable, their beginnings are so obscure. The university grew up gradually, but it was not incorporated till kings and bishops thought good to recognise acknowledged facts. "*Universitas* means corporation." Paris University has no documents to show its existence earlier than 1250, and Oxford is even more deficient.

The chapter on "The University and the City" will be read by all with much interest, for it lucidly and briefly renders in a pleasant, chatty style, a very comprehensive account of the rise and progress of the colleges, and of their growth in power, until the town, or city, as it became, sank to a very secondary position. In Durham Hall was the first public library of Oxford. Bury, Bishop of Durham (1333-45), had found precious volumes in the noblest monasteries, "defiled and injured by mice and worms, and abandoned to moths," and these appear to have been here collected, although it is not said so. The staircases on the left, as you go through Worcester College, are the entrances to old Benedictine hostels, where the half-defaced arms of convents may still be traced, the custom having been for the various monasteries to send up about one in twenty of their numbers to study. At the time treated of, there were only separate schools at Oxford, and many of these appear to have been only of small size, lodgings for the students being found in private houses, and in inns or hostels,—"*The English and French words respectively for lodging-houses.*" Another name for them was "*entries.*" A hostel was a private house hired by a group of students for economy, and the senior among them, who was responsible for the rent and to the University for good conduct, "gradually came to be called Principal." Chaucer's "Poor Scholar," we are reminded, lodged with a carpenter who worked for the Abbot of Osney. The collegiate system had, however, begun as early as the reign of Henry III., for it was in 1274, that William de Merton transferred the scholars of Malden, Surrey, to a freehold at Oxford. His plan excluded the monastic influence altogether, for no friar or monk was to be admitted to the foundation. This was followed by other colleges, the first seven being styled the first group, and they were essentially *civil*, not *ecclesiastical*, the pupils or boarders being commoners at Oxford; pensioners, that is, payers, at Cambridge.

The chapter on the Renaissance and the Reformation treats of the founding of what is called the second group of colleges, in which reaction against the tenets of Wycliffe is shown. The Reformation times brought about the suppression of the monasteries, and several of these soon reappeared as new colleges. Indeed, this transformation had begun before the general dissolution; for, not to speak of Walsey's foundation out of some of the minor priories, we are reminded that Chichele had founded All Souls mainly out of the alien priories. The end of the long reign of Elizabeth is noteworthy in the history of Oxford for the



foundation of what must always remain one of its noblest institutions among so many,—the Bodleian Library.

There are not in this book many references to the information as to the aspect of old Oxford which are to be derived from old views and maps. Still there is notice of Ralph Agas's map, *temp.* Elizabeth, and there is a neat little reproduction of Hollar's charming and scarce map-view of the city, drawn in 1643, in his very best manner. In this pretty print we can see at a glance what Oxford was like when Charles I. made his head-quarters there, and when his standard was raised only to be blown down again,—an ill omen so often noted. The view shows the castle in its entirety, and its relation to the fortifications of the city is conspicuous. The momentous events relating to the king's stay, the erection of the fortifications, &c., are all told briefly, but sufficiently, and notice is taken of the stealing of the books of the college libraries by the Cavaliers. Antony Wood preserves record of many curious references to passing events in Oxford, of which our author has not been slow to avail himself, and thus we hear of the opening of the coffee-house by Jacob, a Jew, in 1650; of Christopher Wren; of newspapers and written news-letters; and many others of equal interest.

A charming chapter on Modern Oxford concludes the book, and the chapter itself concludes with a walk through the city of to-day, in which reader is led by author. "And when he comes back in the evening, just after nine, the visitor will hear Great Tom ring out 101 times in honour of the old number of students. And should he wander through the city for a last look, he may be willing to allow that, far or near, he has seldom seen a fairer sight than that

'Sweet city, with her dreaming spires,'"

#### NOTES.

**T**HE Government Bill on the subject of technical instruction has just been issued, but we can scarcely expect it to become law this session. It is very doubtful if its provisions will be of much value when they do find their way into the Statute-Book. By Section 2 "any local authority may pass a resolution" that it is expedient that the elementary should be supplemented by technical instruction,—that is to say, whether a particular district is to be supplied with technical education is to depend on local option; therefore, there is no general scheme introduced by this Bill, but it is left to each locality to do as it sees fit. Technical instruction may be considered the necessary complement of elementary education, and it would be as reasonable to leave the elementary instruction to the caprice of a locality as the technical teaching. It has also to be borne in mind that by Section 4 the expenses "shall be defrayed out of the local rate," so that certainly there will be arrayed against the application of the Act all the diverse forces which make in favour of economy in local finance. In Section 8 it is laid down that the expression "technical instruction" means instruction in the branches of science and art with respect to which grants are, for the time being, made by the Department of Science and Art, or any other subject sanctioned by that Department. Thus this Bill gives no real definition of technical education. It may be a genuine or a nominal education. This is not the way in which a great country should endeavour to remedy its shortcomings. By such feeble efforts we are not likely to place the artisan of England on a level with those of Germany, or effectually help him in the keen industrial race. This attempt to introduce a system of technical instruction is indeed disappointing and feeble.

**T**HE fact that, as appears from the current report of the Controller-General of the Patent Office, the publications of that office are either, in whole or in part, presented to many institutions, seems to show that the plan might well be carried further. The possession of these papers by working men's clubs and insti-

tutes and similar bodies cannot fail oftentimes to be of great use to those who belong to these societies. In the same way, any papers or Blue Books which bear on technical matters, or on such points as are likely to be useful or instructive to artisans and others, should be presented to any club or institution which may apply to be placed on a free list. That the publications of the Patent Office are peculiarly interesting to nearly every one having to do with technical matters goes without saying. Over 12,000 persons applied for patents from England and Wales in 1886, and over 17,000 patents were applied for in that year. The study of the drawings and specifications which are now available, through the spread of the Patent Office publications, must therefore enormously tend to stimulate technical ingenuity, and keep up the standard of knowledge of many ingenious artisans.

**L**ORD STRATHEDEN and CAMPBELL'S proposed "Smoke Nuisance Abatement (Metropolis) Bill," even "as amended by the Select Committee," is a foolish affair, unscientifically worded, as may be seen from Clause 6, "The Metropolitan Board of Works may from time to time make, and when made alter and repeal by-laws for requiring any fire-place or furnace intended to be used in any building to be constructed after the passing of this Act to be so constructed as to consume or burn, as far as possible, all smoke arising therefrom." The saving clause, "as far as possible," has more point than Lord Stratheden and the Committee seem to be aware of. The object to be aimed at is not the "consuming" of smoke, which is practically a very difficult matter when smoke is once given off; it is the prevention of the formation of smoke by ensuring perfect combustion, which is by no means a very difficult problem. Every one who knows anything about the matter knows this; and yet here is an Act which has been solemnly sat over by a Special Committee, none of whom have apparently known how to state correctly and scientifically the object of their Bill. As to the practical effect of the Bill, we should be very glad to get rid of smoke; but it is necessary to enter a caution against what may prove another and equally serious public nuisance, viz., the licensed official interference with that sacred institution, the fireside. Any attempt to legislate against the community at large in the matter of smoke production can only be reasonably made in the interests of the community, and it is a question to be asked whether many of the community would not compound with a certain amount of smoke rather than be exposed to the annoyance and expense of having their household fires officially interfered with. There ought to be some definite attempt made to ascertain what is the public feeling on this point. There are, no doubt, a certain number who would support legislation on the subject, but many of these are mere *doctrinaires*,—people who are blockheads enough to think that putting an end to London smoke would put an end to London fog. Let them try. They will soon find their mistake, practically and definitively. It would, however, be very desirable to diminish London smoke if we could do so without a vexatious interference with private houses and their occupants, but it is absurd to propose to put dwelling-houses on the same footing in this matter as factories. The two cases, in their relation to public rights and public duties, are perfectly distinct.

**I**N considering canals and other waterways as competitors of the railways, it is generally assumed that, on account of the slow rate of speed on the former, the competition would be restricted to heavy traffic, such as stone, iron, and other raw material for manufacture, and export traffic of no particular urgency. Some time ago, however, as a protest against the high rates of carriage on fruit, a consignment was sent to London from the Kent district by water instead of by rail, a saving of 35 per cent. in freight being thus effected. It would appear that, notwithstanding the perishable nature of the traffic, and

the necessity for speedy transit, the result of the experiment was considered satisfactory, for it has been repeated this week, and it is asserted that the fruit arrived at its destination in better condition than when sent by rail. This fact, together with the energetic movements which have recently been made with a view to improving the canal system of the country, goes to show that the canals may prove far more formidable rivals to the railway companies than the latter have anticipated. Timely concessions on their part to the needs of depressed industries may perhaps avert the danger; though we believe the Kent fruit rates had been reduced,—those for hops from that district certainly were,—some months ago.

**T**HE discussion at the Council Meeting at the Guildhall on Thursday last week, as to whether the office of "City Architect" should or should not be continued on its old lines, is rather amusing reading. Mr. Sly, the Chairman of the Officers and Clerks' Committee, moved that the appointment should, in future, be designated "City Surveyor and Clerk of the City Works," with a salary of 800*l.* attached to it. It appeared, however, that this recommendation had only been adopted by the Committee in question by a casting-vote at a small meeting. Then ensued a curious discussion of the respective advantages of having an official architect, or of employing outside members of the profession. Major Joseph moved an amendment that the office of City Architect should be retained on its old lines, and went into figures to show that the retention of the office of Architect at the salary of 1,500*l.* would really be a saving. Major Joseph, however, spoke as if the only alternative would be putting up architectural works to competition, which is certainly not a necessary result. He went into some of those kind of comparisons which are proverbially said to be "odious," between the buildings which were the result of competitions, and those which had been erected under the superintendence of the late City Architect, in which he was thoroughly unjust to the architects of the City of London School, which is a very good building, while he much over-rated the late City Architect's markets. Mr. Beck supported the amendment in the same strain, apparently also thinking it necessary to vilipend all other architects who had done anything for the Corporation, in order to emphasise the superior ability of the late City Architect. Mr. Edmeston, who followed on the same side, knew better than to draw comparisons of this kind, but he said, with truth, that the Council were proposing to degrade one of the chief offices of the Corporation, and with no adequate reason. After a great deal more desultory talk the voting, curiously enough, was again a tie (61 to 61), and the Lord Mayor cast against the amendment, so as to allow of another being moved, and eventually an amendment was carried to refer the matter back to the Committee for further consideration and further returns and information. The truth about the subject seems to us to be that the Corporation will much better consult its own credit and dignity in continuing the office of City Architect on its former basis, and making it worth acceptance by an architect of high standing and cultivation, and that such a result will be best for the public and best for architecture, as an able man in that position may have an important influence on the architectural treatment of London sites and buildings; and on the whole it is for the interest of the architectural profession to see the office continued, for though the fact of the existence of a City Architect may prevent some works being thrown open to the profession generally, it is nevertheless for the credit and honour of the profession generally that it should be well represented on the Corporation staff.

**T**HE meeting of the shareholders of the Panama Canal Company, which took place on the 21st of July, appears to have been chiefly memorable for the presence of the Emperor of Brazil, in the character of a shareholder; a fact which has no material import-



ance as to any question of engineering or of finance. We defer remarks on the subject until the receipt of the *Bulletin du Canal Interocéanique* of the 1st of August, as the book-keeping of the company is not easy to understand from telegraphic summaries. Thus in the balance-sheet rendered on the 30th of June, 1886, in the "passif" or debtor side of the account, the liability for the three loans contracted in 1882, 1883, and 1884 is set down at 393,379,920 francs; whereas the obligations in respect of which that sum is acknowledged as received bind the company to repay the sum of 595,646,000,—which, therefore, is the real liability. Whatever may be the view entertained by the directors or shareholders as to the true method and audit of accounts, the outside public can hardly fail to be misled by such a statement. It is thus safer to wait for the sixth balance-sheet of the company, in order to compare it with the five preceding statements, than to reproduce the partial details sent by the telegraph. The next number of the *Bulletin* will, no doubt, contain the annual report as well as the accounts,—the latter, however, only down to the 30th of June, 1886.

THE papers read at the recent Conference of Architects on the subject of architectural education have been published in a neat pamphlet form,\* under the editorship of Mr. Arthur Cates, and form an interesting and valuable collection of opinions and information on the subject. A supplement is added, giving the programme of architectural studies at various Institutions in the United States, and at the Royal Academy of Arts, the École des Beaux Arts, and the "École Spéciale d'Architecture" in Paris.

WE have received a copy of the first annual address by the Chairman of Council of the Association of Public Sanitary Inspectors for the North-Western District of England, recently delivered at Liverpool by the Chairman, Mr. Albert Taylor. The general tenor of the address indicates that the new body of sanitary inspectors intend to adopt a high standard, and to take a serious view of the importance and responsibility of their office. In the course of his address Mr. Taylor urged that more and fuller power should be delegated to the sanitary inspector to enable him to carry on the duties imposed upon him in a speedy and simple manner, and that his position ought to be rendered more secure than it is,—that he should only be discharged or called upon to resign, "which are one and the same thing," in the event of misconduct or proved incompetency. This remark evidently points at the evil, of which we cannot ignore the existence, of the sanitary inspector being hampered in the execution of his duty by the necessity (if he would retain his post and its usefulness) of more or less considering the personal interests of those whom he serves, where those interests clash with his broader duty to the public. It is easy to say that the sanitary inspector ought to have no interests but those concerning his duty to the public; but it is placing a man in a very cruel and almost impracticable position if he is liable to be discharged or otherwise injured by making true and unbiassed reports on property in which his official employers may be interested; and we know very well that this dilemma is no imaginary one.

WE some time ago adverted† to a scheme of restoration, which had then been just commenced, of St. John's Church, Clerkenwell. We may here supplement our earlier accounts of the crypt, October 7, 1884, and July 1, 1876, by stating that during last week it was opened for inspection by visitors. The portions which have not been bricked up are the central aisle of five bays; one bay (east) of the northern aisle and two bays (east) of the southern aisle. These bays of the side aisles and three of the five central bays have pointed main arches; the remaining three bays, west of the central aisle, have round arches with massive square

archivolts or soffits. All the ribs spring from rounded columns, having square capitals, rising from a level of 32 in. above the earthen floor. The easternmost portion of the crypt lies beneath the vestry; and on the right of the entrance steps are two little chambers that are probably part of the original undercroft. This crypt, indeed, extended further westwards, the present church representing no more than the choir of the original fabric; but it is to be observed that its western wall, underneath the church steps, is very thick. A passage communicates from the furthest bay, which is vaulted in brickwork, of the middle aisle to the closed-in portion of the northern aisle. In these vaults are deposited various human remains, including those of "Scratching Fanny," whose ghost is said to have haunted the house in Cock-lane. Her coffin and its contents were once an object of vulgar show; they are described by J. W. Archer. The clock above the church's main doorway is a relic from the old church of St. James's, Clerkenwell.

THE rebuilding, now in progress, of the upper floor of No. 16, James-street, Haymarket, for Messrs. Hebbert & Co., army contractors, will considerably change the pristine aspect of their premises. The building formed one of the last of the remaining tennis-courts in the town, having been used as such until about twenty years ago. There is extant a view of the interior, with Randall and Turner sparring in the Fives-court,—engraved by T. Blake, 1825. This is, in all likelihood, the same court with that wherein Peppys saw King Charles II. at play, with a degree of dexterity which evoked his courtiers' willingly-bestowed applause. It is, perhaps, a survival of the Gaming-house, or "Shavers' Hall" which, erected temp. Charles I. by the gentleman barber to the Earl of Pembroke and Montgomery, Lord Chamberlain, is so often confused with its neighbour Piccadilly Hall. The latter stood on the northern side of Coventry-street, at the angle with Great Windmill-street. The upper floor, with its deep top-cornice, is to be replaced with two stories. The ground range of windows is quite modern. Over one of these windows, facing the southern end of Oxendon-street, but removed from its original position, is a finely ornamented plaque, which is inscribed "James Street, 1673." This tablet had been (as late as 1850) on the house between the Tennis-court and the "Barn," the still standing wooden premises then known as Busher's Coach Factory. A view of all three was published in 1886, by the now defunct Society for Photographing Relics of Old London, *et curis* Mr. Alfred Marks.

THE fourth fascicule of Dumont and Chaplain's "Les Céramiques de la Grèce Propre" has just appeared. As we have noticed the other issues from time to time we need only briefly to call attention to this volume, which contains both the faults and the merits of its predecessors. The two most valuable chapters are those on Corinthian vases and on the vases of the Greek colonies in Africa. A treatise that comes from France should be strong on Corinthian pottery, for the Louvre contains a unique series of inscribed vases of that type. To study these adequately has been hitherto no easy task. The Campana collection, which contains them, has no catalogue except the old original Italian one, a book possessed by a few private individuals, and rarely to be found in libraries. M. Polier is at work on a new catalogue, but he holds out no hopes of its appearance under two years. Meantime, in the present issue of the *Céramiques*, most of the important Louvre Corinthian vases are given with their inscriptions, and are thus made fairly accessible, if not to the general student, at least to the specialist. The chapter on the pottery of Africa deals, of course, with the new discoveries at Naukratis, and the editors acknowledge their obligations to Mr. Cecil Smith's monograph published by the Egypt Exploration Fund. The plates of the new volume include several Attic white *lekythos*, and also the curious and unique

*Locrian lekythos*, usually, though we believe wrongly, interpreted as the punishment of the Tyrrhenian pirates.

THE relief known as "the Apotheosis of Homer," in the Græco-Roman Gallery of the British Museum, is a monument almost too well known; we mean that the public is familiar with it in countless inexact reproductions, and that uncertainties in its interpretation have by long currency become canonical. Dr. Salomon Reinach (*"Gazette Archéologique,"* 1887, 5-6) does double service. He gives in plate 18 a beautiful and strictly faithful reproduction of the monument in a Dujardin Heliograph, and he suggests a new and we think very interesting interpretation of three of the figures. The paper should be read in detail. We have only space to note the chief points. From the inscriptions,—the form of which is now for the first time accurately published,—Dr. Reinach concludes:—1. That the letters were cut in Asia, probably in the neighbourhood of Smyrna; 2nd, that they date between 120-180 B.C. It is satisfactory to know that this coincides with Mr. Newton's opinion. Others have been inclined to date the monument as late as the time of Tiberius. As regards the interpretation, the tall commanding figure next to Zeus has always been called Melpomene. Dr. Reinach shows, we think, convincingly that she is Mnemosyne, goddess of memory, mother of all the Muses,—hence her superior height. The figure dancing down the slope, who seems to bear the message of the Apotheosis, he calls Calliope. If this be true she is a speaking monumental commentary on the "Descende coelo Calliope" of Horace. In the second rank of the relief there is a figure of smaller size standing within the cave with Apollo: she,—on the strength of a seeming patera held in the right-hand,—has been called the Pythian priestess. Dr. Reinach and Mr. Cecil Smith agree that the patera is no patera at all, but a roll, the common symbol of any and every Muse: hence she becomes a Muse, probably the now missing Melpomene. Dr. Reinach points out her analogy to a terra cotta recently found at Myrina, and now in the Louvre.

DR. A. MILCHHOEFFER thinks that he has discovered the site of the Sanctuary of Dionysos, in Icaria, and he writes to the *Berliner Philologische Wochenschrift* (No. 25), earnestly pleading that the subject may be taken up, and thorough excavation of the site be promptly made. From the inscriptions and fragments he had already, by the most superficial search, discovered, it seems likely that such an excavation would be richly rewarded. If his supposition be right, a double gain is registered. He has discovered an important early centre of the worship of Dionysos; second, he localises the deme of Icaria. Tradition says that King Icarus first received the wine god into Attica, and this scene of the reception of Dionysos is depicted in a number of marble reliefs, one of which is in the Græco-Roman Gallery of the British Museum. The story of the death of Icarus and of his ill-fated daughter Erigone are well known. Statius (*Theb.* xi., 644) says Icarus was slain "Marathonide sylva," and this agrees well with the site Professor Milchhoeffer has fixed on. Leake had already noted the same site as a likely one for the deme Icaria, and he was aware of the ruins of a church built to a large extent out of the ancient marble blocks which had previously served some other purpose. He also copied an inscription which had obviously belonged to some choragic monument. But what clinches Prof. Milchhoeffer's argument is his discovery of another inscription on a slab built into a doorway. It runs as follows:—

"Κηφισίος ἱερὰν (χοῦ) Ἱκαρίδος  
ἐνθάδεος ἀνέθηκεν τῇ Διονυσίᾳ."

"Kephisos, of the deme of Icaria, dedicated this votive offering to Dionysos." If Kephisos was an Icarian where should he dedicate his offering but in the local shrine?

AMONG the various new methods of lighting which are being brought forward at the

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† *Builder*, November 28, 1885.



present time, under the stimulus given to the subject by the development of electric lighting, the Ross Patent Lighting Company propose a system of oil lamps continuously fed from a main supply, instead of separate lamps which have to be charged afresh each time they are used. The system is, in fact, the gas-burner system with oil substituted, but under special and improved conditions. A cheap rock oil (5d. per gallon) is used, which in itself gives but a poor and smoky light, which is developed into a bright flame by a current of air mechanically poured into the flame through the burner. The supply of oil is by gravitation, from a tank fixed in any convenient situation outside (if possible) of the building, —at least outside of the living-rooms in which the light is burned, otherwise a certain degree of smell may cause annoyance: the oil is not an explosive or highly inflammable one, so that, with anything like ordinary care, there is no danger in its storage; and there is an efficient automatic check against over-supply to the burners. The air-current is supplied either by a small fan worked by a clock-weight, or, where water power can be easily applied, by a small organ-bellows worked by water. The latter, which was in use at the company's offices at the time of our visit, is quite noiseless, and the clock-work fan would probably be practically so; it could easily be placed where no noise could be heard from it. The system claims to give the same light as gas at half the lowest cost of gas for small installations, and a much greater proportionate reduction on large ones. To test this, it would be necessary to have comparative burners of the two lights supplying light at the same cost; that is the only practical way to make a comparison. In itself the light does not appear to us to be a very bright one in proportion to the extent of the flame, but it is unquestionably a very cheap one, and the principle of supplying a current of air to the flame is, of course, a perfectly scientific one, the efficacy of which has been long recognised in procuring complete combustion in furnaces. A piece of paper held as close over the flame as can be without setting it alight remains quite clean, showing a very perfect combustion, which gives it one great advantage over gas as a stationary system of lighting for dwellings. The flame is, as may be supposed from the way in which it is produced, perfectly steady. One advantage claimed in the prospectus, that the light is more sanitary than gas, because the air current is conducted to it from outside the building, and it "does not consume the air in the apartment," is a piece of claptrap to catch the ignorant, and had better be omitted. It is not the fact of the gas living on the air in the room that does harm: it is the discharge of the products of its combustion into the room, instead of carrying them away outside, that does the mischief. With this attended to, and proper means for the influx of fresh air, any flame burning in a room only acts in assisting and quickening ventilation; much more so, in fact, than when a special supply of air is led to the flame from outside.

IT is to be hoped that the two strong letters in the *Times* from Mr. Poynter and Mr. Horsley on the artistic demerits of the new coinage will at least have convinced the Chancellor of the Exchequer that some people know a little more about the design and modelling of coins than he does, and that the general dissatisfaction expressed with the coinage is not, as he seemed to suppose, a mere grumble without reasonable motives. Mr. Horsley supports Mr. Poynter's proposition in favour of a competition for the best designs; and if the competitors were judiciously selected and not too numerous, such a competition would probably bring out some good work and be of much interest. It would be necessary also, however, when a fine design was secured, to be sure that there were the means of having it properly carried out. In this respect, however, we are rather inclined to think that Mr. Poynter's observations on the execution are a little more severe than is called for. We have examined the crown-piece carefully in comparison with his remarks,

but it does not appear to us that the planes of the modelling are so entirely out as Mr. Poynter suggests: the head is not sunk below the plane of the cheek, nor is the crown standing out in advance of the cap rim,—as far as we can judge. The clumsy modelling of the nose, which, as Mr. Poynter says, ought to be the lowest part in relief (as furthest from the eye in a profile head), is indeed very obvious, and also the mistake in the cap, "which is sunk into the head instead of projecting from it." Altogether, the more one looks at the new coinage the poorer and more unworthy of the occasion it seems; and there is no need to exaggerate its defects.

#### THE KENT ARCHEOLOGICAL SOCIETY.

THE annual meeting of the Kent Archeological Society took place on Tuesday, the 19th, and Wednesday, the 20th, the old market town of Tonbridge having been selected as the place of assembly.

The weather on Tuesday was very fine and brilliant, and the programme being a fairly attractive one, there was a large attendance.

The meeting commenced for despatch of business at eleven o'clock. New members having been elected, and a goodly balance having been stated to be in hand, a move was made to Tonbridge Castle, which, with its beautiful grounds, was thrown open to the inspection of the party by its present owner, Mr. C. J. M. Wanton. The remains of the ancient building, now attached to a modern house, are very curious and interesting. They have, however, been difficult to make out, not only from their at present incomplete condition, but from their overgrown state. Fortunately, a well-prepared paper was published by the Society on the architectural arrangements, by Mr. J. F. Wadmore, and this was published in the sixteenth volume of "*Archæologia Cantiana*."

The castle has consisted of a lofty conical mound raised on a low-lying site, on which was erected in late Norman times a shell keep with large projecting buttresses, of which only a fragment or two remains. Walls of irregular oval plan, with deep ditches, enclosed the inner baillium, while an outer baillium was defined in like manner beyond it, the whole being connected with the town wall and ditch. The River Medway forms one of the boundaries of the site. Subsequently to the erection of the keep a large entrance tower was erected, and in this the best rooms were placed, there being a curious curtain wall carrying a passage of communication from it to the keep. Mr. Wadmore pointed out this unusual feature of the arrangements, and the Rev. Canon Scott-Robertson, the secretary, pointed out many of the most remarkable features of the ruin, one of which was the existence of some apertures in the sill of the window, once the inner arch of entrance. This window is in one of the best rooms, but the apertures were evidently for the descent of missiles on to the heads of an entering foe. An early date was claimed for the formation of the mound, for since Roman coins have been found upon it, it is stated to be as old as that people, if not of even earlier date. Tonbridge Church is a plain building, with a good early fourteenth-century western tower.

After the visitors left the Castle, a long line of carriages was formed, and the party proceeded to the fine old mansion, Penshurst Place, which, by the courtesy of Lord De l'Isle, was thrown open to the party. This charming house was reached after a drive through a very beautiful part of Kent, the grounds of Hall Place, Leigh, having been opened for the passage of the party by Mrs. Morley, while Mr. Hills, in like manner, permitted the party to pass through those of Redleaf. The brilliancy of the sunshine enabled Penshurst to be inspected with great advantage, and the party, having alighted, proceeded into the great hall, which remains almost exactly as it was originally built by Sir John de Pulteney in 1341. The Rev. Canon Scott-Robertson briefly described the history of the building, and the curious arms and armour on the walls; also the long old oak tables, which are probably as old as the hall. The party then ascended into the old withdrawing-room, built by Sir John, now used as a State dining-room. The walls are hung with interesting pictures. The room has been

restored of late years, in fact, to its original aspect, except that it is impossible to re-open the ancient windows. Beyond this is "Queen Elizabeth's Room," and then the picture-gallery. Afterwards many of the party descended to inspect the vaulted cellar, while others saw the exterior of the building, rich in its many colours of warm stonework and red brick mellow with lichens. The church was also inspected, as well as the curious fifteenth-century church-house and lych-gate. The carriages were then resumed, and on the return to Tonbridge, after dinner, an evening meeting was held, and the temporary museum in the New Science Buildings of Tonbridge School inspected. The museum contained a remarkable collection of old coins and ancient Greek pottery, lent for the occasion by Mr. J. W. Trist, F.S.A., and of sketches of old buildings in Kent by Mr. Wadmore.

Wednesday's proceedings were of no small interest, since a journey into the midst of the Weald of Kent was arranged for, the scenery being the most picturesque of its kind in the county, and the day being one of great beauty. The district is still so well wooded as to afford a good idea of the density of the forest which must have covered it in early times. Houses and cottages are few and far between, and the cultivated portions being to a great part covered with hops of more or less luxuriant growth, the appearance of the foliage of to-day is singularly befitting the old name. A long drive from Tonbridge brought the party to the quaint old town of Brenchley, which may be regarded as the capital of the Weald district. It is a town of ancient timber houses, of irregular size, with an open space in its midst, around which are grouped the few shops of the place, while the grey old church, which is partly behind the houses, presents its sturdy tower to make up as pretty a picture of English rural life as can well be found. Progress was made through the village to a remarkable old house called the Old Rectory, but in reality the mansion-house of the Fane family. It has a beautiful room, the walls of which are covered with quaint old panelling of Elizabethan date, in perfect condition, the work having survived the passage of time unimpaired. The house is approached by a quaint stone archway, of simple but very good detail. The old Workhouse, so called,—almost everything is old at Brenchley,—is a fine timber-framed mansion, the last house in the town, having a brick chimney of enormous size. The church is cruciform, with a massive western tower, all being of plain and simple work, extremely so when the large size of the building is taken into consideration. Its effect is in perfect harmony with its surroundings, and the building is a capital study of what may be done by simple forms when in good proportion. The church has a clearstory, as has the adjoining church of Horsmonden, although such a feature is less common in Kent than in some other counties. The whole has been restored under the direction of Mr. Jos. Clarke, F.S.A. There remains in the interior the base of what has been a very beautiful rood-screen of later date than the fall of Cardinal Wolsey, in whose time the church was given to his college, Christ Church, Oxford. There is also a monument to the memory of the lady who built the old rectory, who died in 1596, although the date is given as 1566 by a singular error of the engraver. She was a woman of many virtues; but then, if we may judge by the epitaphs of this period, there could have been no lack of very good people. The party quitted this most interesting village with no little regret, and not a few remarks were made that our landscape-painters and lovers of pictures of English rural life have too much neglected this charming district. Progress was then made for the church at Horsmonden, which stands in the midst of a village thoroughly Kentish in character. A merry peal of bells welcomed the party, and after a welcome from the Rev. H. F. Smith Marriott, the history of the building was briefly told by the Rev. Canon Scott-Robertson.

Horsmonden church has a sturdy tower at the west end, having a staircase turret at one angle, a common feature in the county. It has here the addition of an obtuse pinnacle, which is not common, and more quaint than beautiful. A remarkable feature within the building is the existence of what appears to be two rood-loft staircases, one in the wall of the south aisle, by which access would be obtained to the rood by a gallery over the parclose screen of the south aisle. The second



staircase is westward of this, one bay intervening. It is an all but exact counterpart of the other, there being to each an external octagonal projection and buttress. The explanation rendered was that while the most eastern were the roof-loft stairs, those to the west were for entrance to the *pulpitum*, as in some cathedral churches. There have been several altars along the south wall, as is evidenced by the existence of the piscinae. An external north porch of timber is remarkable for being of fourteenth-century date. The south porch screen is of great beauty.

A long drive brought the party to Scotney Castle, the village of Goudhurst perched on a high hill having been in view for many miles. Tempting as was its appearance, it was not visited. At Scotney the party was welcomed at the modern house by its owner, Mr. E. Hussey, and entrance afforded to the charming grounds of the mansion, the boundary of Kent and Sussex running through the estate. At the lowest level stand the ruins of Scotney Castle. This ancient fabric is little known, partly from its singularly sheltered and hidden position, surrounded by high hills on nearly all sides, and from its being within the grounds of a private mansion. It is surrounded by a wide moat of running water, which thus forms it into a little island, approached by a stone bridge, once defended by a barbican, now in ruins. The outer court, through which access is obtained, is itself almost surrounded by water. The castle, so far as the more ancient stonework is concerned, is of Edwardian date, one of the towers of circular plan being fairly perfect, and having massive corbels and arches forming a projecting parapet.

To the tower is attached a small Elizabethan house, in perfect condition, in which a recently-discovered secret chamber, covered by a sliding panel in the floor, attracted much attention. Beside this are the ruins of a seventeenth-century building, attributed, on slender grounds so far as appearance is concerned, to Inigo Jones. The plan and position are not unlike those of Leeds Castle. The modern mansion stands on high ground, and here refreshment was partaken of. The contrast of position between the house of to-day and that of former ages in a low-lying position, for the sake of water and shelter, was very remarkable. The grounds are of great beauty, and the adaptation of the quarry, from which stone for the house was dug, into an ornamental garden, has contributed not a little to the beauty of the effect. After thanks to Mr. Hussey, the carriages were resumed, and a hasty visit was made to the ruins of Bayham Abbey, which, although in the adjacent county of Sussex, had to be passed on the way to Frant Station, where the party separated. The ever-present and genial hon. secretary, the Rev. Canon Scott-Robertson, rapidly, as befitted the occasion, led the party over the ruins of the fine old abbey, pointing out all the principal features of interest. The proceedings were very enjoyable to the large party of members and their friends, and the arrangements for the carriages, which have been admirably carried out under the direction of Mr. Geo. Payne, F.S.A., contributed not a little to the success of the meeting.

#### MEETING OF THE ARCHITECTURAL AND ARCHEOLOGICAL SOCIETY OF THE COUNTIES OF LINCOLN AND NOTTINGHAM, AT NOTTINGHAM.

The Lincolnshire and Nottinghamshire Architectural and Archaeological Society held its annual meeting at Nottingham on Tuesday and Wednesday in last week, July 19th and 20th, under the presidency of the Bishop of Nottingham. The first day was devoted to Nottingham and its immediate neighbourhood. On the second day it had been proposed that Newstead should have been visited, but the request of the authorities of the Society for permission to do so met with so cold a reception that it was felt to be necessary to make other arrangements, and ultimately Bakewell and Haddon Hall were fixed upon. Happily such discourtesy is rarely met with, and the treatment of the Society by the owner of Newstead is an exception to the general behaviour of the proprietors or occupiers of historic houses.

The Society assembled in good numbers on Tuesday morning at St. Mary's Church. Choral matins were said at 10.30, immediately after

which an historical and architectural description of the church was given by the Bishop of Nottingham. St. Mary's is well known as one of the grandest and most characteristic examples of the class of building which had its origin here, and is to be found nowhere but in England, the large Perpendicular parish church. The whole building is approximately of one date, the chancel being somewhat later than the nave and transepts. Thus there is no admixture of earlier styles, the entire fabric being of one design, and the major part of it executed "d'un seul jet." On this account the building is all the more worthy of careful examination, and we think that the designers of our modern town churches, intended for large congregations, may do well to pay more attention than they have commonly done to the fifteenth and early sixteenth century parish churches, so peculiarly the growth of our own soil. As a rule, they are better suited for modern requirements, and harmonise better with urban surroundings, than the more powerful buildings of thirteenth or fourteenth century design. The continuous clearstory, which is so peculiarly a feature of these later churches, has a manifest fitness for town sites, which are apt to be cramped, and where the aisle windows are liable to be darkened by adjacent buildings. St. Mary's, Nottingham, is cruciform in plan, with a very broad and bulky central tower, and a long chancel. The aisles are very wide, having two windows instead of the usual single window at the western end. The piers of the crossing deserve notice for the slowness of their projection, causing unusually little obstruction to the eye and ear, while their sufficiency for their work is shown by the solidity of the tower, which, though of immense weight, shows no symptom of failure. The uniformity of this church, as well as the multitude of its windows, and the great size of the principal of them, together with its general air of spaciousness, will strike every visitor, as it struck old Leland nearly four centuries back. In fact, there is hardly any solid wall, the whole building being pierced in every direction with an elaborate system of fenestration, not leaving a corner where another window could be introduced. There is not much to commend in the design of these windows. Of the largest of them it may, indeed, be said, design there is none; they are very little more than vast stone frameworks, under low, almost triangular, arched heads of very ungraceful outline. The great end windows of the nave and transepts are each of twelve lights, divided horizontally by three transoms, comprising as many as forty-eight separate compartments, besides the openings of the tracery. The coloured glass, which alone can make such huge openings tolerable, has been gradually replaced, to the great improvement of the effect of the interior. The best glass is that in the west window, by Messrs. Hardman, which is very silvery in tint. The same firm is not to be congratulated on the east window, which is heavy and inharmonious. The great south transept window is still more offensive. We could not learn who the artists were. A very good beginning has been made in the centre of the north transept window, by Messrs. Clayton & Bell. We hope the rest will soon follow. The window proposed as a memorial of the late vicar, Canon Morse, will, we hope, be worthy of a man to whom the Church of St. Mary, in common with the whole town of Nottingham, owes so much. Many of the smaller windows are filled with glass of various degrees of merit, or demerit; but here, as is too commonly the case, the want of a definite scheme for the subjects of the windows, making them one continuous whole, is to be deplored. During Mr. Morse's incumbency, the work of restoration, which had been already begun, was carried on with judgment and vigour. All the galleries and pews with which the fabric was encumbered in every part were removed; the glazed screens which partitioned off the area to form a convenient preaching-house were thrown down, and the whole area laid open. The oaken stalls and benches of the chancel, which had been sold by a previous vicar to a neighbouring church, and replaced by decent deal pews, were re-erected; a lofty light pierced screen, of exquisite design, surmounted by a gilt and coloured cross, was set up in the chancel arch, and the altar furnished with a highly decorated reredos, which, together with the screen, is from the designs of Messrs. Bodley & Garner. The reredos is panelled in two tiers, each tier

of five compartments, containing sacred paintings. The chief subject, which fills the central upper panel, is the Crucifixion, under a rich canopy, rising up in a tall tabernacle in front of the east window, and,—it is no loss,—hiding some of its glass. The side panels contain figures of saints. The position of the organ is a problem which greatly exercises the minds of architects, and which has not yet received a satisfactory solution. In St. Mary's the organ, enclosed in a lofty carved oak case of elaborate richness, fills one bay of the chancel wall on the north side. The chancel is wide enough to bear it, but it is an obstruction which would be better away. We are convinced that in cathedrals and other large churches there ought to be two organs,—a small one in the choir for the ordinary services, and a large organ at the west end of the nave, as in Continental churches, for the grander functions. To hide an organ in a triforium, as at Canterbury, or stow it away in a side chapel, as at Lichfield, is at once a confession of not knowing what to do with it. The position of St. Mary's is a noble one, on an eminence sloping down rapidly to the east. The west front, which had then given way, was rebuilt in 1726, in a strange pseudo-Classical style, with flaming urns and obelisks, but was restored again after the original design by Sir Gilbert Scott. It cannot be called beautiful, being filled with one vast ill-designed window.

From St. Mary's the party moved across the town to the Castle, of which Mr. T. C. Hine, F.S.A., who told the members that he filled the ancient office of constable or custodian of the castle, gave a clear and interesting account to the members assembled in the Long Gallery. The position of the castle on the edge of a lofty escarpment of sandstone rock is a noble one, and worthy of a more suitable fabric than that which has replaced the picturesque Medieval fortress. The Conqueror's Norman keep, or "Cesars' Tower"; the castle hall with its double row of columns, like those still existing at Oakham and Winchester and originally at Westminster, the additions of Henry III. and subsequent sovereigns, especially Edward IV., who erected the stately and magnificent semi-octagonal tower at the north-west angle of the outer ward, called by Leland "the most beautifullest and gallant building for lodging"; the adjacent range of apartments with projecting oriels due to the same monarch; indeed, the whole fabric of the castle has entirely vanished, leaving no trace of its existence but one or two bastions and lines of wall, and the fourteenth-century gatehouse to the lower ward, which, with the addition of a ridiculous pepper-box at the side, still forms the entrance into the castle precincts. The existing building, in the heaviest style of the revived Classical architecture of the end of the seventeenth century, long and low, was erected by the royalist general, William Cavendish, the first Duke of Newcastle, who, it appears from Mr. Hine's investigations, was his own architect. The building forms three sides of a quadrangle, the chief front being decorated with attached Corinthian pillars supporting a bold cornice, and is not devoid of a certain ponderous staidness, but its prevailing horizontal lines are quite out of harmony with the soaring altitude of its site. As is well known, the modern castle was reduced to a roofless shell, split and blackened during the riots excited by the throwing out of the Reform Bill by the House of Lords in 1831, in which the Duke of Newcastle had taken a leading part, when the mob, unchecked by the authorities, attacked the castle and set it on fire. After having lain a ruin for nearly half a century, various schemes for utilising the shell having, we may now say, happily proved abortive, it has in the last few years been successfully converted by the constructive skill of Mr. Hine into an Art Museum for the town and county of Nottingham. The task before Mr. Hine of adapting the mansion to so entirely different a purpose from that for which it was built, and turning a three-storied building into one of two stories with the loftiest apartments at top where the lowest had been, and supplying them with adequate light for the exhibition of pictures, was by no means an easy one, and he is to be congratulated on the ingenious way in which he has carried it out. Few of the great English towns have art galleries so well lighted, so well arranged, and so spacious. We cannot leave the castle without echoing the astonishment which Mr. Hine told us was expressed by the Prince of Wales on his visit,



that the equestrian statue of the Duke of Newcastle, which occupies the centre of the principal facade, and was smashed by the rioters, should be suffered to disgrace the building by its mutilated condition. If the town is too poor to do it, a word to the present noble owner of the castle would probably secure its restoration.

In the afternoon an excursion was made to Wollaton Hall, which (in marked contrast to the endeness experienced at Newstead) was thrown open in every part by Lord and Lady Middleton, who themselves returned to Wollaton that they might do the honours of their beautiful house. On the way to Wollaton the party halted at Lenton Church,—not for the sake of the church itself, which is a modern edifice in the meagre Early English of fifty years ago,—but to inspect the very remarkable Norman font, which, having originally stood in Lenton Priory Church, and having afterwards done duty as a garden ornament for many years, has been happily rescued and restored to its sacred purpose. The font is of a cubical form with an attached nook-shaft at each angle. The basin, instead of being circular, is of a quatrefoil shape. Each face of the cube is ornamented with subjects carved in low relief. The south side is entirely occupied with a large floriated cross. That opposite to it, on the north, exhibits the Crucifixion,—Our Lord hanging on the Cross, the Soldier piercing His side with the spear, and the Two Thieves each breathing his last on his cross, their souls being represented as small naked figures issuing from their mouths, one taking its flight upwards, the other sinking downwards to the jaws of a hideous monster, emblematical of hell. The eastern side has two rows of subjects: the upper represents the raising of Lazarus, the lower has not yet been certainly identified. To the left are three nimbed figures; to the right is an open domed building supported on pillars. Some have considered it the Adoration of the Magi, but the occurrence of the nimbus is fatal to that supposition. The western side is also in two tiers, of twelve arched panels. The Descent from the Cross, it is said, but doubtfully, occupies the chief panel of the lower tier, winged angels standing on the other panels. This very curious font deserves more attention than it seems to have hitherto received. We commend it to the practised eye and wide knowledge of the Rev. G. F. Browne, our chief living authority on all early carved stones.

Of Wollaton Hall it is unnecessary to say much, as it is well known as one of the most admirable examples of Renaissance architecture in its best phase in this country, combining dignity of form, picturesqueness of outline, purity of detail, and opulence of ornamentation, animated by a joyousness of spirit which, though, in Ferguson's appreciative words, "running occasionally into excesses bordering on the grotesque, presents probably the happiest conception of its age in this country." The heavy mass of the great hall rising as a huge tower from the centre of the building, occupying what in earlier designs would have been an open courtyard, with its course and heavy windows, and clumsy angular bartizan turrets, certainly so overpowers the beautiful facades, with which it is out of scale, that we could almost wish it away. But it is really too queer and quaint to be readily spared. As a whole, Wollaton Hall is one of the most picturesquely beautiful things in the world. When seen from a little distance, rising above the trees of the richly wooded, deer-bested park, it looks almost like a palace of enchantment, which one can scarcely believe to be real. It is remarkable that the whole area of the hall, 62 ft. by 80 ft., is occupied by an immense chamber above it (making this central tower mass more obtrusive than it would otherwise have been), approached by a spiral staircase in one corner. The old name of this apartment, now called the "Prospect Room," was "Bedlam," not with any reflection on the sanity of its projector, but, probably, as we gather from other examples at the old Palace of Richmond and at Hurstmonceux Castle, with reference to its purpose as a large general sleeping-chamber for the accommodation of the less honoured guests of the mansion. The interior of the house, with the exception of the timber-roofed central hall, is disappointing. The whole passed under the hands of "Wyatt, the Destructive," who, while he impressed upon it an air of modern comfort and refinement, effectually wiped out all trace of antiquity. To Wyatt Wollaton owes its

extensive conservatories, which cost 10,000*l.* in building and stocking with plants, the price of the camellias alone amounting to 1,400*l.* The house itself, built between 1580 and 1588, cost 30,000*l.*, and was eight years in building. One Smithson has been occasionally accredited with its design, but the researches of the present Lady Middleton, who takes the interest of a true archaeologist in all connected with Wollaton, proves that he was only the surveyor employed, and that the architect was, as has generally been believed, John of Padua.

From Wollaton Hall the party drove through the picturesque park to Wollaton Church, close to which stood the earlier Hall, of which an ivy-clad fragment is still to be seen. Wollaton Church is a small building of no great architectural interest. Its north aisle is Jacobean, and the arcade on this side seems like a clumsy rebuilding of Decorated piers and arches at the same time. The south aisle has been recently added from the designs of Mr. Hodgson Fowler, who has also rebuilt the Willoughby Chapel, which had been destroyed. The tower, which is crowned by a spire, stands on open arches, like those of Brading in the Isle of Wight, and Coningsby in Lincolnshire. The interest of the building centres in the Willoughby altar tombs, with effigies, on either side of the chancel,—that of Sir Richard Willoughby, 1471, the builder of the chancel, and his wife, to the north, and that of Sir Henry Willoughby, 1528, and his four wives, whose diminutive effigies lie around that of their husband, to the south. Both tombs have "cadavers" below. The day closed with an evening meeting, at which papers were read, viz.:—"An Account of the Discovery by Sir John Savile Lumley, of the Temple of Diana Nemorensis, and a Description of the Collection of Classical Antiquities from the Site of the Temple, presented by him to the Nottingham Art Museum," by Mr. G. H. Wallis, F.S.A., Curator of the Museum; "The early History of Nottingham," by Mr. W. H. Stevenson, editor of the Records of the Borough of Nottingham; and "The Rock Habitats of Nottingham," by Mr. J. T. Godfrey, F.R.A.S.

The next day, Thursday, was employed in an excursion by rail to Bakewell Church and Haddon Hall, both of which are too well known to warrant our troubling our readers with any account of them, even if our space permitted.

The meeting concluded with a *soirée* given by the Mayor and Mayoress in the Art Museum to the members of the Society and their friends.

#### THE CITY AND SOUTHWARK SUBWAY.

LITTLE attention has hitherto been paid to an undertaking which, when completed, will confer great benefits upon persons who have to pass from one side of the river to another in the neighbourhood of London Bridge, a spot where we meet with perhaps the most concentrated traffic in the world. The undertaking in question is the City of London and Southwark Subway, and consists of two tunnels, reaching, when completed, from the Monument in King William-street to the Swan at Stockwell, a distance of over three miles. The two tunnels pass down Arthur-street West, side by side, but, before reaching Swan lane, one tunnel is superposed above the other on account of the narrowness of that thoroughfare. Shortly after entering the bed of the Thames, one tunnel diverges a little to the right, and the two then run alongside each other for the remainder of the route, the distance between them being about 5 ft. The depth at which the tunnels have been placed varies between 40 ft. and 60 ft. below the roadway, and they follow Borough High-street, Newington Causeway, Kennington Park-road, and Clapham-road, there being four intervening stations, viz., at the junction of Great Dover-street and High-street, the Elephant and Castle, New-street (Kennington Park), and the Oval. As the tunnels are carried at a great depth through virgin clay, all intervening obstacles are eluded, and there will be no interference whatever with private property, excepting for purposes of access. The mode of construction, devised by Mr. J. H. Greathead, the engineer-in-chief of the undertaking, is as novel as it is expeditious. Unlike the underground railways, there will be no disturbance of the surface excepting at the stations, and the only sign at present of operations of some kind being carried on at all is the

staging erected behind Old Swan Pier, London Bridge, where we find a crane, a small tramway, a small engine driving a fan and an air compressor, and a wooden office. From this stage a shaft 13 ft. in diameter has been sunk to the crown of the upper tunnel, up and down which the skips, bringing up clay and taking down material for construction, pass all day long. The two tunnels have been completed under the river, west of London Bridge, and for some distance on the south side. The mode of construction is exceedingly simple; but it is only through a personal inspection that we learn how simple tunnelling in clay has become by the method employed by Mr. Greathead. A steel shield, overlapping (like the cap of a telescope) the forward end of the iron tunnel constituting the subway, is driven forward by hydraulic power as the material is excavated before it through an opening in the shield. The tunnel, 10 ft. in internal diameter, is built up of flanged segments, 14 in. thick, which are bolted up under cover of the shield, and form rings, 1 ft. 7 in. wide. Six of these rings can be erected daily, which represents a rate of progress of about 10 ft. at each face. As the shield is moved forward, the annular space outside the iron tunnel, left by the advance of the overlapping steel plate of the shield, is filled up by hydraulic cement, ejected by air pressure from a vessel inside the tunnel. The iron tunnel is thus protected on the outside by an impervious coating, whilst the circumferential joints are filled up by tarred rope and cement, and the longitudinal joints by pine strips. When the subway is completed, the "up" traffic will be worked in one tunnel and the "down" traffic in the other. The use of locomotives is dispensed with, rope traction as applied in American cities for tramways, and now also being introduced in Edinburgh and Birmingham, being employed. Owing to the exclusion of engines, and also to the traffic being worked always in one direction in each tunnel, the air will be pure and free from noxious gases, and a continuous circulation will be kept up. The carriages are promised to be commodious and well lighted, and a frequent train service is to be established, small trains carrying a hundred passengers running at first every two minutes. The fares are to be 1*d.* and 2*d.*, according to distance. A further boon will be conferred upon the public by the erection of hydraulic lifts at each station, such as are now being successfully worked on the Mersey Railway, which will take passengers from the street level down to the respective platforms, or *vice versa*. The hydraulic power for working the lifts, as well as the power for working the cables, will be derived from a central station, placed at the Elephant and Castle. The average speed is to be about that on the underground railways, so that a resident in Clapham will be able to reach the heart of the City in twenty minutes, without having to undergo the annoyance of travelling in smoke-begrimed carriages and in an injurious atmosphere. The carrying capacity of the line is estimated at over 100,000 passengers per day. The contract for the subway and stations is being carried out by Mr. Gabbutt, of Liverpool, and the cost of the undertaking is put at 550,000*l.*

#### CONGRESS OF MUNICIPAL AND SANITARY ENGINEERS AT LEICESTER.\* Asphalte and Concrete Foot Pavements.

MR. G. B. STRACHAN (Chelsea) read a paper "On Asphalte and Concrete Foot Pavements." He said that the object of the paper was to invite the criticism of the members of the Association upon the experiments and experience of the writer and others on asphalt and concrete as materials for foot pavements, and to induce other surveyors to make experiments with the view to perfecting pavements of those descriptions. He desired to place in the forefront of the paper the fact that the credit of the Hornsey experiments, referred to in the paper, was due to Mr. T. de Courcy Meade, who placed them at his disposal. Having referred to the nature and origin of asphalt, he described the works of the French Asphalt Company,† which obtains its supplies for England

\*Continued from p. 132.

† Mr. Strachan said he described the works of this Company because they had executed all the asphalt works in Chelsea, but he wished to say that the Val de Travers Company, Clarges's Asphalt Company, and others, did equally good work.



from its mines at St. Ambroix, in the South of France. He next described the manufacture of and methods of laying compressed and mastic asphalt, and gave numerous analyses of good asphalt. He then went on to give various practical details of work which has been carried out. We make the following extracts from the paper:—

In Chelsea there are 16½ miles of footways paved with mastic asphalt, having an area of 68,290 square yards. On the Queen's Park Estate there are 41,500 square yards, which have been laid five years, and which are now in good condition, not having cost one penny for repairs. In King's-road, at Walpole-street, a length has been laid for seven years. The foot traffic over it is 7,500 persons in eighteen hours. At the end of the first five years it was cut open, and the wear was found to be such as had reduced the thickness to a spare ½ of an inch, the original thickness being 1 in. full. On the east side of New Bond-street a length of mastic asphalt was laid thirteen years ago between Oxford-street and Conduit-street, the thickness being ½ of an inch. The asphalt is now wearing through on to the concrete in the line of traffic at the forecourt line. The cost for repairs has been so trifling that it may be neglected. In this case the concrete foundation is as sound as before, and all that is necessary to restore the footway is to relay the asphalt at about two-thirds of the original cost, when the pavement will be good for another thirteen years. As the traffic here is very severe and the footway narrow, it is reliable evidence of the durability of asphalt.

The foundation for the asphalt footway is made with 3 in. of Portland cement concrete (6 to 1) of a very good quality. The surface is smoothed with the shovel, and four days are allowed for drying. The concrete has been laid hitherto without any joints. The mastic asphalt is floated over this surface, and the path is then completed. Mastic asphalt does not show any cracks on the surface. The concrete foundation, when the asphalt is removed, shows the irregular, tree-like cracks all along its length, branching from the kerb to the back line, but the elasticity of the mastic asphalt is sufficient to resist the tearing action of the concrete as it contracts.

A study of the asphalt question resolves itself principally into a study of the movements of concrete when laid in long lengths, narrow widths, and small thicknesses. The writer inclines to the opinion that concrete has in itself a small power of contraction, apart from any considerations of temperature. The experiments of Dyckerhoff which show that neat cement (slow setting) had an average expansive power over twelve months of '0734 per cent., and quick-setting cements of '2019 per cent., and that concrete (3 to 1, sand) had an expansive power of '0264 per cent. (slow setting) and '0320 per cent. (quick setting), seem to show the contrary to be the case. The writer laid down a length of concrete (6 to 1, ballast) 52 ft. long, 12 in. wide, and 3 in. thick, under a shed which had an open front, but so that the sun did not touch the concrete. The strip was laid on sand so as to give it freedom of movement. Another strip 26 ft. long, of the same width and thickness (3 to 1, pebbles), and a third of the same dimensions (3 to 1, sand) were also laid under the same conditions. The only movement discernible at the end of one month, was a slight contraction in length in all the samples. The uniform experience of concretes under asphalt is that cracks occur, which would tend to show that contraction and not expansion is the rule. At the same time, the writer has experience that concretes do expand, but this he attributes to the action of temperature. It is no uncommon thing to see the surface of an asphalt path raised crosswise in an irregular line, as though a small tree root was under it. In every case where the asphalt has been uncovered at these points by the writer, he has found the concrete crushed and the concrete on the falling level thrusting itself under the concrete on the rising level. This effect is most marked on hot days. In January last the writer laid some thousands of feet of asphalt path in St. Luke's Gardens, Chelsea. The sun is on it all day, and during the hot weather at the beginning of June, the number and size of these raised lines was astonishing. Shortly after midday they were most pronounced, and towards night they were less prominent. As a further evidence of the expan-

sion of concrete under the sun's rays the streets in the City can be named. The footway and carriageway are in asphalt on concrete. The expansion of the concrete in the carriageway presses the kerb at the bottom; the expansion of the concrete in the footway presses the kerb at the top on the opposite side, and the two have tilted up the kerb in a marked manner. The writer has on a hot day taken up asphalt on a footway and has found the heat much greater under the asphalt than on the surface. In order to avoid the expansion showing itself in footways the concrete should be laid in sections, and the joints between them filled with some compressible substance.

Compressed asphalt has about one-third longer life than mastic asphalt under the same conditions. The cost is the same, but the use of compressed asphalt for this purpose has not been universally followed by reason of the cracks that appear on its surface. The cracks do not tend to spread under traffic, nor does the asphalt wear more at these parts than at others. They are unsightly, however. It is found that these cracks are exactly of the shape and in the position of the cracks in the concrete foundation. Compressed asphalt has no elasticity in itself, and when subjected to the contracting force of the concrete it is torn through. It is an admirable tell-tale of the movements of the concrete. Much ingenuity has been displayed in endeavours to avoid the cracks. The first step was to localise them. This was done by laying the concrete in 12 ft. bays and in alternate bays, and filling up the screed space with fine concrete. The contraction then showed its effects at these places, with a result that a series of regular straight cracks appeared instead of the irregular tree-like cracks when the concrete was laid in one piece. These effects can be seen at many places in London without specifying any particular place. Having localised the cracks, an experiment was made at Hornsey to avoid them. A strip of bituminous felt 6 in. in width and ½ in. thick was placed on the concrete over the whole length of the screed mark. This felt has much elasticity, and the object of the experiment was to ascertain whether it would take up the contracting movement of the concrete and absorb it. The length is laid at Crouch Hall-road, between Coolhurst-road and Clifton-road. The result has been that, instead of one crack at each screed mark, there are two, one on each side of the narrow strip of felt. It is evident that the concrete in contracting compresses the asphalt longitudinally, and that the cracks appear at the points where the opposing motions meet; and as the strip of felt represented a narrow area which was free from these forces, a crack appeared on each side where the forces took effect. In Archway-road, Hornsey, another experiment was made by covering the screed mark with a strip of mastic asphalt 9 in. in width and ½ in. thick, just as in the last case with felt. For three months no cracks appeared; then a few slowly and at irregular intervals showed themselves; but during the severe winter of 1886-7 every screed mark showed its crack. These cracks were irregular in line, but they are confined in each case to the area covered by the mastic asphalt. These footways are laid on a 3-in. foundation of concrete. In Marlborough-road, Chelsea, an experiment was made on different lines. A foundation of concrete 6 in. thick was laid, and the compressed asphalt laid on it. For four months no cracks appeared, but after that time they occurred at frequent intervals, though they are fewer than usually appear on a 3-inch foundation. When the asphalt and concrete were removed at the cracks it was found that the crack extended through the whole thickness of the concrete. This experiment was based on the observation that cracks do not appear in compressed asphalt carriageways, and as the principal difference between the foundations in the footways and carriageways is the thickness of the concrete, it was assumed that it was the cause. The observation is, however, an incomplete one. In streets of light traffic the cracks do appear in the asphalt, as in Little Blenheim-street, Chelsea, and elsewhere. In streets of heavy traffic the cracks in the concrete tear the asphalt as they slowly form, but the traffic welds the asphalt together again before they show on the surface. In footways of heavy traffic there are fewer cracks than in those of light traffic, for a similar reason. At Muswell Hill, Hornsey, the experiment of covering the width of the area of the footway

between Onslow Rise and Grosvenor Gardens with bituminous felt was tried. The felt was in 3-ft. widths, and was laid longitudinally with butt joints. At the circular kerb the pieces were necessarily somewhat patched. The result has been that cracks have appeared at every joint of the felt with marvellous fidelity, owing to the movement of the concrete. In Whitehead's-grove, Chelsea, between Marlborough-road and Keppel-street on the north side, a length was laid in 1885 on a 3-in. concrete foundation, which was covered with mastic asphalt ½ in. in thickness. On this ½ in. of compressed asphalt is laid. The mastic asphalt was laid to absorb by its elasticity the movement of the concrete without transmitting it to the compressed asphalt. It has survived two winters of great severity, and has lived twenty-one months without any cracks appearing. From this it would appear that the principle of a material between the concrete and the compressed asphalt which will absorb the effects of the movements of the concrete is a correct one, and the writer invites the members of the Association to experiment on cheapening the method. The present result is an increase of life of 33 per cent. at an increase of cost of 12 per cent.

As evidence of the durability of compressed asphalt in footways, those in Cheapside may be named. They were laid in 1876 at a thickness of 1 in., and are now wearing through. On the south side of the Strand, east of Wellington-street, 1 in. of compressed asphalt was laid in 1881, and has had only the most trifling repairs. The streets in the City, with the heaviest foot traffic in the world, are paved with compressed asphalt on the footways.

The advantages of asphalt foot-pavements are durability, a smooth surface unbroken with joints, a good foothold, even and regular wear, their impervious character, and the readiness and neatness with which they are repaired. They have a sombre appearance, and show water on their surface longer than stone pavements. They wear to the last thickness without breaking up, and give a useful wear for the whole of their thickness. When a stone of other pavement has worn 1 in. it may not be half worn through, but its useful life is over. Where there are cellars under footways, asphalt as a material for footways is unrivalled. In ordinary traffic, such as those named in King's-road (7,000 to 8,000 persons per day), an asphalt pavement can be laid 1½ in. thick with the certainty that for at least ten years it will need no repairs whatever. This pavement has also the advantage that the foundation is always preserved and good for use again when the wearing surface of asphalt has to be renewed.

The following abstract of the present contract schedule in Chelsea will give the prices for these pavements:—

	Per sq. yd.
Compressed or mastic asphalt 1 in. in thick- ness on 3 in. of concrete	s. d. 8 3
Do, ditto, ½ in. thick	8 6
Compressed asphalt ½ in. thick on 3 in. mastic asphalt, laid on 3 in. of concrete.	7 0
Compressed on mastic asphalt 1 in. thick on concrete foundation (relay)	3 6
Do, ditto, ½ in. thick	3 0

These prices carry a guarantee of free maintenance for ten years. The Vestry prepares the foundation for the concrete in new work at a cost of 2d. per square yard. The specification provides that the asphalt will be cut open by distances not exceeding 50 ft. apart, and the thickness measured. Five out of every six of these measurements must be at least the specified thickness, and the average of every six must be at least the specified thickness. The specification is strictly adhered to. The cost of the foot-pavement in New Bond-street, already referred to, over twenty-six years, would be as follows at per square yard:—

	s. d.
Preparing foundation	0 2
Laying concrete foundation and ½ in. mastic asphalt	5 6
At end of 18 years relaying mastic asphalt (life 13 years)	3 0
Repairs	0 0
Total	8 8

or a cost per year, not including interest, of 4d. per square yard. It should be mentioned that the small cost of renewing asphalt footways is due to the fact that the asphalt taken up is as good as new asphalt after it has been cleaned and prepared, and is re-used for footways.

In dealing with the question of concrete as a material for foot-pavements, the writer



cannot claim such an experience of it as he has had with asphalt. In 1880, however, the Vestry of Chelsea had laid by the respective makers a series of pavements in King's-road against the Royal Military Asylum wall, and in 1885 a report was made on them by the writer.

Mr. Strachan went on to give a synopsis of this report, which is now out of print. In it he described the manufacture of the "Imperial Stone" pavements, of which a specimen piece was laid down in competition with other pavements in King's-road, Chelsea. As to these trials of pavements, Mr. Strachan continued:—

In the King's-road experimental pavements the makers laid their pavements with the knowledge that they were competing with their rivals. They were laid in 1880. Asphalt, York stone, Ferrumite stone, Victoria stone, and Imperial stone were laid side by side and subjected to the same traffic. The writer includes the York stone results, though not strictly coming within the subject of the paper.

In June, 1884, the Ferrumite stone was removed, as its slipperiness had become a source of danger. Its area was taken by Wilkinson's granite concrete pavement and by Shap-stone pavement. After five years' wear of the original stones, the following results were obtained:—

The York stone occupied an area of 87 square yards; the original thickness was 3 in.; the number of stones 123, of which, after five years' wear, 10 had broken edges, 16 had broken corners, 21 had their surfaces peeling off, and six were worn so as to be dangerous. The wear was not measurable by reason of the uneven thickness of the stones, but it was unmistakable. The foothold was good in all weathers. The actual cost was 8s. 7d. per square yard laid.

The Victoria stone occupied an area of 81 square yards; the original thickness was 2 in.; the number of stones 168, of which thirty-five had broken edges and corners, two had their surfaces peeling off, and three were visibly cracked across. The wear was not quite  $\frac{1}{2}$  in. at the greatest traffic line. The joints of the stone were pleasing, and the colour cheerful. The foothold is not so sure as that of York stone in dry weather, and in a drizzling rain it approaches slipperiness. The cost was 6s. 4d. per square yard laid.

The Imperial stone occupied an area of 90 square yards. The original thickness was a full  $2\frac{1}{2}$  in.; the number of stones, 187, of which eighteen had their corners and edges broken, and one had its surface partly peeled off. The wear was not quite  $\frac{1}{2}$  in. at the greatest traffic line. The regularity of the joints is pleasing to the eye, and the colour is light and cheerful. The foothold is more sure than that of the Victoria stone sample, but it becomes somewhat slippery in drizzling rain. The cost was 6s. per square yard laid.

The experience gained with the Shap stone laid in 1884 is more limited, but the stone does not appear to be better than the concrete stones described. The length laid *in situ* by Messrs. Wilkinson is subject to the same remark, but the aggregate is already wearing up. It is laid in 8-ft. bays. A repair made in it is a great disfigurement to it. The effect of the traffic in wear is visible.

Mr. Walker, of Leeds, has laid down (1886) in King's-road, a short length, in bays of about 4 ft. square. It has a very smooth surface, and appears to be a very good pavement. He lays a foundation of ballast concrete,  $2\frac{1}{2}$  in. thick, to within  $\frac{1}{2}$  in. of the finished surface, and cuts roughly through it so as to form the bays. He then floats the surface with fine rich concrete, made of one part of cement to one or one and a quarter part of crushed granite or slag which pass through a  $\frac{1}{2}$  in. sieve. This is then cut through with a knife into bays of small areas. The foothold is fairly secure, and the wear very satisfactory. No cracks appear when the bays are made less than 10 ft. square. At 322, Oxford-street, a piece has been down three years, and no wear is visible. He claims that his fine rich concrete on the surface attains more nearly to the texture of York stone than any other pavement. The joints, however, have a tendency to spread.

Concrete pavements laid in slabs have two serious disadvantages. The writer's experience refers to Victoria stone, but there is no reason to suppose that slabs of other make are free from them. The first is the annoyance caused by the hard metallic sound of the foothall on

them, which is especially noticeable at night. The other is their brittle nature, and the presence of hidden cracks after wear. When taken up to relays, it is often found that a stone which was apparently sound breaks before it can be relaid.

Concrete pavements *in situ* have the serious disadvantage that they cannot readily and cheaply be repaired. A patch in them shows for the whole life of the pavement, unless a whole bay is removed.

The writer is of opinion that concrete pavements *in situ* are preferable to concrete pavements laid as slabs. There is, however, no reason why this pavement should not be laid by surveyors themselves, without the aid of a contractor. Much has to be learned before concrete as a material for foot-pavements is perfected, but that can most readily be learned by each engineer doing his own work, and exchanging experiences. The prices paid for concrete pavements are very great. One stone is advertised for 7d. per square foot, which equals 4l. 14s. 6d. a cubic yard. This is an extravagant price to pay for concrete, even if it be of the very best kind, and silicated too. Concrete for foot pavements has its own field, and within well-marked limits its use is advisable, but until its capabilities are more largely tried, and its usefulness increased, the full advantage will not be obtained from it. The price stated is large enough to cover the cost of experimenting, and the writer trusts that the members will carry out such a series of tests and trials as will complete the knowledge of concrete as a material for foot pavements.

Mr. Vawser (Manchester) opened the discussion by mentioning the advantage which was experienced at Macclesfield by laying concrete footpaths in about 4 ft. squares, and putting between each a piece of plank. It was found that the elasticity of the planking was sufficient to prevent any cracking.

Mr. Fowler (Manchester) agreed as to the great value of concrete paving, which, seven years ago, he used for the Newcastle Cattle Market. There he placed a lath round the boundary of each section, and there was not a single crack.

Mr. Ellice Clarke (London) said his experience of an asphalt footpath  $\frac{1}{2}$  in. thick was that at the end of three years it required very considerable repairs. The unsightliness of cracks in asphalt was their principal objection; they did not detract at all from its wearing well. The practice mentioned by Mr. Vawser had been discontinued by all who had had much experience of asphalt. Now it was usual to lay two slabs of concrete on alternate days, or two or three days.

Mr. Cockrill (Great Yarmouth) spoke of the satisfactory wear of thirty miles of asphalt footpath in that town.

Mr. Parry (Reading) said that paving that was the hardest, in his experience, was the first to be discarded, and that wore best which approximated nearest to York flagging.

Mr. Boulnois (Portsmouth) said that some of the earlier samples of ferrumite stone had too much iron in them, and being thus too hard, had a very slippery surface. The secret of the wear of asphalt lay in a nutshell. Unless it got sufficient traffic upon it it would never consolidate properly.

Mr. Lemon (Southampton) said that twenty years ago he was very enthusiastic about asphalt, and his Corporation laid a great deal of it down. He had come to the conclusion now that there must be a very large traffic over it, or at least sufficient to keep it together, otherwise it was bound to fail. Some laid down  $\frac{1}{2}$  in. thick soon wore out, but some laid 2 in. thick in a roadway where there was great traffic had been down for fifteen years, and had never cost expense for repairs. With respect to concrete, he thought concrete made and laid *in situ* was the foothall of the future.

Mr. Jones (Ealing) said that from the clinker from their destructor they were making a very good pavement at a cost of about 3s. per yard superficial.

The President (Mr. J. Gordon, Leicester), in closing the discussion, said that the difficulty of laying concrete foundations was one that he did not think had yet been solved. He mentioned several examples of cement pavement in Leicester, and to which he directed the attention of members.

Mr. Strachan was thanked for his paper, and in acknowledging the compliment, he observed

that the way in which it had been received and criticised was an encouragement to young members to come forward and give their experiences.

In other columns we give some particulars of the granite quarries, &c., visited by the members of the Congress, but we are compelled by want of space to hold over some other portions of our report of the Congress until next week.

#### SANITARY REGISTRATION OF BUILDINGS BILL, 1887.

THE Council of the Civil and Mechanical Engineers' Society having appointed a committee to consider the provisions of the Sanitary Registration of Buildings Bill, 1887, now before Parliament, the committee, after very careful consideration of the Bill as a whole, and also of its several clauses, arrived at the conclusion that in its present form it would not be of benefit to the public; and they further proceeded to draft a Bill to replace it, the provisions of which they thought would be acceptable, and the Council of the Society resolved that it would be in the interest of the public to strongly urge the substitution of the Bill drafted by the committee for that now before Parliament.

The main points of difference between the proposed and the original Bills may be, with a few additional words, summed up in the report presented by the committee:—

1. They consider that as the Bill is one of registration only of the decisions as to quality and description of work,—over which the registering body is not intended to have any power,—it would not be compatible with the dignity of the Local Government Board (in itself the highest sanitary authority in the country) to be in the position of a registering machine, especially when such registering machinery already exists, as in the case of the registrars for births, deaths, and marriages, and for vaccination, and they suggest that this duty should fall on the Registrar-General and his subordinates.

2. It is considered that if the buildings mentioned in the Bill are to be registered compulsorily, it is just as necessary that boarding-houses, restaurants, and all places where food is produced, stored, or distributed, should come under its provisions as the places mentioned in the original Bill, namely, schools, colleges, hospitals, asylums, and lodging-houses and hotels; and that the action of the Bill should be universal instead of being limited to districts having a population of 2,000 and upwards.

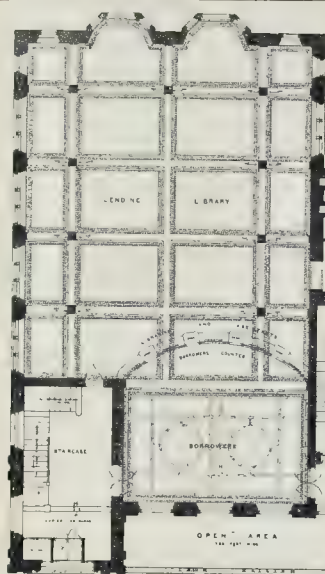
3. It is thought necessary that some definition should be made as to who is to bear the expense required by the Bill, and the Committee arrived at the conclusion that the owner ought properly to bear this burden, and they have provided accordingly.

4. In the Bill it is provided that corporations shall receive licences in sanitary practice. This, it is contended, is contrary to common sense and to the interests of the public,—as, although severe penal clauses are introduced in the Bill, these would be practically nugatory so far as corporations are concerned, for they could neither be examined as bodies nor could they be adequately punished as corporations; and there would be no security that their qualification to act rested on any sure basis; therefore the word "corporations" has been entirely expunged from the Bill.

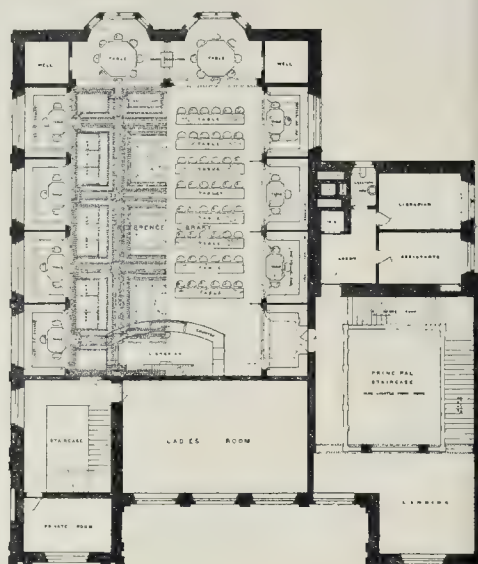
5. It is considered that the provisions for examining candidates by the several bodies or corporations to which they might belong, while no adequate provision was made for the examination of those who were not members of any body or corporation, were faulty and clumsy; and a clause has therefore been introduced for examinations to be made by one or more specified bodies authorised for the purpose by the Registrar-General.

6. It is found that the question of the eligibility of any persons or class of persons to be registered as Licentiates in Sanitary Practice without examination, offers many difficulties; but after much consideration, it was decided that it was impossible to require that all should be examined before being registered, but that the number of those who might be considered to be eligible was strictly limited to men who should from their professional training be expected to understand, and be able to deal with, not only the theoretical but the practical part of sanitary science; and this body has





LENDING LIBRARY FLOOR PLAN



REFERENCE LIBRARY FLOOR PLAN N° 1

Edinburgh Public Library Competition.—Plans of Second Premiated Design, by Mr. Jas. B. Dunn.

therefore been limited to architects and engineers of a certain standing.

7. Clause No. 10, which specifies the minimum requirements before a licence can be granted, has been considerably amplified, as it is felt that if all sanitarians are agreed that this minimum of requirements is necessary, then this clause only emphasises this fact; if, on the other hand, they are not agreed as to the necessity for this minimum, it is all the more necessary that it should be clearly, amply, and distinctly specified.

8. Although it is specified in the Bill that if any alterations be made in the structure of any building which affects the sanitary arrangements the building shall be considered as uncertified, no provision is made for the publication of such alterations, which might be easily made, and the same certificate remain in force, although the whole plan of the drainage had been altered, and its efficiency destroyed. A clause has therefore been introduced throwing the onus of publication on whomever it may be who makes the alterations.

9. In order to effect a further safeguard, a clause, No. 15, has been introduced intended to prevent Licentiate in Sanitary Practice from granting certificates for houses in which they are peculiarly interested; and as it is considered contrary to professional etiquette to advertise, provision is made in the same clause for the prevention of any such practice either directly or indirectly.

10. The Authority which shall decide as to what buildings come under the provisions of the Act, has been somewhat varied so as to provide that decisions shall not be given except by magistrates sitting in court and otherwise.

11. The forms attached to the Bill have been varied and amplified to meet the alterations in the body of the Bill, and a list of fees to be charged by Licentiate in Sanitary Practice has been added.

**Obituary.**—The death is announced of Miss Margaret Gillies, one of the pioneers amongst English lady artists. The *Daily News* says that she studied oil painting for a short time in Paris under the brothers Henry and Ary Scheffer, and painted a few works in oil. But water-colour was the medium in which she was destined to acquire most fame. She joined the Royal Society of Painters in Water-Colours in 1852 or 1853, and since that time has been a frequent contributor to the Society's exhibitions.

## Illustrations.

### COMPETITIVE DESIGNS FOR THE IMPERIAL INSTITUTE.

**WE** give this week the detail elevations of the designs for the Imperial Institute by Mr. Blomfield and Mr. T. G. Jackson. The detail elevation of the last-named design was one of the most refined pieces of design and drawing in the collection, though we do not think the author has succeeded in harmonising the details of the dormers with those of the substructure; the dormer looks rather as if transplanted from somewhere else.

### EDINBURGH PUBLIC LIBRARY COMPETITION.

#### SECOND PREMIAED DESIGN.

**WE** give this week the exterior perspective, the interior of the Reference Library, and two plans, of the second premiated design in this competition, by Mr. Jas. B. Dunn. We fully commented on and described the design in our general article on the subject in the *Builder* for June 18th of this year (p. 893). Mr. Dunn only asks us to add that the Lending Library was designed to store 45,326 volumes (nine to the superficial foot), and the Reference Library, Plan No. 1 (the one we give), for 68,420 volumes, and plan No. 2 for 96,210 volumes. The interior perspective is drawn in accordance with No. 2 Plan, which contains five alcoves in its length, instead of four. The panelling above the bookcases in the return portions, shown in the view of Reference Library, was intended to occupy the space for the present until more bookshelves were required; the panelling would then have been removed, and the shelves carried to the top of the alcoves.

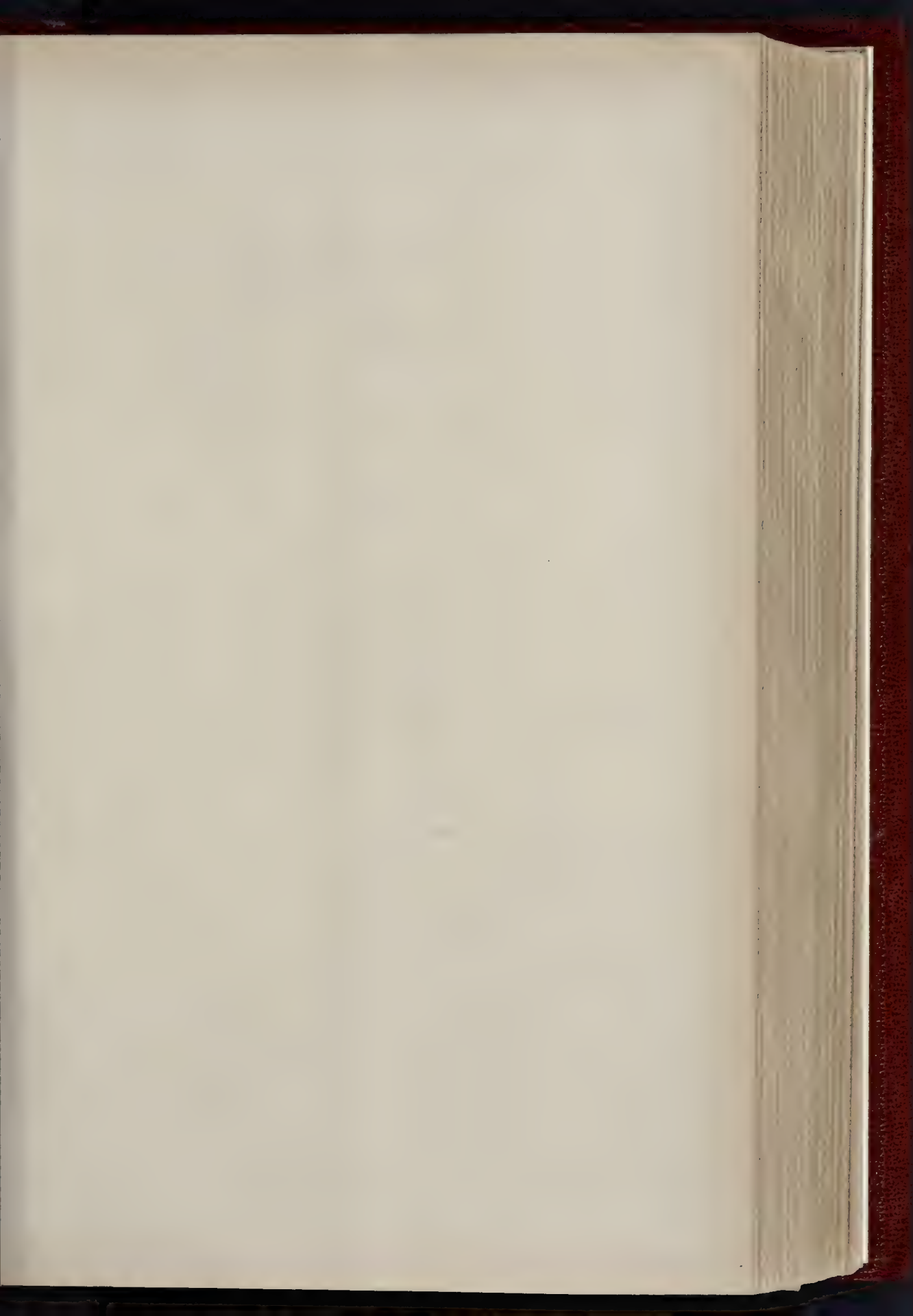
### CHURCH OF THE SACRED HEART, WIMBLEDON.

**THIS** church is being built upon the rising ground between Wimbledon and Raynes Park, and is to take the place of a temporary iron church a short distance away, which has for some years past supplied the needs of the Roman Catholics of the district. It comprises on plan nave, aisles, chancel, with side chapels and sacristy, while a large organ-chamber and singing-school will be placed above one of the side chapels and sacristy, opening by a large

arch into the chancel. The total length of the church when completed will be 168 ft., the width 64 ft., and the height from floor to ridge 68 ft. The style is Late Decorated, the materials used being, externally, flint with dressings of Ancaster stone, and Broseley tile for roof. Internally, nearly the whole is of Beer stone. At present the nave of eight bays is all that is carried out. Its chief characteristics are its loftiness and general richness of detail and carving. Elaborate niches occur in the spandrels of the arches of each alternate bay, while the arched and moulded principals of the roof spring from corbelled-out wall-shafts with richly-carved caps. The ceiling is arched and panelled with carved wooden bosses, decorated in gold and colour at the intersection of the ribs. Mr. Frederick A. Walters, F.S.A., is the architect, and the contractors are Messrs. Goddard & Sons, of Farnham. The carving has been carried out by Mr. McCulloch, of Kennington, who is also preparing a large, elaborate roof and beam to be fixed in the chancel arch. The heating is by Grundy's hot air system.

**Festivity at Wilton Park.**—During the last few months extensive alterations have been in progress at the mansion at Wilton Park, Bucks, to fit it for the occupation of Mr. Pascoe Grenfell. The alterations, &c., which will cost considerably over 10,000l., have been carried out by Messrs. G. and H. Bywaters, of London from the plans and under the direction of Mr. Arthur Vernon, architect. The approaching completion of the work was celebrated a few days since by a dinner to the workmen employed, together with the staff engaged of the estate, and the tenants, all of whom were invited by Mr. Arthur B. Grenfell, the trustee of the estate, to join in the festivities. A party of some 250 gathered in a large marquee placed near the mansion. Both Mr. Grenfell and the architect, Mr. Vernon, spoke in very high terms of Messrs. Bywaters and their men, and a very pleasant day was spent by all concerned.

**Institution of Mechanical Engineers.**—The summer meeting of this Institution will be held in Edinburgh on Tuesday morning, the 2nd of August, and Wednesday morning, the 3rd of August, in the University. The chair will be taken at half-past nine o'clock by the President, Mr. Edward H. Carruth, in the Natural History Lecture Theatre. The list of papers will be found in another column under the heading "Meetings."

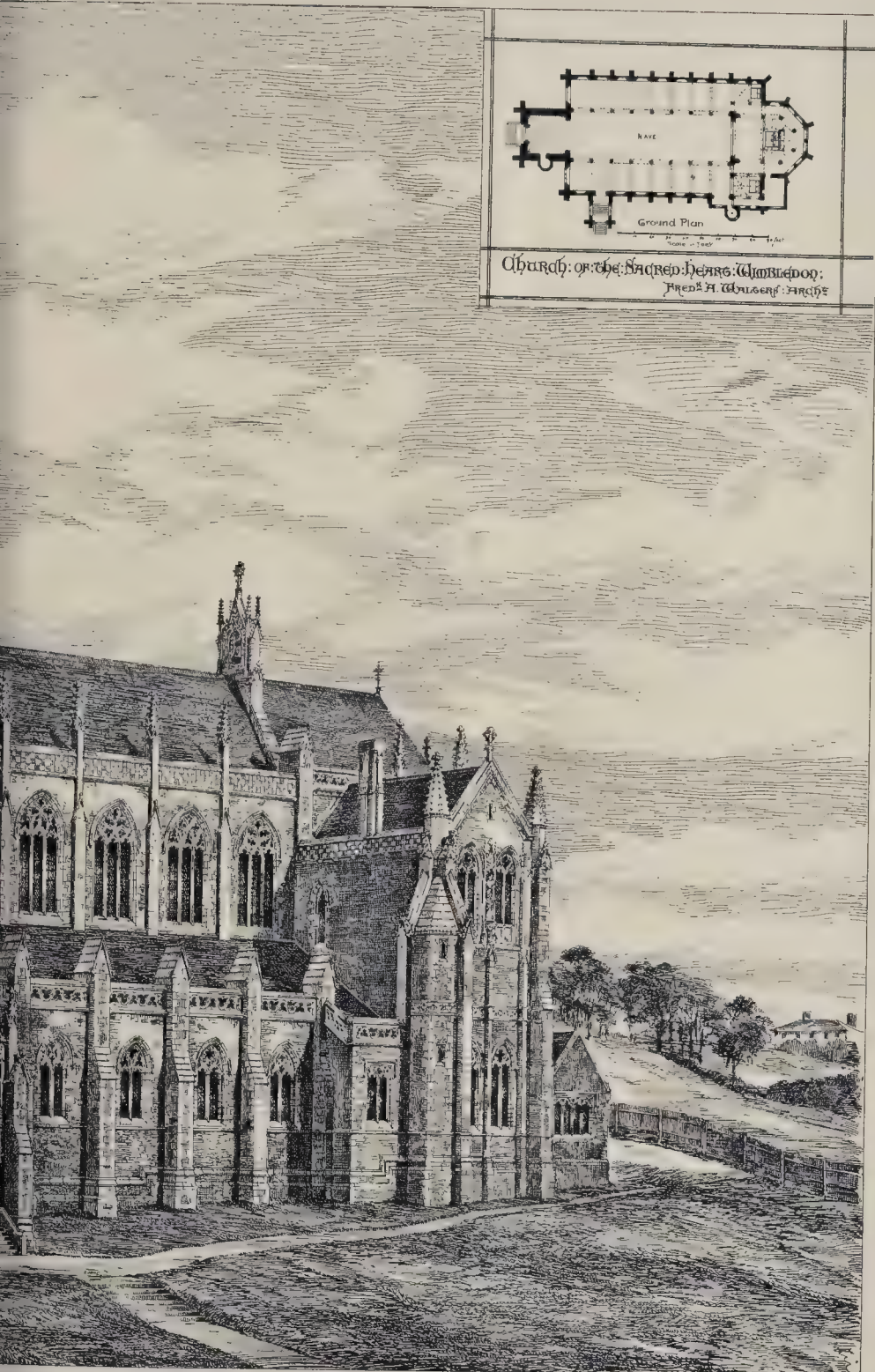






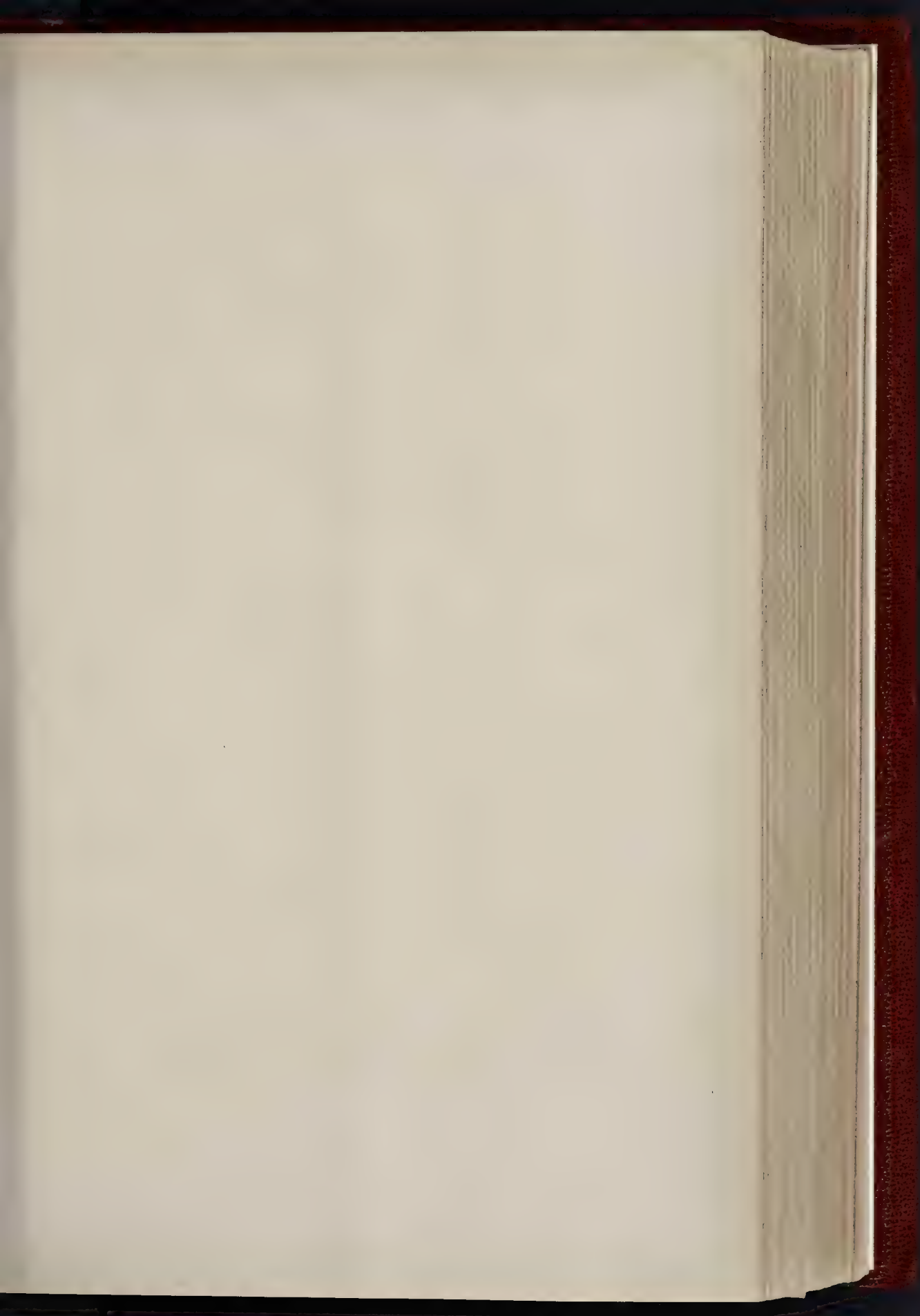
CHURCH (R.C.) OF THE SACRED HEART





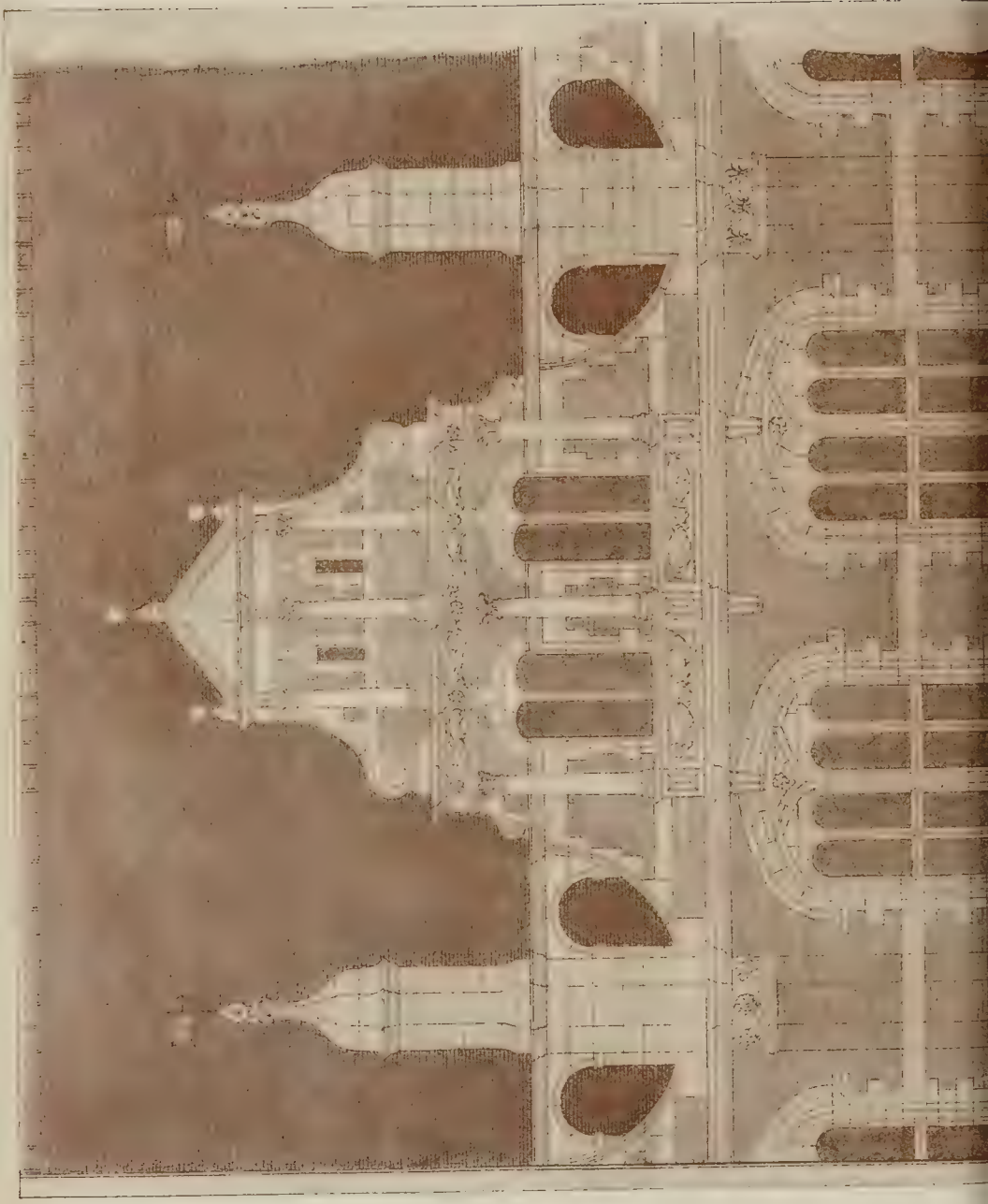


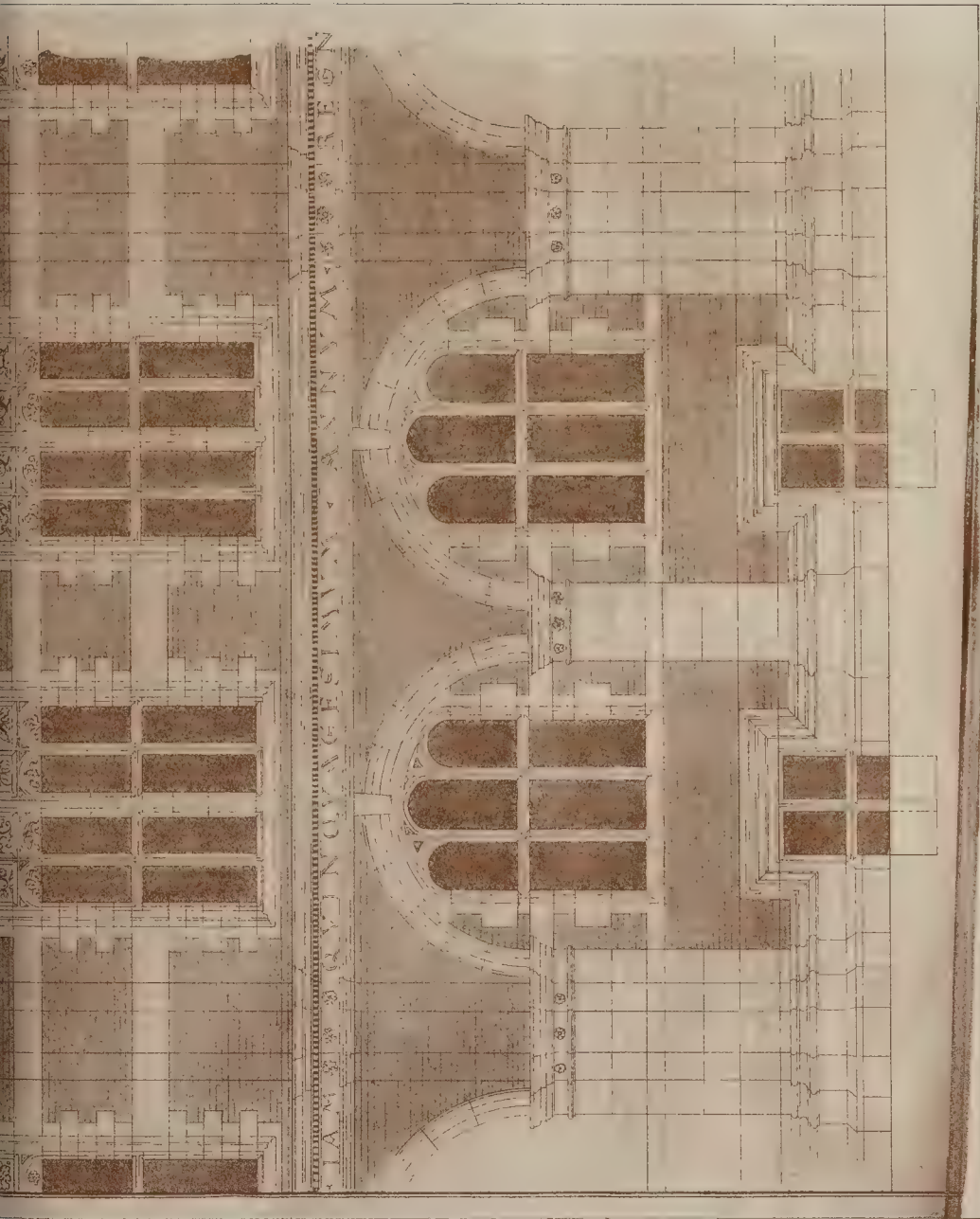






THE BUILDER, JULY 30 1867





COMPETITIVE DESIGNS FOR THE IMPERIAL INSTITUTE.





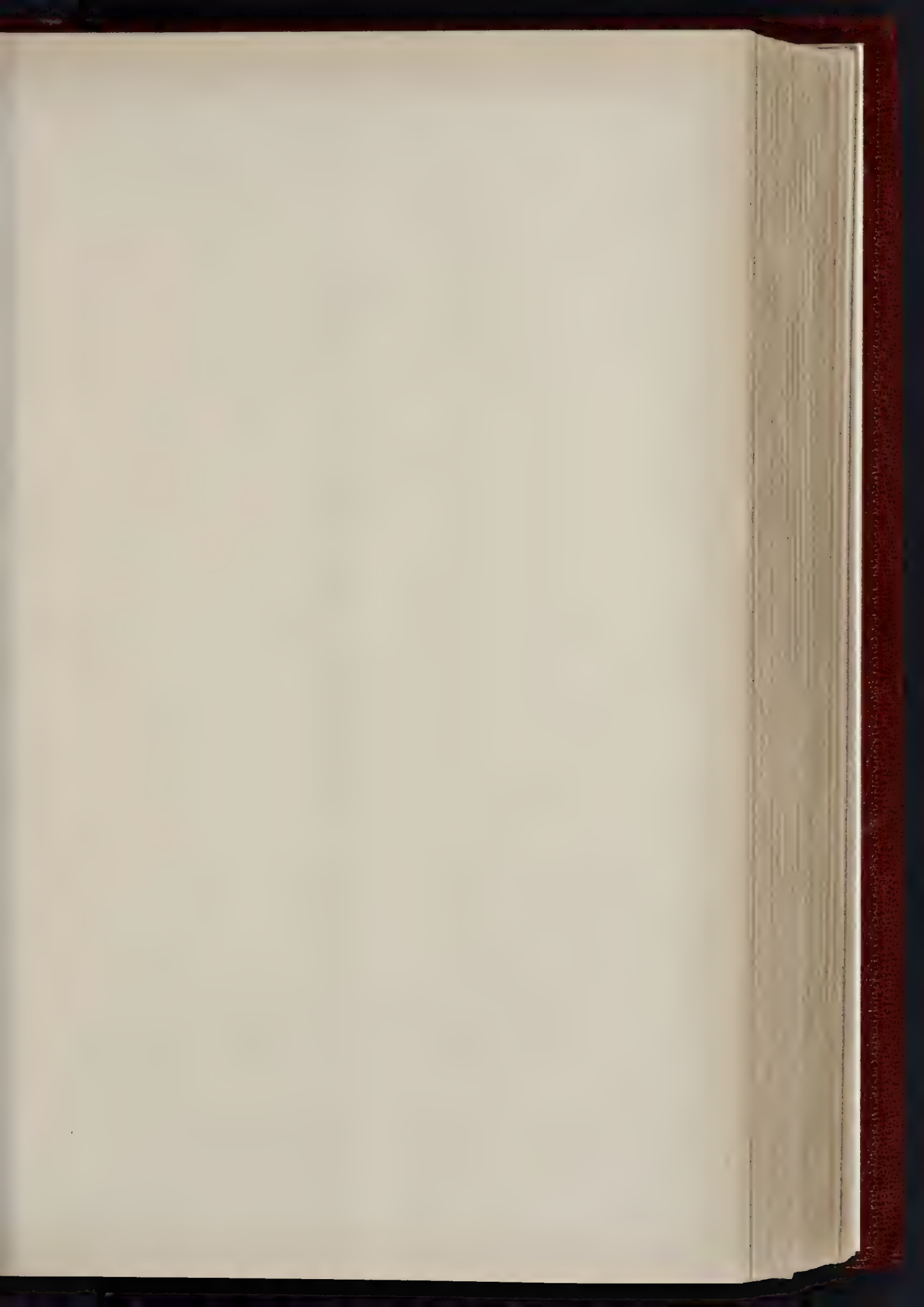






PHOTO L. THO. HARRIS & CO. 22 MARK LANE, LONDON E.C.

COMPETITIVE DESIGNS FOR THE IMPERIAL INSTITUTE.

DETAIL OF DESIGN BY MR. A. W. BLOMFIELD, M.A. F.S.A.



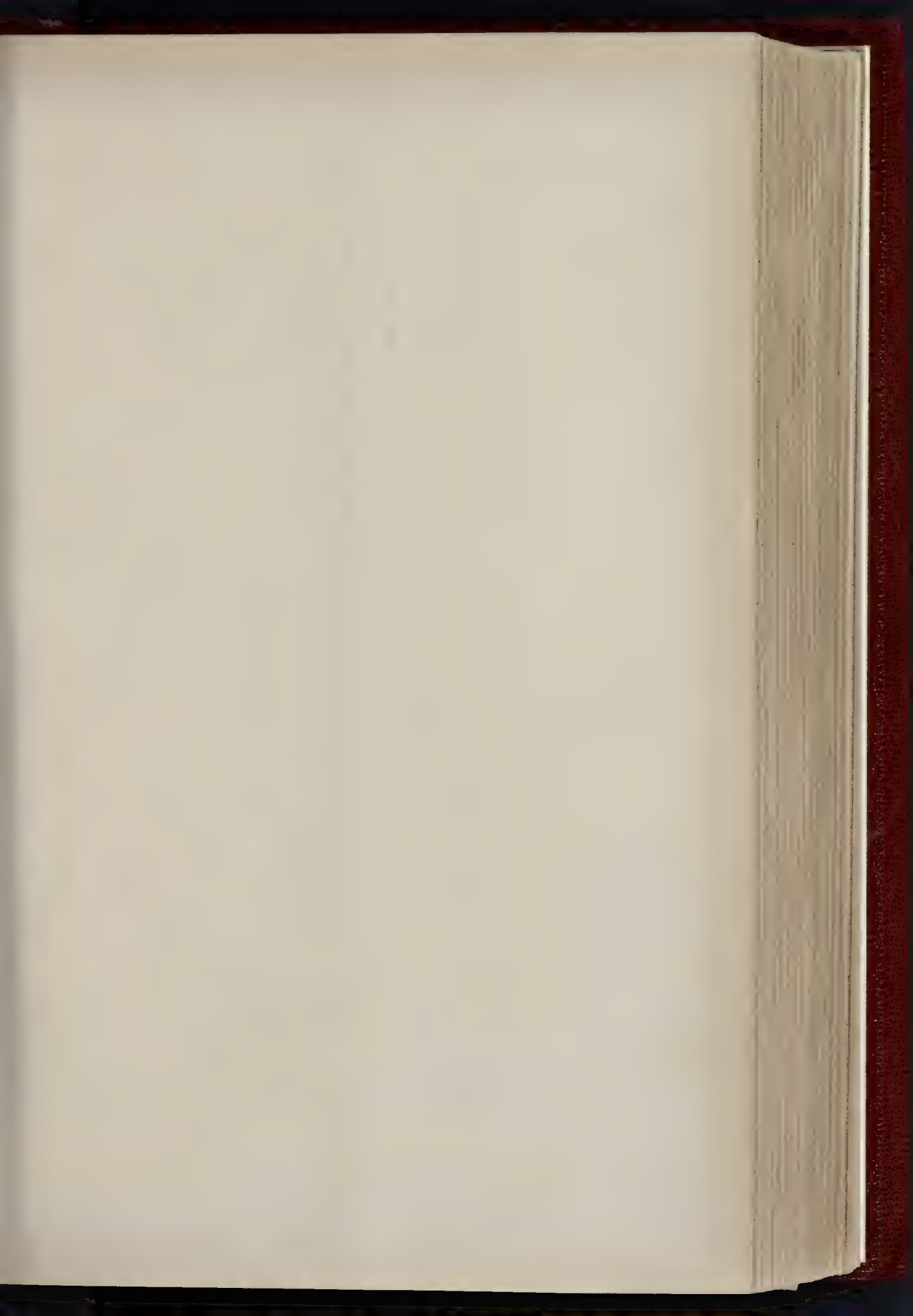
PHOTO LITHO SPRAGUE &amp; CO. 28, MARTIN LANE, CANNON ST. LONDON E.C.

COMPETITIVE DESIGNS FOR THE IMPERIAL INSTITUTE.

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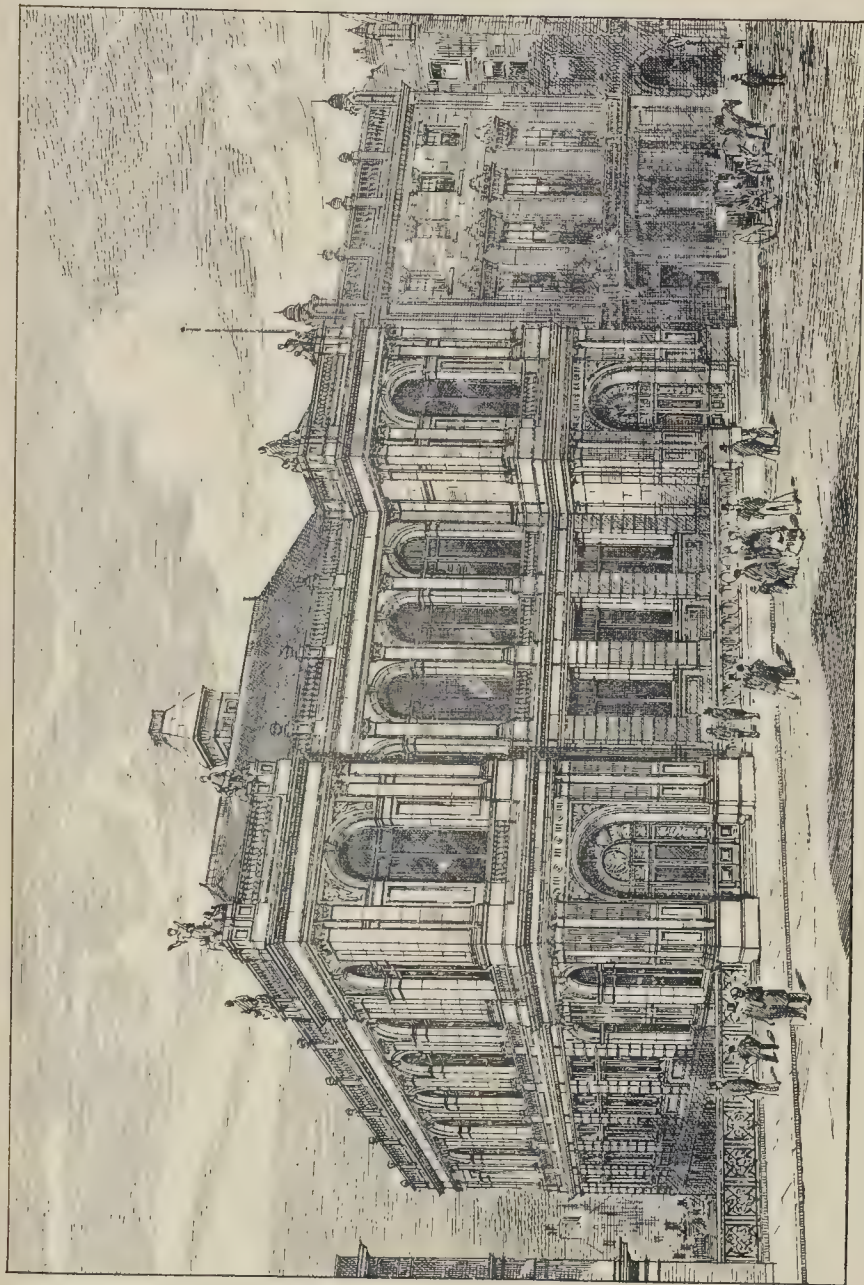




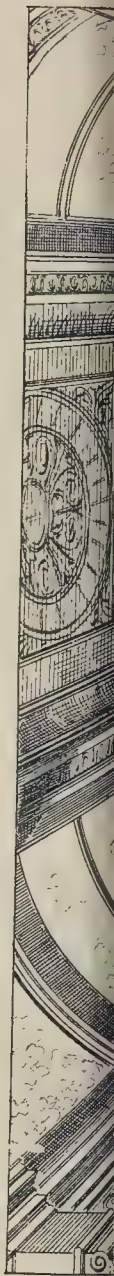




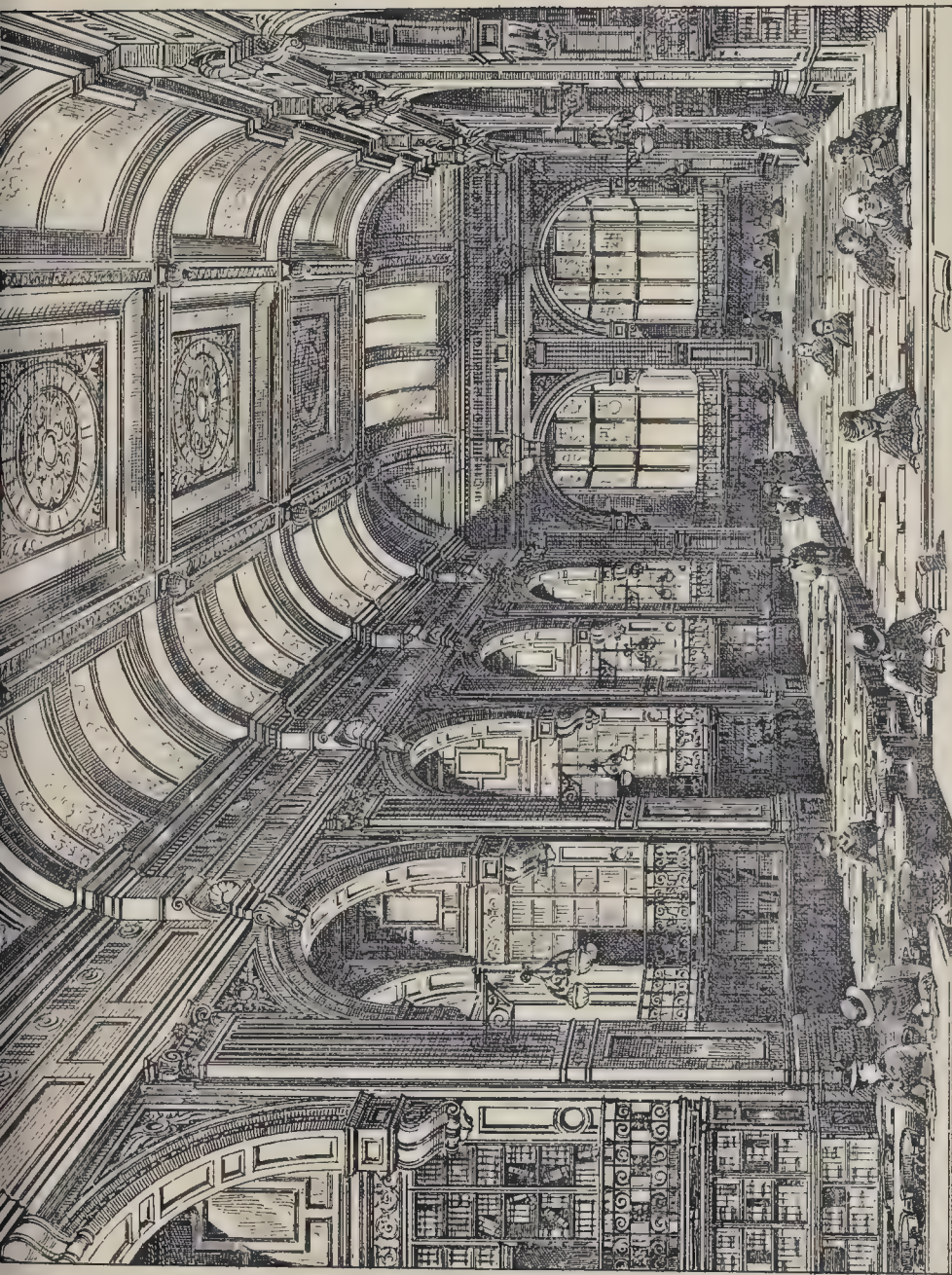
THE BUILDER, JULY 30, 1887.



VIEW FROM GEORGE IV. BRIDGE







INTERIOR OF REFERENCE LIBRARY.

EDINBURGH PUBLIC LIBRARY COMPETITION.

SECOND PREMIAED DESIGN: MR. JAS. B. DUNN, ARCHTITECT.





VISITED BY THE ASSOCIATION OF  
MUNICIPAL ENGINEERS.

by Granite Quarry and Victoria Stone Works.  
 N the occasion of the recent annual meet-

*The Mountsorrel Granite Quarry.*

For further information concerning these quarries  
found in the *Builder* for Nov. 12 and Dec. 10 and  
0.

*The Barrow Lime and Cement Works.*

BUILDERS' BENEVOLENT INSTITUTION.

Major Brown, the Secretary, read the annual report, which stated that during the past year ten deaths had occurred among the pensioners, and nine candidates who had been waiting for the benefits of the charity had been elected. The total number of pensioners was 32 men and 33 women, necessitating a large annual expenditure, and causing deep concern in the minds of the Committee to obtain new subscribers, the more so as many, who had for years past given regularly, and liberally to the Institution, had been removed by death. The Committee greatly regretted that the income of the Institution for the past year had not been sufficient to meet the expenditure, and that it had been necessary to withdraw the balance of the Reserved Fund. There was also an increase every year in the number of applicants seeking election. The Committee were under great obligations to Mr. Basil E. Peto for his valuable aid during the past year, and they also remembered with gratitude the support his father (Sir S. Morton Peto) had given to the Institution. The Committee were pleased to announce that Mr. H. H. Bartlett would be the President for the ensuing year, and that with the consent of the Court of the Carpenters' Company, the annual dinner would take place in Carpenters' Hall on the 3rd of November next.

Votes of thanks were passed to the President for the past year (Mr. Basil E. Peto), to the Vice-Presidents, to the Trustees (Mr. George Plucknett, J.P., Sir James C. Lawrence, Bart., Sir S. Morton Peto, Bart., and Mr. C. T. Lucas, and to the Treasurer (Mr. George Plucknett, who was again re-elected).

Votes of thanks were also accorded to the Committee, the retiring members of which were re-elected, and Messrs. Basil E. Peto and A. Moore added to their number. A similar compliment was paid to the auditors (Messrs. Ward, Bolding, and Duffield).

Mr. Thomas Stirling seconded the motion, which was unanimously agreed to.

A vote of thanks to the chairman closed the proceedings.

**The Rossetti Memorial.**—We are asked to mention that the granite used for this memorial, mentioned in our last, was from the Gunnislake Quarries, Tavistock.



### BUILDERS' CLERKS' BENEVOLENT INSTITUTION.

A GENERAL MEETING of the subscribers and donors to this Institution was held at the Offices, 21, New Bridge-street, E.C., on Tuesday evening last, at which the President, Mr. W. R. Freeman (Messrs. John Mowlem & Co.), took the chair. There were also present Mr. E. Brooks (Treasurer), Messrs. C. K. Turpin, F. Robson, H. W. Parker, W. D. Gilbert, J. Burchell, E. C. Roe, and other gentlemen.

At the conclusion of the formal business, three candidates for the Widows' Pension of 20l. per annum were elected by show of hands. There were in the first instance but two vacancies, but a third was specially announced in honour of the Queen's Jubilee, thus enabling the meeting to elect the three cases, without subjecting the candidates to the harass and expense of a canvass. The new pensioners are Louisa Hadrill, Maria Bowile, and Eliza Holding.

At the close of the election the following additions to the Rules of the Institution were submitted to the meeting and adopted:—

Rule II., Sec. 3, add:—"For the purposes of this Section it shall be lawful for the Trustees to purchase presentations for periods of twenty-one years, in such Institutions as a General Meeting may from time to time sanction, in the names of the Trustees of the Builders' Clerks' Benevolent Institution."

Rule XIX., add new Section:—"That the holders of each presentation purchased in pursuance of Rule II., Sec. 3, shall bind themselves to use such presentation only in favour of such candidates as shall be elected by this Institution, and to conform in all points to the Rules thereof, and to the Rules of the Institution into which the child is to be presented."

At the close of the business a cordial vote of thanks was accorded to the President for his services, not only on that occasion, but for his active personal interest in all that pertained to the welfare of the Institution.

### THE "NORTH LONDON COLOSSEUM."

BICKMORE V. BAKER AND GINNETT.

This case was tried in the Queen's Bench Division recently, before Mr. Justice Grantham and a common jury.

The plaintiff was Mr. William Bickmore, of Shepherd's Bush, builder and contractor, who sued the defendants, Mr. Henry Minter Baker, of Dover (a member of the firm of Barnwell & Baker, Government contractors), and Mr. George Ginnett (the well-known circus proprietor), for the recovery of 452l., balance due to the plaintiff for work done, materials supplied, and money advanced for the use of the defendants in connexion with the erection of a building in Roseberry-place, Dalston, known as the "North London Colosseum"; for the brick, timber, and iron work, for which the plaintiff was the contractor; and also for damages for breach of contract in completing the plaintiff having been stopped by defendants when about one-fourth of the work had been done, and afterwards prevented from proceeding further with the same, which was completed by another firm of builders (Messrs. Wilkes & Co.), who used all the plaintiff's plant and materials left on the ground by him for the purpose of carrying on the buildings. The defendants employed a Mr. Alfred Brandreth as their agent and architect in the concern, and with whom the plaintiff principally dealt as such agent; but since the stoppage of the work and during the course of the action, the defendants denied such agency and repudiated the plaintiff's claim and their dealings with him and connexion with the building in question.

The plaintiff was represented by Mr. E. U. Bullen and Mr. Stamp W. Lambert, instructed by Messrs. Turner, Son, & Norton; and the defendants by Mr. Cock, Q.C., and Mr. Glyn, instructed by Messrs. Thos. Beard & Sons.

The first witness called for the plaintiff was Mr. Griffith Williams, of 20, Spring-street, Sussex gardens, W., tailor, who deposed to having cashed cheques and post-office orders from Brandreth, which he (Brandreth) had received from the defendants, and to conversations which had taken place in his presence between Brandreth and the defendants, in which they appeared to treat Brandreth as their servant.

Mr. William Bickmore, the plaintiff, was called, and examined by Mr. Lambert. He said he first met the defendant Baker on the site of the intended building in the latter end of August, 1885, when Brandreth introduced Baker to him as one of the proprietors of the concern. Baker asked him how long the job would take, and what money he should require, and the plaintiff stipulated for weekly payments, which sums Baker said he should be prepared to pay on the certificate of Mr. Brandreth, his architect. He was afterwards introduced to the defendant Ginnett in the same way by Brandreth, and went into the matter with him. Plaintiff first met Brandreth in the matter some time before he met the defendants, when Brandreth produced to him a rude drawing of a circus, which

he had built in Manchester or Liverpool, from which he was asked to give an idea of the price of brickwork. Mr. Brandreth said he should want him to assist in working out the drawings, as he (Brandreth) was not used to the Metropolitan Board's requirements. He was to submit his estimate, others having been sent in at too high a figure. The plaintiff then detailed at length the circumstances connected with the taking of the land from the freeholder, the preparation of the building agreement by Messrs. Beard & Sons, and the commencement of the works, Brandreth having in the meantime written letters to the plaintiff, in which he represented himself as being merely the architect of the concern, and alluding to his principals. Plaintiff duly prepared and forwarded the specification and contract to Mr. Brandreth, expecting him to sign a duplicate, and return; which, however, he did not do, but wrote to the plaintiff as follows:—

"2, Spring-street, W. Thursday Evening, August 20, 1885.

Dear Sir,—Sorry was not at home when you called. Hope to begin work on Monday, or at least sign your contract. You may get scaffolding on ground when you like. I will tell the above work was in hand, as you told Mr. Baker, and the fact of your having your scaffolding on the ground, or getting it on when we get there, may greatly hurry up the money. Do you understand? Yours truly, ALFRED BRANDRETH."

He took this letter to be in answer to the contract and specification which he had left, and he accordingly attended the ground on January 21st, and further discussed matters with Mr. Brandreth and Mr. Baker, this being the interview with Baker before alluded to. He then went on with the work till he had notice to stop. It appeared that the cheques given in payment were sent to Mr. Brandreth, who cashed them, and handed the plaintiff what he thought fit. On the 14th of September, the plaintiff received the following letter from Brandreth:—

"Railway Hotel, Leicester, 14th December, 1885.

Dear Sir,—Mr. Ginnett, Mr. Baker, and their solicitors will be on the ground at one o'clock sharp, on Thursday morning next. I have told them the wall was up all round the building about 5 ft. Mind you keep the men hard at it. I have also said the ironwork was in hand, as you told me you had settled with Lycegh.—Yours truly, in haste, ALFRED BRANDRETH."

At this meeting matters were gone into, and some discussion ensued as to the advisability of discharging some of the workmen, which caused some discontent among them, and they were accordingly retained until just before Christmas. Mr. Ginnett and Mr. Baker visited the ground, and as the time was approaching for the completion of the building by the time required, the plaintiff said he should want 50l. or 60l. a week to get it done. Mr. Ginnett and Mr. Baker, he understood, arranged that he should receive that amount. Soon after the work was somewhat stopped by the frosty weather. Defendant Ginnett left ten sovereigns for him on the desk in the office. During the time the work was in progress, the plaintiff had drawn three bills of exchange, for 25l., 50l., and 65l. respectively, which were drawn on condition that the defendants should know it, and that they should be duly met. On the 23rd January, a formal notice was served by the Metropolitan Board of Works on the plaintiff, by a letter from Mr. Brandreth to him, of the 30th, as follows:—

"National Hippodrome Company, 20, Spring-street, Sussex gardens, Hyde Park, W. 30th Jan. 1886.

Sir,—I hereby give you notice that pending certain investigations and surveys in connexion with the building operations in Roseberry-place, Dalston-lane, the work will be stopped on and from Monday next, the 2nd of February, till further orders, and that your services will not be required on the ground until the Metropolitan Board of Works' Surveyors and the ground landlord's surveyors have inspected ground and deliberated on the matter with me as to the course to be adopted. I need not remind you that should you attempt to ignore this notice you will expose yourself to very unpleasant proceedings. I had a consultation with my solicitors this afternoon, and I may as well add that I shall require the builder to enter into a building agreement, containing usual clauses, and providing satisfactory securities for their fulfilment before the work is resumed, or any further moneys advanced.—I am, sir, yours, ALFRED BRANDRETH."

The last payment on account of the work was on the 23rd January, 1886, when Brandreth handed plaintiff 40l.; on the 12th February plaintiff saw defendant Ginnett on the ground, when they conversed on the matter, and Ginnett did not understand the work being stopped. Plaintiff wrote to Brandreth, with his account, and on the 23rd February he received a reply from him disputing the accuracy of the same. Ultimately the work was taken up by Messrs. Wilkes & Co., who used the plant left on the ground by the plaintiff. Plaintiff also wrote to defendants, but received no reply to his letters.

In cross-examination by Mr. Glyn, the plaintiff could not say whether or no he did any work on the ground prior to the 30th September, the date of the building agreement. He maintained that Brandreth represented Baker, in that gentleman's presence, as his principal in connexion with the works, and his evidence-in-chief was not shaken on any material points.

Edward Collier, a labourer, of Starch Green, said he had been in the employ of the plaintiff off and on for 24 or 25 years, and was employed by him on

the occasion in question in looking after the job, cutting up the ground and concreting. Baker and Brandreth came on the ground, and the former asked him whom he was working for. He replied, for "Mr. Bickmore." The scaffolding arrived on the ground in their presence, and he saw Baker there many times afterwards. He also saw Ginnett there. He, witness, deposed to different conversations he had with Baker, and to messages having been left for plaintiff by Baker, and to the fact of plant and materials being left on the ground by the plaintiff and being used by Messrs. Wilkes & Co.

James Tilbury gave similar evidence. Mr. George Sparrow, an architect and surveyor, formerly in the employ of Mr. Legg, District Surveyor of West Hackney, proved service of the formal notice on the plaintiff in January, 1886. He assisted Mr. Brandreth in amending the plans required by the Metropolitan Board of Works. In 1886 Mr. Ginnett was introduced to him in Mr. Legg's office as one of the proprietors of the Hippodrome, by Mr. Brandreth. At that time he believed Messrs. Wilkes had not taken up the building. He never saw Mr. Baker.

Mr. George Hamilton was called to prove discrepancies in the bills drawn by the plaintiff, and that the bill for 50l. was taken up by a cheque of defendant Baker.

Mr. Charles Steel, proprietor of the Crown and Castle, Kingland Gate, close to the building, said he saw Mr. Ginnett during the erection of the Colosseum with Brandreth and Bickmore. Mr. Brandreth introduced him to him as one of the proprietors. In a conversation with Ginnett, the latter said that Wilkes claimed some 3,000l., 4,000l. as owing to them, and remarked, "We spent 700l. or 800l. on the place before Wilkes took on." This closed the plaintiff's case.

Mr. Cock then opened the case for the defendants and contended there was not the slightest foundation for trying to make them liable to the plaintiff.

Mr. Thos. Beard, of the firm of Beard & Sons, of 10, Basinghall-street, solicitors, was then called to prove his instructions for and the preparation of the building agreement of 30th September, 1885, and that he was not instructed by the defendants.

Mr. Alfred Brandreth said he was an architect and surveyor, of 17, Devonshire-square. He had been for some time previously to the 30th September, 1885, endeavouring to form a company to develop an idea which had since been developed, viz., a hippodrome which had taken the name of "Olympia," and succeeded very well. He worked hard to develop it, but failed in doing so for want of the necessary capital. In the course of his investigations in London he found two suitable sites—one at Kensington where the American Exhibition is now, and another at Dalston. He saw the owner of the land in the latter case, and ultimately a building agreement was entered into. The witness then detailed at length the history of the transaction, and said he remembered employing the plaintiff to do some work. He positively denied ever having represented to plaintiff that defendants were the proprietors of the concern, but stated he was sole proprietor, and money necessary to enable him to carry on the work having been lent him by Mr. Ginnett. Witness was then submitted to a long cross-examination by Mr. Bullen, with a view to show that his financial condition was a serious one.

Mr. George Ginnett, examined by Mr. Glyn, said he was a circus-proprietor and one of the defendants, and had known the last witness for some years. He proposed to witness building a theatre or circus in London to be used for all sorts of purposes, and asked witness to finance him, which he agreed to do on his being given the preference to let it for the first season for a circus, and he accordingly advanced him money from time to time. He never instructed Brandreth as his agent to employ builders. He never dared say in his (witness's) presence that he (witness) was his principal, and he should have to him differently if he had; nor had Baker any share or interest in the matter more than witness had.

In cross-examination by Mr. Bullen the witness could not say how many circuses he had had in his time, but he had a fresh building every winter. Perhaps four of these had been built for him by Brandreth, and in the case of a circus in Birmingham the relations between them were similar to the present. It was not a building of this kind, and he had been taken down. He had lent witness money, and one transaction held a bill of sale on his property for about 155l.

Mr. Henry Minter Baker, the other defendant, was then examined by Mr. Glyn, and said he was Government contractor residing at Dover. He had no interest whatever either in the land taken up by the building agreement, or in the building that was erected on the land. When the Hippodrome Company was formed, he subscribed for five shares on the 1st of May, for which he paid 500l. in May and June; that was his only interest. Ginnett asked him for money to lend to Brandreth. Brandreth never, to witness's knowledge, ever advanced him any money as his principal, or he should have contradicted it directly. He never heard of Flint or Allen until this case came on.

Cross-examined by Mr. Bullen.—Do you mean to say, Mr. Baker, that you never heard of Flint or Allen?—I never heard of Flint or Allen.



his statement which appears in this letter of the 14th of November, 1885, written by Brandreth, at whom?

—To whom? Plaintiff. It has been read over and over. "What about this week's cash? That's I have written to inquire this evening. They not let me take money from Beard or Flint, nor was there a procuration to pay and they red saving it as they were not short of 1,000." at true?—No; perfectly untrue. Brandreth mentioned Flint's name to me.

Justice Grantham.—Nor Beard's?

Witness.—Nor Beard's. I did not know him 3 months after. Examination continued.—I believe it to be fact invention of Brandreth's. I have seen more two or three times on the ground, and none to him. I know nothing of him in connexion with the work at Datchet. I knew that Brandreth riding and Bickmore doing work by the wish andreth. I was not certain of it. The account conversation given by Bickmore at the "Crown Castle" is quite false. I never asked why he did not go on faster. I never told Bickmore I had plenty of money, or had any connection with him.

His counsel the defendant's case, and Mr. Glyn addressed the Court, and Mr. Bullen having read on the whole case, the learned Judge said up. He said he thought the jury would very little difficulty in coming to a conclusion as to the truth of the case. Did they think a builder the plaintiff was likely to undertake work of kind without asking how he was going to his money? But that was the defendant's case, and it was for the jury to say whether they believed it or not. In regard to the relations between Baker and Brandreth, did they think one would lend another money in that way without any? As to the relations between Ginnett and Brandreth, it was for the jury to say whether the loans of principal and architect, which it was well known existed between them formerly had ceased at the present occasion.

The jury at once found a verdict for the plaintiff, and costs, on all the issues, and his Lordship gave judgment accordingly, and directed that the amount due for work done, materials, &c., and expenses should be found by a reference to one of official referees.

# PROVINCIAL NEWS.

Newcastle-under-Lyme. With regard to the proposed municipal buildings here, the following communication received by the Mayor, read at a recent meeting of the Town Council:—

"Treasury-chambers, July 4, 1887.

—The Lords Commissioners of Her Majesty's Treasury have had before them the memorial from the Corporation of Newcastle-under-Lyme, dated the 5th of June last, for leave to purchase land and borrow money for the erection of a council-house, assembly-hall, free library, &c., together with a counter memorial from the ratepayers, and the correspondence that ensued thereon, as well as the report of the Local Government Inspector upon the whole scheme. The conclusion to which my Lords has arrived is as follows:—The objects of the scheme are no doubt desirable, but in view of the opposition it has excited on the part of a large number of the ratepayers, arrangements should be made to prevent the execution of it from entailing any addition to the net indebtedness of the borough. Moreover, the expediency should be taken to include in the scheme the abolition of the requisite municipal offices, whilst making economical alterations in the general design of the buildings as will prevent the addition of these offices from increasing the total cost. The Corporation owns a site in the street which was bought in 1879 for 10,000*l.* for municipal offices, the funds being raised by loan with the sanction of the Local Government Board. This site is a valuable one, and my Lords propose that the Corporation should, with the concurrence of the Local Government Board, sell this site, or so much of it as is not required for widening, and apply the proceeds to the reduction of the debt in accordance with section 176 of the Public Health Act, 1875. Their lordships have reason to know that the Local Government Board will assent to this, and if the Town Council will pass a resolution giving themselves to adopt it, my Lords will consent to the borrowing of a sum of 1,000*l.* for the purchase of the site, and the erection of the buildings on the scheme now in contemplation. The loan of 1,000*l.* will have to be repaid in more than thirty years. As regards the further loan for the erection of buildings, my Lords cannot decide on the amount until the plans have been modified so as to include municipal offices as already suggested, nor until they know what amount of debt has been cancelled by the sale of the High-street site.

I am, Sir, your obedient servant,  
R. E. WELBY."

The Mayor said he thought the Council were in a position to discuss this communication on such short notice, and moved that the question be referred to the General Purposes Committee. This was agreed to.

Oldham.—Alterations and additions have been made to the Convent here, the new portion being opened a few days since. A large octagon has been built, while the existing ones have been considerably enlarged. The floor of the extension consists of dormitories, corridors, and bath room, while the chapel, which is of lofty proportions, is on the ground floor, being entered from the portion

previously erected. It has an open-timbered, hammer-beam roof. The walls, to a height lineable with the window bottoms, are covered with oak panelling, the head of each panel being filled in with tracery, the panels alternating in design. On each side of the chapel are ten stalls, the seats being made to lift up, showing the carvings beneath, the whole of which vary in design and detail. At the end of the chapel, adjoining the entrance, is a screen, consisting of eight compartments, the upper portion of each filled in with tracery. At the other end of the chapel is the altar, of Decorated Gothic design. The side niches are filled in with statues. The altar-table, which is executed in stone, stands upon black marble columns, with foliated caps. The windows are filled in with stained glass, two of the windows containing representations of Our Lady, St. Joseph, St. Angela, and St. Stanislas. The brickwork has been executed by Mr. Haines, the masonry by Mr. Staley, the joiner's work and slating by Messrs. S. Ashton & Sons, plumbing, glazing, and painting by Mr. Hearn, all of Oldham. The whole of the fittings, including altar and screen, have been executed by Mr. Oor, sculptor, Roermond, Holland, who makes a speciality of this class of work. The stained glass has been supplied by Mr. S. Bourne, of Birmingham, and the gas-fittings and brass work to the altar by Messrs. Thomasson & Co. The plans of the building, and details of the altar-screen, and other fittings, have been prepared by Mr. A. Banks, of Oldham, who has superintended the erection of the work.

Redcar (Yorkshire).—The trustees of the Kirkleatham Estate have offered sixteen acres of valuable land to the Local Board for pleasure-gardens. Mr. J. Howcroft, their surveyor, has received instructions to prepare plans for laying out the same. The Board have also decided to extend the sewer outfalls through the rocks to low water, as recommended by their surveyor.

Sunderland.—A new hospital for infectious diseases is now in course of erection in the Hylton-road. The ground upon which the buildings are being erected is twelve acres in extent, and was purchased from Col. Scudfield in February, 1885, for the sum of 5,000*l.* It is situated a little more than two miles from the centre of the town. The boundary-walls upon three sides of the site were erected by Mr. T. P. Shafto, the contractor for these buildings, in 1885, at a cost of 780*l.* The buildings now being erected include the administrative block, the washing, laundry, and disinfecting establishment; boiler house, stable, and ambulance house; post-mortem room and mortuary, two fever pavilions, entrance lodge, and the northern boundary-wall, gates, &c. The administrative block will be erected in the form of the letter T, with kitchen department in the centre and rear, so that in the future it may be extended if necessary in the form of a quadrangle. The west frontage will be 100 ft. in length, and the main building will be three stories in height, whilst the wings will be two stories, and the kitchen offices one story high only. The fever pavilions will each contain two large wards, for male and female patients, 48 ft. long and 26 ft. wide, by 13 ft. high. Each ward will accommodate eight patients. At the extreme end of each ward will be situated the annexe containing the conveniences, &c., and in the centre of the building will be the nurses' duty-room, overlooking each ward, together with bath-room, pantry, and coal store. An isolation pavilion is to be erected for the purpose of accommodating cases in which it is not always possible in the early stages to be positively certain of the precise nature of the disease. This building, like the fever pavilions, will be one story in height only; it will contain four smaller wards for the reception of ten patients, and will also have the requisite duty-rooms for nurses, and the usual conveniences. The floors of all wards will be laid with narrow pitch-pine boards, screwed down and waxed, and the walls will be plastered with Parian cement. The block of one-story buildings on the south-side of and adjacent to the administrative block will comprise disinfecting rooms, washhouse, laundry, stable, hay and straw store, ambulance house, boiler house, post-mortem room and mortuary. The buildings have been designed by the Borough Engineer, Mr. S. Ronnhwaite, and the quantities were taken out by Mr. G. D. Irwin. The contract for the whole of the work has been entrusted to Mr. T. P. Shafto, of Sunderland, the amount

of his tender being 13,796*l.* 1*s.* 8*d.* Mr. J. Binks is acting in the capacity of clerk of works.

Ventnor (I.W.).—The new pier at Ventnor, and the enlargement of the Ventnor Hospital for Consumption, are two works noticed in the *Hampshire Independent*. With regard to the pier, it is stated that the Ventnor Local Board in 1884 obtained an Act of Parliament which enabled them to purchase the old pier at a cost (including the charge in connexion with procuring the Act) of 3,500*l.* They bought the old pier, and have since carried out the present fine promenade and landing-place, which has cost nearly 12,000*l.* Mr. Henry E. Wallace was the engineer selected by the Board in competition, and he appointed Mr. Theodore Saunders, Ventnor, as resident engineer. The contract was obtained by Messrs. Trehearne & Co., of Battersea, and Mr. Grace, of Southampton, has acted as foreman of the works. The work was making rapid progress when, in October last, a considerable portion of the staging was washed away, and a delay of three months ensued. The head of the pier may be described as shoe-shaped, measuring 100 ft. by 80 ft. A glazed wind screen is fitted at the head, and a bandstand of cast-iron is erected within this screen. There is a landing-stage entirely disconnected from the pier. This stage consists of two levels, one for high water and the other for low, and is constructed upon green-heart piles 14 in. square, and braced in wrought-iron. The head is raised 18 in. above the trunk of the pier, and is reached by three steps. The width of the body of the pier, measuring between the backs of the seats, is 25 ft. It is built throughout on cast-iron piles, braced with wrought-iron. There are wrought-iron gates at the entrance by Messrs. Macfarlane & Co., Glasgow. The whole structure measures from end to end about 650 ft.

—With regard to the Consumption Hospital, a new block has been added to it with money bequeathed by the late Mr. John Jones, of Piccadilly. The new block is larger than any of its predecessors. Immediately opposite to the entrance are doors which open on a small landing overlooking a spacious dining-hall, where the whole of the patients under treatment at the hospital, and more, can be accommodated. At each end of the hall are sitting-rooms. On the left of the entrance-hall are apartments for the head-nurse and the dispenser, and on the right are consulting and waiting rooms. Upstairs there are bedrooms for twenty patients, each to have a separate apartment, and all facing the south. A verandah runs outside the bedrooms, from which the patients will have a splendid view over the sea and the landscape below and on each side of them. All the rooms are fitted with the means of ventilation, and the warming apparatus is most complete. The sitting-rooms and bedrooms have each a box of steam pipes. In the coldest weather the air passes through these pipes into the room at a temperature of 62 degrees. By means of a rapidly-revolving fan the vitiated air in each of the rooms is drawn through a grating near the ceiling, and by this means an atmosphere as pure as possible is maintained. The architect of the new block is Mr. Hillier, of Ryde, and the builders are Messrs. Ingram & Son, Ventnor. The ventilation is carried out by Messrs. Bacon & Co., London; the furnishing by Messrs. Lawes & Son, City-road, London; and the cooking arrangements by Messrs. Edwards & Son, Great Marlborough-street, London. The sewerage arrangements for the entire set of buildings are very complete, and distinct from other systems in the neighbourhood. The drainage discharges into one channel carried under the rocks 200 yards right out to sea. The new block is to be opened by the Princess Beatrice early in August.

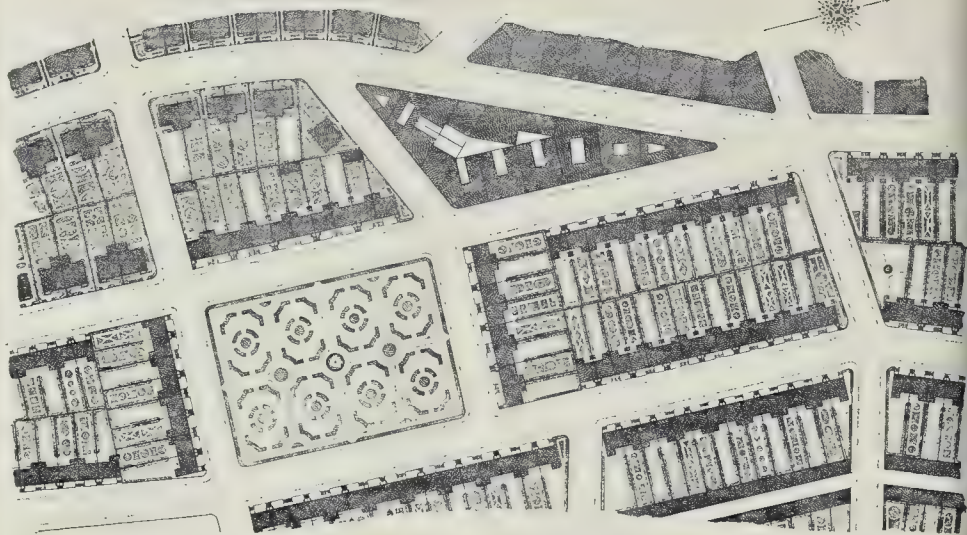
Technical Examination for Carpenters and Joiners.—In order to promote efficiency on the part of carpenters, joiners, builders' foremen, and clerks of works, the Worshipful Company of Carpenters propose to hold examinations in their Hall and at their Technical Institute at Stratford, and to grant to candidates certificates of their theoretical and practical acquaintance with their craft. The first examination will take place in June, 1888, and full particulars, with specimen of examination papers, can be obtained at Carpenters' Hall.



## PART PLAN OF A TOWN

—SCALE—

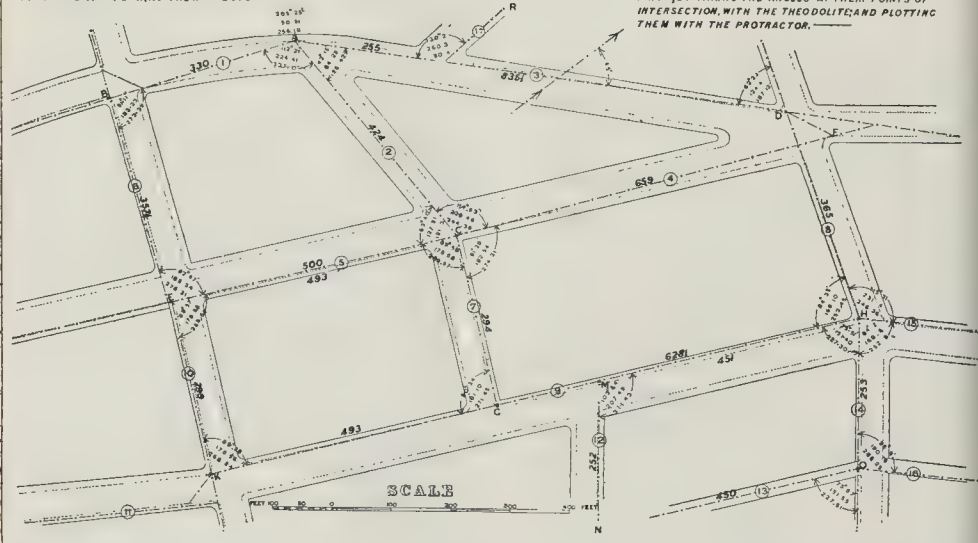
FEET 100 200 300 400 500



## PART PLAN OF A TOWN SHOWING SURVEY LINES

NOTE.—THE DETAIL OF THE ENCLOSURES, CAN AFTERWARDS BE SURVEYED IN, FROM LINES TIED ON TO THE FRONTAGE LINES, TO COMPLETE THE PLAN, AS SHOWN ABOVE

PLAN OF ROADS, SURVEYED FROM BASE LINES SHOWN THUS — THE RELATIVE POSITION OF WHICH, IS FIXED, BY TAKING THE ANGLES AT THEIR POINTS OF INTERSECTION, WITH THE THEODOLITE, AND PLOTTING THEM WITH THE PROTRACTOR.



## The Student's Column.

## LAND SURVEYING AND LEVELLING.

V.—BASE LINES (continued).

**W**HERE a system of chain triangulation cannot be adopted, the angles between the base-lines are taken with a theodolite in the following manner:—The instrument is set up level with its vertical axis exactly over the intersection of two base-lines. This is indicated by the plumb-bob hanging exactly over the centre of the station peg. Upon a well-paved road, the best way to mark the station points is to run the base-lines so that they terminate, where possible, in the joints of the kerbstone into which a 4-inch nail can be easily driven, and can be readily found when required for future reference, by noting its

distance along the kerb from the nearest lamp-post, or other fixed point. The accompanying diagram illustrates a part plan of a town where this method was adopted. The roads were first surveyed from the base-lines as shown. The angles at the points of intersection are taken, and the lengths of the base-lines accurately chained. The detail of the enclosures can then be afterwards surveyed from base-lines fixed in position by being tied on to the frontage-lines to complete the plan. The accuracy of the horizontal angles which are measured is proved by a process of repetition, which consists of respectively doubling and tripling the amount first read, and in order to avoid error of direction in plotting, it is advisable to adopt a uniformity of method, by always recording the amount of arc traversed by the telescope when moved, in the direction of the hands of

a watch. Hence, when the base-line to which you are approaching deviates to the right-hand of the surveyor as he walks over the previous base-line, the angle booked exceeds  $180^\circ$ , and when it deviates to his left-hand it reads less than  $180^\circ$ . It will be observed that as the primary scale of divisions is marked in a continuous circle upon the outer edge of the lower plate, a horizontal angle may be repeated definitely round the limb of the instrument, and thus a number of repetitions added mechanically will serve to secure accuracy of the resulting mean.

Referring to our diagram of last week (p. 154), let us suppose we require the angle between the base-lines A B and B C, fig. 1. The instrument when removed from the box is in an unclamped condition, and is set up over the peg at B, before in a



amping the plates. The vernier of the horizontal plate is then set to zero at F, and clamped. The upper plate being clamped to the lower plate, the reading at F is finally adjusted by the tangent screw to the aid of the magnifying eye-piece and to the horizontal plate. Both plates are revolved upon the vertical axis turning the telescope with the hand. It comes as nearly as possible in the line of the line B A, and the line of collimation is set to intersect the line of a ranging-rod or peg, which has been previously placed exactly upon the line B A. The collar which fixes the lower plate or limb instrument is then clamped, and the tangent-headed tangent screw connected to the collar clamp is slowly turned by the hand until the distant point of observation on the base-line is accurately bisected. When done thus, leave the lower-plate clamped, clamp the vernier plate. By this means it will be given to the stage carrying the telescope to traverse the required angle. The verniers move simultaneously with the plate, and the angle is measured by the arc of arc described, after the telescope is set in the direction of the line B A, and the line of collimation bisects the distant point observed. In proceeding from station A to station C in fig. 1 (*Builder*, July 23, p. 154), the angle at station A between the line A B and B C is at 278° 11', whereas if we were proceeding in the opposite direction from station C to station A, the angle at B would be at 81° 49'. For convenience of reading the verniers the zero point is placed at the side of the stage carrying the telescope, so that the angle required to be taken is situated within fig. 4, the actual angle traversed by the verniers is shown in fig. 3.

# RECENT PATENTS.

## ABSTRACTS OF SPECIFICATIONS.

7, Construction, Bedding, and Laying of Pipes. J. Potts.  
The object of this invention is to provide a solid support for the pipes so that they may be permanently maintained at their proper level or position of fracture. A cradle is therefore laid on the ends of each pipe, so that a sufficient length of the flat bearing surface is obtained. The cradle is either formed in one piece on the pipe itself, and when separate it is connected to the pipe by cement or mortar; or concrete may also be used for the cradles.  
11, Ventilators for Down-draught. H. T. T. T.  
The basis of the invention to which this patent relates, is the employment of grooved rings, the shaft of the ventilator which act as drawn and prevent down-draught. The rings are of metal or of clay. The bases of cylindrical pot the cover may be of any of the common ordinary shapes.  
14, Wood Pavement. E. Bull.  
The object of this invention is to lay wood-pavement in a manner that a better grip is afforded the feet. There is a space all round each block which is filled in with cement, concrete, or in slabs of wood. The blocks are attached to the wood by nails, these are attached to the slabs at right angles. These double slabs may be transported from place to place, and can be laid down without blocking up the way for long periods. A kind of grate is used in the blocks in position when building up the pavement.  
17, Sash-Fasteners. J. Dedden.  
The invention relates to a window-fastening device to prevent the use of a knife to force back the sash spring is fixed so that unless it is pressed back it cannot be pulled back. It is simple, and cheaply made.  
19, Electrical Burglar Alarms. R. Hadden.  
The alarm which is the subject of this invention is rolled by the action of curtains or textile articles which a cord is stretched or a frame is used to the window-curtain, which also is the alarm.  
21, Chimneys. C. J. Henderson.  
The construction of chimneys according to this invention, circular bricks are used, and these tubes, form the continuous openings, while smaller tubes form a shaft to ascend, the heated fresh air is forced for warming apartments, while the smoke is forced to the outer air.  
22, Window Frames and Sashes. S. S. S. S.  
The object of this invention is to provide a device for sliding the sash without weights, for the same against the sides, are the main

points in this invention. A full description of elaborate methods of fixing is given in the specification.

## NEW APPLICATIONS FOR PATENTS.

July 15.—9,939, P. Born, Automatically Cooling the Air in Rooms, &c.  
July 16.—9,971, S. Hazeland, Wood Planing Machinery.—9,973, S. Gratrix, Speaking Tubes.  
July 18.—10,031, R. Smith, Chimney Pots.—10,042, A. Bout, Roofs and Roofing Material.—10,054, G. Lundberry, Door and Cupboard Fastenings, &c.  
July 19.—10,114, J. Wallas, Heads of Rainwater Pipes, &c.—10,132, H. Doulton and M. Marshall, Architectural Mouldings, Chimney Pots, &c.  
July 20.—10,146, J. Wilson, Walls, Buildings, Chimneys, &c.—10,164, J. Davies and W. Codner, Tanks and Cisterns.  
July 21.—10,231, The Acme Ventilating and Heating Co., Ventilating Buildings, &c.—10,236, C. Gregson, Concrete Walls, &c.

## PROVISIONAL SPECIFICATIONS ACCEPTED.

7,773, E. Salomons, Fastenings for Windows.—7,777, W. Phillips, Pivots for Windows, &c.—8,140, W. Bohm, Stair Treads, Flooring, &c.—8,752, E. Edwards, Tinting, Staining, and Colouring Glass.—8,773, S. Jefferys, Chimney Tops.—9,457, S. Hill and R. Hodges, Spring Hinges for Swing Doors.—9,244, F. Taylor, Door Bolts.—7,275, J. Bird, Automatic Weather Bar.—8,509, G. Evans and C. Ford, Wood Block Floors.—8,738, S. Reeve, Warming and Ventilating Apartments, &c.—8,901, W. White, Ventilation of Rooms.—9,277, J. Wilson, Spring Hinges.—9,612, W. Baker, Plastering Machines.—9,616, W. Ingham, Height Measuring Apparatus.

## COMPLETE SPECIFICATIONS ACCEPTED.

### Open to Opposition for Two Months.

12,042, H. Broadway, Basement or Fanlight Stays and Fasteners.—15,227, E. & J. Verity, Sash and Casement Fastener.—17,158, S. Wilding, Briquettes.—6,048, A. Smith, Attaching Door-knobs to Spindles.—13,165, C. Grimmer and J. Cook, Fastener for Windows, Casements, &c.—13,244, C. Portway and A. Kibble, Fastener.—7,966, W. Boelling, Inlaid Floors.—8,648, A. Rammage, Fireproof Column and Stanchion combined for Building Construction.—8,923, H. Lake, Dry Closets.

## RECENT SALES OF PROPERTY.

### ESTATE EXCHANGE REPORT.

July 7.  
By FULMER, MOON, & FULMER.  
South Croydon—Five plots of freehold land .....£1,133  
Croydon—27, 28, and 31, Addington-road, freehold 350  
July 14.  
By FULMER, MOON, & FULMER.  
Farnham, near—An enclosure of land, 10a, 3r. 10p., copyhold ..... 450  
An enclosure of land, 15a, 2r. 15p., copyhold ..... 340  
Two enclosures of copyhold land ..... 340  
Two enclosures of freehold land ..... 225  
July 15.  
By MURRELL & SCORRELL.  
Westminster—A ground-rent of 50l. a year, reversion in 43 years ..... 1,570  
July 18.  
By BEARD & SON.  
Notting Hill—9, Johnson-street, and a Ground-rent of 4l. 10s. 6d. years, ground-rent 12l. .... 1,020  
Paddington—Delancey-crescent, 62 years, ground-rent 8l. 8s. .... 535  
By VENTON, BELL, & COOPER.  
Hackney-road—Ground-rent of 100l., reversion in 39 years, and reversion to 1-3rd of the freehold Ground-rent of 18l. 4s. 4d. and 1-3rd of the freehold, reversion in 39 years ..... 3,020  
July 19.  
By GEO. HEAD & CO.  
Bryanston-square—11, Seymour-place, 40 years, ground-rent 22l. .... 605  
St. James's—10 and 11, Cleveland-row, freehold ... 5,650  
By C. W. DAVIES.  
Gravesend—10 to 18, Queen-street, freehold ..... 1,830  
Ground-rent of 120l., reversion in 47 years ..... 4,310  
By F. HARDS.  
Greenwich—46 and 48, Royal-hill, freehold ..... 1,010  
Church-street—The Ship and Sailor public-house, freehold ..... 700  
By DENHAM, TAYLOR, & CO.  
City of London—17, Broad-street Hill, freehold ... 2,650  
70 and 71, Watling-street, freehold ..... 6,600  
16 and 17, King William-street, 27 years, ground-rent 68l. .... 9,200  
30 and 32, Moorgate-street, 29 years, ground-rent 120l. .... 10,600  
By Messrs. COBE at Ashford.  
Kent, New Romney—The New Inn, freehold ..... 3,500  
The Plough beer-house, and 2a, Or. 7p., freehold ... 700  
Two cottages and gardens, freehold ..... 240  
An enclosure of land, 9a. Or. 22p., freehold ..... 1,025  
Enclosures of land, 58a. 2r. 24p., freehold ..... 5,075  
Enclosures of land, 10a. 2r. 22p., freehold ..... 1,210  
Manciler's Cottages, and 14a. 3r. 9p., freehold ... 720  
An enclosure of land, 9a. 3r. 25p., freehold ..... 350  
Three enclosures of land, 38a. 3r. 9p., freehold ... 1,900  
Appledore Heath—Two cottages, and 10a. 1r. 26p., freehold ..... 575  
July 20.  
By W. W. JENKINSON.  
Sydenham Hill—Ground-rent of 27l. 10s., reversion in 58 years ..... 690  
Ground-rent of 12l., reversion in 76 years ..... 285  
Ground-rents of 20l., reversion in 58 years ..... 475  
Reversion to two plots of land, term 55 years ..... 75

Catford, High-road—Freehold residence ..... 4,950  
Lewisham—1 to 9, Hindley-place, freehold ..... 4,865  
Lewisham Green—Ground-rent of 10l., reversion in 58 years ..... 250  
Lewisham—230, High-street, freehold ..... 760  
Forest Hill—1 to 8, Hindley-place, freehold ..... 1,440  
By F. J. LEE.  
Hackney-road—32 to 41, Teesdale-street, freehold ... 1,420  
Commercial-road, E.—2, 4, and 6, Blakely-street, 10 years, ground-rent 9l. .... 250  
Mile End—50 to 60 even, Ocean-street, 18 years, ground-rent 21l. .... 170  
By THURGOOD & MURPHY.  
Clerkenwell—46 and 47, Cow Cross-street, freehold ... 2,200  
Fetter-lane, Flough-court—Ground-rent of 63l., reversion in 81 years ..... 1,325  
Ground-rent of 63l., reversion in 81 years, ground-rent of 64l., reversion in 81 years ..... 1,360  
By CHESTERTON & SONS.  
Kenington—12, Church-street, copyhold ..... 3,250  
By BAXTER, PAYNE, & LEPPEL.  
Hackney—19 to 21, St. Thomas's-place, 38 years, ground-rent 38l. .... 1,500  
Hayes, Kent The residence, Fernlea, 92 years, ground-rent 27l. .... 1,720  
By TEMPLE & MOORE.  
Edgware-road—53, Queen street, and 15, Newman-street, freehold ..... 1,300  
14, John-street, freehold, ..... 1,230  
41, Nutford-place, 13 years, ground-rent 8l. 8s. ... 450  
July 21.  
By WALTON & LEE.  
Brackley, Northamptonshire—The Evelyn Hall Estate, of 957 acres, freehold ..... 30,000  
Tunbridge Wells—The Nevill Court Estate, with mansion, and 82a. 2r. 25p., 68 years, ground-rent 328l. .... 8,000  
Buckfastleigh, Devon—Enclosures of land, 7a. Or. 9p. .... 900  
By WEATHERALL & GREEN.  
Bristol—55, Effra-road, 66 years, ground-rent 70l. .... 1,500  
61 and 63, Effra-road, 65 years, ground-rent 147l. .... 1,850  
Bayswater—135, Ledbury-road, 72 years, ground-rent 10l. .... 490  
By C. C. TAYLOR & SONS.  
Mile End—28, Norfolk-street, 38 years, ground-rent 3l. 3s. .... 265  
31, 32, and 34, Sidney-street, 38 years, ground-rent 9l. .... 155  
By FUSSELL, PACE, & FUSSELL.  
Kingston Hill—Melbourne House, freehold ..... 1,180  
Hornsey-road—Ground-rents of 12l. 12s., reversion in 66 years ..... 245  
Ground-rents of 18l., reversion in 61 years ..... 240  
By NEWSON & HARDING.  
Holloway—A plot of land, term 44 years ..... 300  
101, Tufnell Park-road, 77 years, ground-rent 6l. .... 435  
Green Lanes—44, Queen's-road, 74 years, ground-rent 8l. .... 400  
Clerkenwell—38, Lloyd's-row, 43 years, ground-rent 12l. 10s. .... 300  
Willesden-green—Ground-rents of 32l. 8s., reversion in 86 years ..... 680  
Pentonville-road—No. 47, term 22 years, ground-rent 6l. .... 465  
Harrow—Improved ground-rents of 94l., term 23 years ..... 410  
By C. & H. WHITE.  
Putney, High-street—A plot of freehold land, area 8,600 ft. .... 1,900  
Lambeth—12 and 134, York-road, 31 years, ground-rent 23l. 6s. 8d. .... 570  
Putney, High-street—The letting of plots of land for 80 years averaged about 14l. 10s. per plot.  
Lower Richmond-road—Averaged about 13l. per plot.  
Lot 21 let at 25l.  
Weimar-street—Lot 28 let at 6l. per plot.  
By WESSBOLD & HILF.  
Dover—65, Snargate-street, 40 years, ground-rent, 7l. 10s. .... 200  
19, Union-row, freehold ..... 180  
3, 4, and 5, Russell-place, freehold ..... 390  
St. Albans-square—Freehold residence ..... 450  
1, Round Tower-street, 46 years, ground-rent 6l. .... 260  
1 and 2, Lansdowne-cottages, freehold ..... 360  
1, Hardwicke Cottages, freehold ..... 170  
Cranleigh Hill—Freehold residence ..... 135  
A plot of freehold land ..... 140  
8, Blucher-street, freehold ..... 140  
Tower Hamlets—A plot of land and drying-shed, freehold ..... 600  
July 22.  
By NORTON, TRIST, & GILBERT.  
Horton—18, Eagle Wharf-road, and Rainbow Dye Works, 46 years, ground-rent 21l. .... 1,385  
Wimbledon-common—A plot of land, 2a. 1r. 39p., freehold ..... 325  
By PROTHESON & MORRIS.  
Snarpsbook—Holly Bush House, and 3r. 39p., freehold ..... 2,000  
Buckhurst Hill, Queen's-road—A plot of freehold land ..... 200  
By E. WOOD.  
Wandsworth-road—Nos. 140 and 140A, term 17 years, ground-rent 7l. 10s. .... 310  
By BAKER & SONS.  
East Sheen—Stonehill Lodge, and 1½ acre, freehold ..... 2,500  
Oxted, Surrey—Four plots of freehold land ..... 465  
Croydon—37, London-road, and Tower House, freehold ..... 1,700  
Upper Norwood, Tudor-road—Brynithron, 65 years, ground-rent 14l. .... 600  
Ground-rent of 10l., term 65 years ..... 175  
Ground-rents of 44l., reversion in 68 years ..... 1,150  
Dorking, Cotmandene—Five plots of freehold land ..... 1,220  
The Mount House, with stabling, freehold ..... 1,600  
High-street—Two plots of freehold land ..... 40  
Ground-rents of 40l., reversion in 96 years ..... 1,247  
By D. WATNEY & SONS.  
New Forest—The Carterton Estate  
The Greenhill Copse and Skiers Farm, 143a. 1r. 17p., freehold ..... 3,000  
The Bell Inn, and 2a. Or. 1p., freehold ..... 350  
The Green Dragon, and 2a. 1r. 17p., freehold ..... 1,120  
Lampards Farm, and 18a. 1r. 37p., freehold ..... 520  
Numerous cottages and enclosures of land, in all 65a. 1r. 17p., freehold ..... 5,635



## MEETINGS.

SATURDAY, JULY 31.

*Architectural Association.*—Visit to Streetham Churches. (See Advt. on p. xiv. of last week's number.)  
*Liverpool Engineering Society.*—Visit to the Forth Bridge Works, at Queensferry. Train from Lime-street Station, Liverpool, at 3 p.m.

MONDAY, AUGUST 1.

*Bradford Historical and Antiquarian Society.*—Excursion to Coxwold, Newburgh Hall, and Byland Abbey.

TUESDAY, AUGUST 2.

*Royal Archaeological Institute.*—Salisbury Meeting begins.

*Institution of Mechanical Engineers (Meeting at Edinburgh).*—(1) Mr. E. Malcolm Wood "On the Structure and Progress of the Forth Bridge." (2) Mr. William Arrol "On the Machinery employed at the Forth Bridge Works." (3) Mr. St. John V. Day "On the Paraffin Oil Industry in Scotland." (4) Mr. David A. Stevenson on "The Electric Light on the Isle of May." (5) Mr. Fletcher F. S. Kelsey on "Description of the new Tay Viaduct." (6) Mr. Frederick John Rowan on "Electro-Magnetic Machine-Tools." (7) Mr. Charles A. Stevenson "On the Dredging of the Lower Estuary of the Clyde." (8) Mr. William Geipel on "The Position and Prospects of Electricity as applied to Engineering." 9.30 a.m.

WEDNESDAY, AUGUST 3.

*Builders' Foremen and Clerks of Works' Association.*—Ordinary meeting, 8.30 p.m.

*Institution of Mechanical Engineers (Meeting at Edinburgh (continued)).* 9.30 a.m.

*Royal Archaeological Institute.*—Salisbury Meeting continued.

THURSDAY, AUGUST 4.

*Royal Archaeological Institute.*—Salisbury Meeting continued.

FRIDAY, AUGUST 5.

*Royal Archaeological Institute.*—Salisbury Meeting continued.

SATURDAY, AUGUST 6.

*Royal Archaeological Institute.*—Salisbury Meeting continued.

## Miscellaneous.

**The State of the Thames.**—At a recent meeting of the Common Council the present disgraceful and dangerous state of the Thames was once more discussed. Mr. E. G. Wood spoke of a large portion of the river as a huge sewer, and Deputy Saunders, who represents the Corporation on the Metropolitan Board of Works, admitted the evil, and even went so far as to confess his fear that it would never be effectually remedied "until the main drainage outfalls had been removed to a far greater distance down the river." The Board is spending enormous sums for chemicals, and is preparing for a still more enormous expense for permanent works of precipitation at the present outfall. But, as we have often pointed out, no true solution of the difficulty is as yet contemplated. The pertinacity of the Board in resisting the mass of evidence before it, and clinging to the present outfalls, is amazing. All the money that is spent on them will be thrown away, for common sense must inevitably prevail in the end, and a simple and practical remedy has repeatedly been suggested. There is, indeed, but one real remedy that is possible. The strongly expressed advice of the Metropolitan Sewage Discharge Commissioners must, sooner or later, be adopted. The sewage must go down to Canvey Island, or some other suitable spot in Sea Reach, and there be defecated, filtered through the land, and only thrown into the river as a clear and innocuous effluent.—*Lancet.*

**Electricity and Health.**—Electricity in the house has some important bearings on hygiene. One of these M. Sambuc has recently called attention to (*Revue d'Hygiène*), in the liberation of hydrogen, where strong batteries are used in which zinc is dissolved by sulphuric acid. Besides the danger of shattering the vessels, the hydrogen spreading in the air may form an explosive mixture; and it may have a cooling effect through its great conductivity for heat. It also deadens the voice and alters its timbre. Further, if, as may be, the hydrogen is charged with sulphur, arsenic, phosphorus, carbon, or silicon, there are other and greater dangers. A chemist is known to have died from breathing a little arsenicized hydrogen. These facts are not cited against the use of electric light, but to induce proper care in those who use it.—*Nature.*

**The Primitive Methodist Chapel and Schools.** Lees-road, Oldham, have recently been re-opened, after extensive alterations and additions. The chapel has been supplied with new pitch-pine pews and rostrum, and the upper floor of the school has been divided so as to form a number of class-rooms. Other improvements have been effected, and a new staircase has been erected. The work has been carried out by Mr. Lees, builder, Oldham, from designs by and under the superintendence of Mr. A. Banks, architect, Oldham.

**Wesleyan Schools, Hyde.**—The foundation stones of the Victoria Jubilee Wesleyan Schools, Hyde, have been laid by the Mayor of Hyde, and other influential gentlemen connected with the town. The schools will have a frontage to Water-street (in which is the main entrance), of 69 ft., whilst the frontage to Milk-street and Port-street is about the same, the side entrances being in these streets. On the ground-floor are infants' school, 48 ft. by 31 ft. 6 in., with classroom adjoining,—the latter 25 ft. by 15 ft. 6 in., and containing galleries; lecture-room, 22 ft. by 16 ft.; class-room, 25 ft. by 15 ft. 6 in.; tea-preparing room, 16 ft. by 8 ft. 6 in.; and boys' and girls' lavatories and latrines. On the first floor will be an assembly-hall, 65 ft. by 31 ft. 6 in., with an open timbered roof in pitch-pine, and on one side will be large class-rooms for the young men and women, each measuring 25 ft. by 15 ft. 6 in., the principal staircase being between these two class-rooms. On the other side of the large hall will be classroom and lavatories, also the back staircases, over these being cloak-rooms. The schools, which are designed in the Gothic style, will be faced with local bricks, relieved with sandstone dressings, and Ruscon terra cotta, and slated with blue slates, capped with red ridge tiles. The ground-floor will be paved with wood blocks, upon concrete, whilst to prevent any noise traversing from one floor to another the joists to the first floor will be covered over with patent silicate slag cotton wool. The whole of the staircases will be of easy ascent, and are to be built of Whitworth stone. The contract for the work has been let to Mr. S. Robinson, Hyde, the designs having been prepared by Mr. A. Banks, Oldham, who was the successful architect in a limited competition.

**New Bank Buildings, Canterbury.**—The new banking premises for Messrs. Hammond & Co. are making good progress. Designed by the late Mr. John Green Hall, the City Surveyor of Canterbury, the carrying out of the work has been entrusted to the care of Mr. W. J. Jennings, architect (and formerly assistant to Mr. Hall), Mr. H. B. Wilson being the builder. The style of the design is Early Tudor. The building has two elevations. The materials of each façade consists of red Suffolk brick, Ancaster and Stoke ground stone. The construction of the massive vaults and cellars has lately been proceeded with. The basement strong-room is 20 ft. by 12 ft. The ground floor will contain a fine bank-room, 41 ft. by 31 ft., which will be entered by the main doorway, through a small lobby. There will be ample accommodation for business within, the bank counters having a total length of over 50 ft. Behind this large room will be a manager's room and bank parlour, and at the back of the counter a bullion-room, built over the strong room of the basement. The upper part of the premises will be the residence of the chief clerk, the entrance of which will be in St. Margaret's-street.

**Railway Work in India.**—The Indian Midland Railway is remarkable for the length of new lines under construction, which exceeds 500 miles, part of which is completed, while a large portion is rapidly approaching completion. The Kalpi Bridge over the Jumna (ten spans of 250 ft.) is well advanced, the masonry being finished and the bulk of the ironwork fixed. There are several large bridges in progress on this railway, the next in magnitude to the Kalpi Bridge being that over the Betwa on the Jhansi-Manikpur Branch, which has thirteen spans of 150 ft. and one of 60 ft., whilst its piers are 90 ft. above low water. A large cutting, 60 ft. deep, in the Antri Pass on the Jhansi-Gwalior Branch, is a prominent feature of the extensive earthworks under construction. A length of forty-two miles, between Cawnpore and Channarah, has been opened for traffic during the year, and is being worked by the East Indian Railway Company.—*Indian Engineer.*

**Plastilina.**—Dr. F. Wilhelm, of Leipzig (according to the *Sprechsaal*), has for several years prepared a modelling composition under the above name, which has been much appreciated by artists and modellers. It is a close mixture of finely-pulverized clay and various fatty substances, usually glycerine. Its plasticity is excellent, and, as it does not dry up, it can always be used again without difficulty.

**Raffety, Thornton, & Co. (Limited).**—The directors of Raffety, Thornton, & Co. (Limited) have declared an interim dividend at the rate of seven per cent. per annum (free of income tax).

**Greenlaw Church, Paisley.**—The competitive plans for Greenlaw Established Church, proposed to be built by the Abbey congregation were on exhibition in Lawn-street School last week. The committee received nine sets of plans from Glasgow and Paisley architects. Mr. Sellars, of Messrs. Campbell, Douglas, Sellars, Glasgow, adjudicated on the merits of the plans, and his award placed the plan of Mr. T. Graham Abercrombie,—with whom associated Mr. R. S. Symington, who has been head draughtsman for the last four years in the office of Messrs. John Burnet & Son, Glasgow,—first; that of Mr. Caldwell, second; and that by Mr. Donald, third. The committee unanimously agreed to Mr. Sellars's report.

**The Norwegian Wood Pulp Industry.** During last year the export of wood pulp from Norway,—an article now used for various ornamental purposes in decorating buildings,—was larger than in any previous year, but prices were very low, falling from 3l. 2s. 6d. to 2l. 10s. per ton free on rail at Hull for mechanical pulp containing 60 per cent. of water. The total export was 120,000 tons against 107,000 tons in 1885, and 42,000 tons five years ago. The value of the total production (including about 15,000 tons used in Norway) was estimated at about 400,000l. There are also at present two factories at work in Norway for the production of nitrate and sulphite wood cellulose, whilst nine more are in course of erection. The total output from the same is estimated at 10,000 tons dry.

**The High School for Girls, Mansel-road, Wimbledon.** of which Mr. J. Osborn Smith, A.R.I.B.A., is the architect (Messrs. Howell & Son, of London and Bristol, being the builders, and Mr. R. Old, of Wimbledon the clerk of works), was opened on the 21st inst. It will accommodate 250 pupils, and has been erected by the Girls' Public Day School Company (Limited), to meet the increased demand for secondary education in this locality. The accommodation consists of ten class-rooms, a laboratory, a studio, a large central hall, rooms for head and assistant mistresses, classrooms, dining-room, covered playground, housekeeper's apartments, lavatories, &c.

**Clock Tower, Basingstoke.**—The ceremony of unveiling the new clock tower presented to the town as a Jubilee Memorial by the Mayor (Mr. May), was performed last week by the Hon. Diana Slater-Booth. The ancient clock, nearly a century and a half old, has been thoroughly restored by Mr. Benson, the dial enlarged from 4 ft. diameter to 5 ft. 9 in., and a new train wheels and two bells added to chime the twelve quarters.

**Brighton.**—The Catholic-Apostolic Church, Brighton, is to be re-roofed, restored, and a system of ventilation introduced under the advice and recommendation of Mr. A. Loader, architect to the trustees. Boy large upcast ventilators is one of the methods recommended. The work is to be begun once, and Mr. G. R. Lockyer, of Brighton, is the builder to whom it has been entrusted.

**New Abattoirs for Sheffield.**—Hadfield has prepared plans for the abattoirs which the Duke of Norfolk contemplates erecting in Cricket-road. The *Sheffield Evening Star* states that preliminary plans have been laid before the Health Committee of Town Council, and met with the general approval of the committee.

**Blinds in the Board Schools.**—We learn that Messrs. James & Son, window-blind manufacturers, of Aldersgate-street and Piccadilly, have been successful in competition in obtaining the contract for taking down, mounting, fitting with new material, and refitting blinds for the London School Board Schools.

**A Methodist Free Church.**—The new church, which has seating accommodation for 500 people, has been designed by Mr. Edw. Speed, A.R.I.B.A., and is Gothic in character. It has been erected at a cost of nearly 3,000l. by Mr. James Holloway, builder, Lavender Lane, St. Swinith's Mission Church, Leeds. The east window of this church has recently been filled with stained glass illustrating the Ascension of Our Lord. The work was designed and executed by Messrs. Warriner & Co., of Fitzroy-square.

**The New Municipal Buildings, Middlesbrough.** were inspected by the members of the Northern Architectural Association on Saturday last, the 23rd inst., under the guidance of the architect, Mr. G. G. Horsfield, President of the Association.



**of Building Sites on the Cliff at Birchington.**—On Monday last Richard J. Collier conducted a sale of building sites, forming a portion of the Cliff at Birchington. The estate stands on 40 ft. above the level of the sea, which immediately overlooks, commanding extended views as well as marine views. Several roads have been constructed on the estate, and all of which are formed in boulevard style, and planted on each side with ornamental trees. Gas and water mains are laid the whole of these roads, the water being obtained by pumping from deep wells in the chalk which abounds in the neighborhood. The sites offered were 74 in number, ranging extensive frontages to the several and suitable for the erection of marine houses and bungalows. The sites offered at the second portion of the estate, the portion having been sold last summer, were taken place at the West Cliff Hotel, when there was a very good attendance. The sale commenced at the eastern portion of the estate, consisting of forty-five lots, being offered. Several sites have frontages of 22 ft. and 25 ft., and 120 ft., whilst other larger plots have frontages of 40 ft. and 50 ft., and depths of 1 ft. Most of the lots were sold, the sites realising from 40l. to 53l. each, and about 2l. per foot frontage. The larger lots disposed of were two plots, having frontages of 54 and 57 ft., these were sold for 150l. and 160l. respectively. The lots on the western portion of the estate, twenty-nine in number, were next offered, and were all sold, those having frontages of 25 ft., realising from 55l. to 60l. Two lots, having frontages of 50 ft., and depths of 170 ft., running through to the avenue, to which also they have frontages sold for 160l. each. The total proceeds of the sale amounted to upwards of 10,000l. As evidence of the increasing value of property, it may be stated that at the first portion of the estate last year, sites having 22 ft. and 25 ft. frontages, sold at from 35l. to 40l. each, whereas of similar dimensions realised from 40l. each at last Monday's sale.

**West Window of St. John's Church, Paddington.** has just been designed by Mr. A. W. Blomfield, and filled with rich leaded glass. There are six large lights, each containing three tiers of subjects, illustrating the life of Joseph, and placed under natural canopies in the fifteenth-century style. The members of the congregation subscribed the sum of 800l. for the glass. Messrs. A. Butler, & Bayne, of Garrick-street, who executed the work, also carried out the east window, which was restored about two years ago.

**Useful Trade Book** is the "General Guide" recently issued by Messrs. George & Sons, of St. John's-street, Westfield. Handy in form, concise in arrangement, and well-printed, it is an admirable vade mecum of sanitary fittings, pumps, pipes and plumbers' brass work, tools, &c. It is illustrated with representations of typical pieces of apparatus and fittings, and there will be found a very useful reference office or workshop.

**Pulpit at St. Barnabas's Church, Oxford.**—A new pulpit, designed by Mr. E. W. Blomfield, for St. Barnabas's Church, Oxford, has just been completed. The pulpit is of oak, and the design is in the style, richly decorated. The framework is supported on six pedestals, and is spaced out in bays, each containing a panel with a figure of an angel, and figures of St. Clement, St. Polycarp, St. Chrysostom, St. Gregory the Great, and St. Augustine of Canterbury. The staircase and balustrade are also decorated, and on the sides of the pulpit are the doves representing the gifts of the Holy Spirit. The whole is mounted by a very massive sounding-board, enriched with carving. On the underside is a painting of the Pentecost. The pulpit and decorations were executed by Messrs. Heaton, Butler, & Bayne, of Garrick-street, London, who have had this costly and elaborate work in hand for some considerable time. It is to be fixed in the church during the week in August, and will be preached on Sunday, the 7th prox.

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	5 10 0	7 10 0
Teak, R.I. ....ton	8 0 0	12 0 0
Sequoia, U.S. ....foot cube	0 2 3	0 3 0
Ash, Canada ....load	3 0 0	4 10 0
Birch " ....do	2 0 0	3 10 0
Elm " ....do	3 10 0	4 10 0
Fir, Dantisc, &c. ....do	1 10 0	4 0 0
Oak " ....do	2 10 0	4 10 0
Canada " ....do	2 0 0	3 0 0
Pine, Canada red " ....do	2 0 0	3 10 0
" yellow " ....do	2 10 0	4 10 0
Lath, Dantisc " ....fathom	3 0 0	5 0 0
St. Petersburg " ....do	4 0 0	5 10 0
Wainscot, Riga " ....do	0 0 0	0 0 0
" Odessa, crown " ....do	2 10 0	3 0 0
Deals, Finland, 2nd and lat. std. 100 " ....do	7 0 0	8 0 0
Riga " 4th and 3rd " ....do	5 10 0	6 10 0
St. Petersburg, 1st yellow " ....do	8 0 0	13 0 0
" 2nd " ....do	7 0 0	8 0 0
" 3rd " ....do	6 0 0	7 0 0
Sweden " ....do	0 0 0	0 0 0
White Sea " ....do	7 0 0	16 0 0
Canada, Pine, 1st " ....do	15 0 0	24 0 0
" 2nd " ....do	10 0 0	15 0 0
" 3rd, &c. " ....do	6 0 0	9 0 0
" Spruce, 1st " ....do	8 0 0	9 0 0
" 3rd and 2nd " ....do	8 0 0	7 0 0
New Brunswick " ....do	5 0 0	6 10 0
Battens, all kinds " ....do	4 0 0	10 10 0
Flooring Boards, sq. 1 in., prepared, First " ....do	0 8 0	0 11 0
Second " ....do	0 6 0	0 7 0
Other qualities " ....do	0 4 0	0 6 0
Cedar, Cuba " ....foot	0 0 2	0 0 3
Honduras, &c. " ....do	0 0 3	0 0 4
Australian " ....do	0 0 2	0 0 3
Mahogany, Cuba " ....do	0 0 4	0 0 7
St. Domingo, cargo average " ....do	0 0 4	0 0 6
Mahogany, Mexican, cargo av. " ....do	0 0 3	0 0 4
Tobacco " ....do	0 0 4	0 0 7
Honduras " ....do	0 0 3	0 0 4
Maple, Bird's-eye " ....do	0 0 5	0 0 7
Rosa, Rio " ....ton	8 0 0	11 0 0
Balsa " ....do	7 0 0	8 0 0

TIMBER (continued).	£. s. d.	£. s. d.
Box, Turkey " ....ton	5 0 0	12 0 0
Satin, St. Domingo " ....foot	0 0 5	0 0 9
Porto Rico " ....do	0 0 6	0 0 10
Walnut, Italian " ....do	0 0 3	0 0 6

METALS.	£. s. d.	£. s. d.
Iron—Bar, Welsh, in London " ....ton	4 7 6	4 15 0
" " in Wales " ....do	4 5 6	4 7 6
" Staffordshire, London " ....do	5 10 0	5 0 0
Sheets, single, in London " ....do	6 15 0	6 10 0
Hoops " ....do	6 0 0	7 0 0
Nail-roads " ....do	5 15 0	6 10 0

COPPER.	£. s. d.	£. s. d.
British, cake and ingot " ....ton	43 15 0	44 0 0
Best selected " ....do	44 10 0	45 10 0
Sheets, strong " ....do	50 0 0	50 0 0
Chill, bars " ....do	40 1 3	40 10 0

YELLOW METAL.	£. s. d.	£. s. d.
Spain " ....ib.	0 0 0	0 0 0
Lead " ....do	2 2 6	0 0 0
English, common brands " ....ton	12 7 6	0 0 0
Sheet, English " ....do	13 7 6	13 12 6

SILVER.	£. s. d.	£. s. d.
Spanish, special " ....ton	14 12 6	14 15 0
Ordinary brands " ....do	14 10 0	14 12 6
Tin " ....do	10 10 0	0 0 0
Strait " ....ton	10 10 0	0 0 0
Australian " ....do	10 10 0	0 0 0
English ingots " ....do	10 10 0	0 0 0

ZINC.	£. s. d.	£. s. d.
English sheet " ....ton	0 0 0	0 0 0
OILS.	£. s. d.	£. s. d.
Linseed " ....ton	21 12 6	21 15 0
Cocunut, Cochin " ....do	30 0 0	33 0 0
Baylen " ....do	24 0 0	0 0 0
Palm, Lagos " ....do	21 0 0	0 0 0
Rapeseed, English pale " ....do	23 0 0	0 0 0
" brown " ....do	21 10 0	0 0 0
Cottonseed, refined " ....do	21 0 0	21 10 0
Tallow and Oleine " ....do	25 0 0	45 0 0
Lubricating, U.S. " ....do	5 0 0	8 0 0
" refined " ....do	5 0 0	12 0 0

TURPENTINE.	£. s. d.	£. s. d.
American, in casks " ....cwt.	1 6 0	0 0 0
TAR.	£. s. d.	£. s. d.
Stockholm " ....barrel	0 14 0	0 14 0
Archangel " ....do	0 9 6	0 10 0

CONTRACTS.

Epitomes of Advertisements in this Number.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Kerbing, Draining, and Making-up Lane	Leyton Local Board	W. Dawson	August 2nd	x.
Tar-paving, Kerbing, and Channelling	Southend Local Board	F. H. Tulloch	do.	ii.
Mill End Vestry	do.	J. M. Knight	August 3rd	ii.
Paving and Making-up Streets	do.	Official	do.	ii.
Road Making and Paving Works	Hammersmith Vestry	Official	do.	ii.
Works to Stone Building	St. George-in-the-East Guardians	Wilson, Son, & Aldwinckle	August 5th	x.
Painting, &c., Works	Met. Asylums Board	A. & C. Harston	August 8th	ii.
Kerbing, Tar-paving, Metalling, &c.	Lewisham Bd. of Wks.	Official	August 9th	x.
Engineering Works at Laundry	Bethnal Green Guardians	A. & C. Harston	do.	x.
Works to Entrance, Lodge of Cemetery	Hammersmith Burial B.	G. Saunders	do.	ii.
Broken Granite and Gravel	Hendon U. R. S. A.	Thos. Henry	August 10th	ii.
Pavements, Crossings, Sewers, &c.	Hove Commissioners	Official	do.	ii.
Yorkshire Stone Paving	Richmond (Surrey) U.S.A.	W. Brooke	August 12th	x.
Road Materials	do.	do.	do.	x.
Cast-Iron Water Mains, Sluice Valves, &c.	Wakefield U. R. S. A.	A. Fawcett	August 22nd	ii.
Dining-Hall, &c.	Guardians, St. Matthew, Bethnal Green	A. & C. Harston	August 23rd	ii.
Stoneware Pipe Sewer, &c.	Walhamstead Local Bd.	H. S. Ridings	August 24th	x.
Public Hall, &c., Streatham	The Promoters	E. Power	Not stated.	ii.

TENDERS

ABERDARE.—For the erection of a Wesleyan chapel at Tre-y-non, Aberdare, S. Wales. Mr. William Drew, architect, Swindon.	
D. Davies, Aberdare (accepted) .....	2550 0 0
BETHNAL-GREEN.—For alterations at the Fox Bishop's-road. Mr. Edward Brown, surveyor, 21, Liverpool-street, E.C. ....	2245 14 0
J. Anley " .....	233 4 0
G. Mower " .....	239 14 0
J. A. Taylor " .....	198 14 0
J. Walker " .....	187 13 0
S. W. Hawkins (accepted) .....	187 13 0
BROMLEY (Kent).—For building two villa residences, from plans supplied by Mr. W. H. Watson, for Mr. F. A. Graham.	
H. & G. Thorlow " .....	22,750 0 0
J. Simpson & Co. " .....	2,750 0 0
Butler Brothers " .....	2,500 0 0
R. Radburn & Sons " .....	2,500 0 0
Rown & Co. " .....	2,200 0 0
W. Castle, Nunhead-green " .....	2,165 0 0
Plumbing, Gasfitting, and Bells.	
W. Castle, Nunhead-green " .....	208 0 0
" Accepted.	
COLCHESTER.—For additions, &c., to the Asylum for Idiots, Colchester.	
Martin, Wells & Co. " .....	28,630 0 0
Sevard " .....	6,347 0 0
Holloway " .....	5,892 0 0
Diss " .....	5,300 0 0
Orfeur " .....	5,079 0 0
Greenwood " .....	6,550 0 0
Coe " .....	5,600 0 0
Gibson " .....	5,620 0 0
Kirk & Randall " .....	5,517 0 0
Grinwood " .....	6,380 0 0
Mason " .....	5,329 0 0
Kingslee " .....	5,287 0 0
Dugout " .....	5,135 0 0
Bowles " .....	5,060 0 0
Dobson " .....	4,978 0 0
Everitt " .....	4,995 0 0
Chambers (accepted) .....	4,988 0 0

LEE (Kent).—For completion of houses on the Burnt Ash Park Estate, Lee. Messrs. Poley & Wynn, architects, No. 6, Duke-street, Adelphi—

	A	B	C
T. Collins, Tollington Park .....	2319	2236 0 0	2432
T. Knight, Sidecup, Kent .....	405	295 0 0	495
A. Durbin, Burnt Ash Hill .....	—	275 17 6	—
G. Cox, Lower Sydenham .....	253	179 0 0	350
G. A. Rowley, Hawksley-road, N. ....	316	189 0 0	359
D. Doubleday, Kingsland-road " .....	250	200 0 0	430
H. Fenn, Peckham, S.E. ....	477	183 10 0	487
H. R. Ockenden, Aulerley " .....	340	247 0 0	444
A—Plot 24, Winn-road.			
B—Plot 15, Burnt Ash Hill.			
C—Plot 16, Burnt Ash Hill.			

LONDON.—For the erection of fire brigade station, Pratt-street, Camden Town, for the Metropolitan Board of Works.—

J. W. Dixon " .....	210,050 0 0
H. E. Lee " .....	9,268 0 0
Martin, Wells & Co. " .....	7,700 0 0
J. T. Chappell " .....	8,617 0 0
M. Gentry " .....	8,490 0 0
Gould & Broad " .....	7,967 0 0
Mowlem & Co. " .....	7,980 0 0
E. Toms " .....	7,846 0 0
Scrivenor & Co. " .....	7,837 0 0
Stimpson " .....	7,893 0 0
Howell & Son " .....	7,831 0 0
Oldrey & Co. " .....	7,789 0 0
Brass & Son " .....	7,673 0 0
Kirk & Randall " .....	7,324 0 0

LONDON.—For the erection of No. 16, Weymouth-street, W., for Mr. R. J. Miller. Messrs. New & Son, architects—

Curtis " .....	21,887 0 0
Mark " .....	1,647 0 0
Longmire & Burge " .....	1,617 0 0
Tennant " .....	1,602 0 0
Oldrey & Co. " .....	1,495 0 0
Manning " .....	1,468 5 4
Scrivenor & Co. " .....	1,441 0 0



LONDON.—For repairing, cleaning, and painting schools, for the School Board for London. Mr. T. J. Bailey, architect:—

*Alldham-street Schools.*

J. Kitchener	£219 0 0
C. Fleming	185 0 0
Knight & Walden	178 0 0
W. Horner	175 0 0
W. G. Lilly	154 0 0
C. F. Kearley	142 0 0
T. W. Smith & Son	138 0 0
G. S. S. Williams & Son	137 0 0
G. W. Durrant	129 0 0
W. Oldrey & Co.	110 0 0

*Nightingale-street Schools.*

W. H. Rhodes	99 15 0
W. Oldrey & Co.	98 0 0
J. H. Patchy	93 0 0
W. Hodnett	85 0 0
G. W. Durrant	83 0 0

*Lutimer-road Schools.*

W. Oldrey & Co.	120 0 0
Pardoe & Sons	117 0 0
W. G. Lilly	113 0 0
G. R. Eardson	93 0 0
G. W. Durrant	86 0 0

*Oxford-garden School.*

W. Oldrey & Co.	116 0 0
C. F. Kearley	109 0 0
W. Horner	97 0 0
G. W. Durrant	88 0 0
Pardoe & Sons	87 0 0

*Edinburgh-road Schools.*

Cutting & Co.	396 6 0
W. Johnson	318 0 0
G. Giles & Co.	210 0 0
G. S. Williams & Son	229 0 0
C. F. Kearley	215 0 0
G. P. Kent	189 0 0
M. M. Arthy	196 0 0
T. Rendon	184 0 0
G. W. Durrant	179 0 0

*St. Clement's-road Schools.*

Cowley & Drake	464 10 0
G. F. Kent	415 0 0
C. F. Kearley	343 0 0
W. Oldrey & Co.	320 0 0
G. W. Durrant	297 0 0

*Stephen-street Schools.*

W. Horner	130 0 0
Knight & Walden	121 0 0
J. H. Patchy	119 0 0
C. F. Kearley	113 0 0
G. W. Durrant	113 0 0
W. H. McLachlan	108 10 0
W. H. Rhodes	97 0 0

LONDON.—For the erection of new premises in Weymouth-street, W.—  
Wm. Oldrey & Co. £5,479 0 0

LONDON.—For rebuilding No. 180, Oxford-street, W., for Mr. W. Smith:—  
Wm. Oldrey & Co. £2,685 0 0

LONDON.—For rebuilding No. 182, Oxford-street, W., for Messrs. J. & G. Sampson:—  
Wm. Oldrey & Co. £4,792 0 0

LONDON.—For sanitary work and general repairs at 61, Lanes-ter-gate, for General Shaw Stewart:—  
Wm. Oldrey & Co. £930 0 0

LONDON.—For rebuilding Nos. 37 and 37A, Chilton-street, Euston-road, N.W. Mr. John Saville, architect:—

Combes & Son	£2,348 0 0
A. Drew	2,270 0 0
A. & E. Brail	2,228 0 0
Oldrey & Co.	2,158 0 0
Wall Bros.	2,171 0 0
Gould & Brand	2,167 0 0
Chappell	2,099 0 0
J. W. Dixon & Co.	2,040 0 0
J. Anley	1,989 0 0
Ward & Lambie	1,867 0 0
Spencer & Co.	1,890 0 0
Hawkins	1,837 0 0
Jarvis & Son	1,883 0 0
S. R. Lambie	1,871 0 0
G. Beale	1,836 0 0

LONDON.—For repairs, &c., No. 55, Dudley-grove, Harrow-road, for the executors of the late Mr. W. Smith. Mr. J. Douglas Mathews, architect:—

Wilkinson	£125 0 0
Clifton & Son	87 10 0
G. W. Durrant (accepted)	97 0 0

LONDON.—For building three houses in Hawkeley-road, Stoke Newington, to complete the Estate, for Mr. J. R. Furzeux:—

Hamin	£1,137 0 0
Sheffield	1,030 0 0
Woodhouse	1,000 0 0
Rowley	980 0 0
G. S. Archer (accepted)	950 0 0

LONDON.—For alterations at the King's Arms tavern, Aldersgate-street. Mr. R. A. Lewcock, architect, 88, Bishopsgate-street Within:—

Ivory	£240 0 0
Jackson & Todd	163 0 0
Steel Bros.	135 0 0

LONDON.—For improvements at the Connaught tavern, Cliford-street, Caledonian-road, Mr. R. A. Lewcock, architect, 88, Bishopsgate-street Within:—

Goodall	£351 0 0
Spencer & Co.	310 0 0
Walker	302 0 0
Jackson & Todd	285 0 0
Ivory	285 0 0
Steel Bros.	280 0 0

LONDON.—For alterations, &c., to the Warrior public-house, Deptford Lower-road, Rotherhithe, for Mr. V. Dean. Mr. H. E. Mountford, 23, Pigott-street, Limehouse, surveyor:—

W. W. Tyler, Bermondsey	£288 0 0
G. Lusk, Mile-end	810 0 0
J. Walker, Limehouse	690 0 0
J. T. Chappell, Finsbury	649 0 0
S. Sall, Limehouse (accepted)	648 0 0

LONDON.—For the erection of shop and dwelling-house, No. 12, Collier-street, N., for Mr. Jasper Wilkins. Mr. L. P. Crace, architect, Nottingham-place:—

Lidstone	£281 0 0
Allard	337 0 0
Riley Bros., Pentonville (accepted)	289 0 0

NOTTINGHAM.—For the erection of the Nottingham Borough Asylum Extension. Messrs. Thos. C. Hine & Son, architects. Quantities by Messrs. Berridge & Barnes:—

Perry & Co., London	£39,060 0 0
J. Hodson & Son, Nottingham	38,998 0 0
E. Gabbett, Liverpool	38,390 0 0
H. Lovatt, Wolverhampton	38,168 0 0
Kirk & Randall, Woolwich	37,630 0 0
Kirk Knight & Co., Sheffield	37,600 0 0
H. Vickers, Nottingham	37,501 0 0
Rudd & Son, Grantham	37,307 0 0
H. Willcock, Wolverhampton	36,875 0 0
E. Hind, Nottingham	37,877 15 0
J. Thompson, Peterborough	34,920 0 0
R. Neill & Son, Manchester	34,676 0 0
Bell & Son, Nottingham (accepted)	34,490 0 0

PADDINGTON.—For painting, and other works, at the Infirmary, Harrow-road, for the Guardians of Paddington. Messrs. A. & C. Harston, architects, 15, Leadenhall-street. Quantities not supplied:—

Croxford & Gowan	£1,127 0 0
Aitchison	1,027 0 0
W. H. Handover	950 0 0
Woodford & Son	877 15 0
H. J. Ball & Co.	850 0 0
W. Nash	700 0 0
R. Proctor	650 0 0
C. Conway	495 0 0
W. Dudley	513 13 0
G. Foxley, 36, King-street, Regent-street, W. (accepted)	474 0 0

[Architect's estimate, £251.]

PADDINGTON.—For repairs to 27, Newton-road, Westbourne-grove, for Mr. D. Oliver. Mr. J. H. Taylor, architect:—

Barnard	£111 10 0
Marks	107 0 0
Clifton	92 10 0
Peocor	84 2 0
Frederick & Sons	83 0 0
Spurgeon	67 10 0

PECKHAM.—For painting and decorating the Peckham public hall, the small halls, committee-rooms, corridors, &c., for the proprietor, Mr. W. L. Down:—  
Marchant, Lady Somerset-road. £144 0 0  
Accepted.

SWINDON.—For making alterations and additions to the Lamb and Flag Inn, New Swindon, Wilts. Mr. William Drew, architect, 25, Vile-street, Swindon:—  
G. Wiltshire, Swindon (accepted) £194 0 0

SWINDON.—For the erection of a dwelling-house at Baydon, Swindon, R. S. O., Wilts. Mr. William Drew, architect, Swindon:—  
G. Wiltshire, Swindon £205 0 0  
H. Looker, Stratton 385 10 0  
W. Moulding, Aldbourn 381 15 7

TILFURST (near Reading).—For restoring Tilfurst Rectory-house, burnt down. Mr. E. G. Bruton, F.R.S.A., architect:—

S. Elliott, Newbury	£2,957 0 0
J. Bottrill & Son, Reading	2,887 0 0
Symon & Co., Oxford (accepted)	2,860 0 0

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C. West ("Plaster or Cement,"—but which? Impossible to answer a question put in such vague terms).—W. D.—R. E.—J. L. B. are not available, as it does not give locality of residence. Yorkshire is not a county.—A. L. G. W. D.—A. B. R. E. & G.—S. S. S. (thanks; much better to do the two together). All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline pointing out books and good addresses.

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BOX GROUND. | COMBE DOWN.

WESTWOOD GROUND. | STOKES GROUND.

RANDELL, SAUNDERS, & CO.,

CORSHAM, WILTS.

## Bath Stone.

Pictor's Monks' Park. | Combe Down.

Corsham Down. | Stoke Ground.

Box Ground. | Winsley Ground.

Farleigh Down. | West Wood.

PICTOR & SONS, Box, Wilts. [A]

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The stone from these quarries is known as the "W. Beds," and is of a crystalline nature, and doubtfully one of the durable stones in England. It is of the same crystalline nature as the Cheltenham, but finer in texture, and suitable for the most exacting work.

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THE BRAMBLEDITCH STONE.

## HAM HILL STONE.

Greater facilities have been provided working these quarries, and the stone supplied in large quantities at short notice. Prices, and every information given on application to CHARLES TRASK & SON, Norton-sub-Hamdon, near Ilminster, Somerset. London Agent—Mr. E. WILLIAM, 16, Craven-street, Strand, W.C. [A]

Doubling Free Stone. For prices, &c., address S. & J. STANLEY.

HAM HILL STONE. Quarry Owners, &c.

BLUE LIAS LIME. And Lime Merchants.

Stoke - under - 1

(Ground or Lump), Ilminster.

Asphalte.—The Seyssel and Metallic

Asphalte Company (Mr. H. Glenn), Office

Poultry, E.C.—The best and cheapest mats

for damp courses, railway arches, ware-

houses, flat roofs, stables, cow-sheds, and

rooms, granaries, tun-rooms, and terraces.

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Seyssel, Patent Metallic Lava, and

White Asphaltes.

M. STODART & CO.

Office:

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STATIONERS, &c.

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Office.

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and Others.—WHALEY'S WATER-CLOSET, &c.,

water waste from lavatories, sinks, roofs, &c.,

immediately after being used. Costs 50 per cent.

ordinary water-closets. No water closet requires

fitting. No water supply. Simplicity and effec-

guaranteed. Being largely adopted and giving

satisfaction.

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ty Engineers, Medical Officers, &c. Highly spoken of

leading trade papers.

Prices, drawings, and full particulars, on applica-

tion.

BROOKS & PICKUP,

Townley Colliery, Burnley.

Remedy for Damp Walls.—App-

dry weather CARSON'S ANTI-DAMP

is an economical and effective

Full particulars (post-free) WALTER CAR-

& SONS, La Belle Sauvage-yard, I-

Hill, London.



# The Builder.

VOL. LIII. No. 2322.

SAURDAY, AUGUST 6, 1897.

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### The Panama Canal Report.

**C**ONTRARY to the usual custom, the Committee of Management of the Panama Canal have issued an extra number of the *Bulletin*, containing the report presented to the annual meeting of the shareholders on the 1st July. We are thus in possession of the accounts a few days earlier than we anticipated. They come down, however, only to 30th June, 1886.

At that date it is stated that the total expenditure of the company amounted to 40 millions of francs, or 25,600,000*l.*, and the *actif disponible*, or available funds, to 32½ millions of francs. But these two items, which alone M. de Lesseps takes notice, are very far from representing the liability incurred by the company to that date. To their aggregate has to be added the rebate, or discount, at which the loans of 1882, '83, and '84 have been issued, which raises the debit of the company, at 30th June, 1886, to 39½ millions sterling. To this have to be added the figures of the loan of 1886, involving a debt of 18 millions sterling, and of a loan to an equal amount announced for issue in July, 1887. If this loan is placed, the published liabilities of the company will amount to 75½ millions sterling.

As to what has been done for that portion of this immense sum which is brought to book in the present report, there is a great silence. For a considerable period the *Bulletin du Canal Interocéanique* published monthly telegrams stating the amount of excavation done in the preceding month. That good habit has been abandoned; and it takes a considerable amount of research to arrive at the fact that the total quantity of earthwork returned as excavated from the commencement of the undertaking to the 30th of June, 1886, was 14,250,000 cubic metres, of which rather more than half had been done in the year then closing. The total sum expended in that year on management and work in the Isthmus was 88 millions of francs, showing a cost of 11½ francs per cubic metre excavated in the year. In 1885-6 only 78 million of francs are carried to account under the same heading, so that it is not probable that more than seven or eight millions of cubic metres of excavation were done during that year, instead of the 24 millions of the programme. As to the work of 1886-7, we are still more in the dark.

The total quantity of excavation required for the canal was stated by M. de Lesseps in

1879 at 46,150,000, in 1880 at 75,000,000, and in 1883 at 120,000,000 cubic metres.

There are, however, some grounds for questioning whether even the last-named figures are at all a reliable maximum. Herr Beyeler, in October 1886, on data furnished by the officers of the canal, gives a quantity of 150,000,000 cubic metres. In this case the total volume is divided into the contents of the twelve sections comprised in the line, and 20,000,000 is allowed for river diversions. But even here it must be remarked that the deepest cutting, that at Culebra, is set down as containing 25,000,000 cubic metres within a length of two kilometres. The axis of the canal here crosses the water-shed which separates the valley of the Obispo from that of the Rio Grande, at the lowest point, which is 100 metres above the level of the sea. But the summits rise on either side to 120 and 190 metres respectively, and allowing only 1 to 1 slopes (which for clay and sand exposed to a rainfall of 170 in., is a very questionable allowance), the deepest part of this cutting attains a depth, on the eastern slope, of 557 ft. 9 in., and one of 425 ft. 9 in. on the western slope. As a mere calculation on paper, 33 millions come nearer the mark than 25 millions for the contents of this cutting. And what it would ultimately prove that it would be necessary to remove, in order to open and maintain a sea-level trench through this treacherous hill, he must be a bold man who would even presume to guess.

In the same way it is easy to see that the estimate cited by Herr Beyeler of 20 millions of cubic metres for river diversions is wholly inadequate. The river Chagres crosses the axis of the canal at the 45th kilometre from Colon, the bed of the river at the point being 74 ft. above that proposed for the canal. In heavy floods,—as, for instance, in 1879,—the Chagres is known to rise 40 ft. above its ordinary level. Its volume at such a time is estimated by M. Dingler, one of the ablest and best-trusted servants of the Canal Company, at 1,600 cubic metres of water per second, or rather more than four times that of the Thames in flood. To allow such a cataract to pour into the canal, when dug, is of course impossible, as it would wreck and choke the whole channel from Matabachin, the point of intersection, to the sea. The Chagres intersects the axis of the canal no fewer than twenty-nine times, finally leaving its course at about 8 kilometres from Colon, and falling into the sea to the west, while it debouches from the east of the canal line. On the first crossing it unites with the Obispo, the volume of which we have not found stated in the publications of the company; and lower down it receives the Rio Trinidad, with a volume of 400 cubic metres per second, from the west, and

the Gatuncillo, of an equal volume, from the east, besides smaller affluents.

It is obvious that in order to maintain, under such circumstances, not only the navigation, but the bare existence of a sea-level canal, it is indispensable that two lateral canals should be constructed,—one on the west, to carry to the sea the waters of the Obispo, the Trinidad, and three other large affluents; and one on the east to receive the flow and the floods of the Chagres, the Gatuncillo, and eight other affluents, and to carry them into the sea to the east of the peninsula of Colon, without crossing the canal. The latter channel, however, must be so enormous that it has been proposed to regularise and delay the floods of the Chagres by forming a large dam where this river issues from the mountains. It was first proposed to erect this of masonry, but the foundation proving unreliable, the plan selected, up to the present time, has been to construct an earthen mole, 1,000 metres long, 960 metres wide at bottom, 240 metres wide at top, and 40 metres high, behind which the flood would expand into a large lake containing a thousand millions of cubic metres of water. Sluices and culverts were to be constructed in connexion with this dam in order to draw off the water gradually at the rate of 400 cubic metres per second. Even that flow, through a channel of the cross-section of the proposed maritime canal, would cause a current of the velocity of 6 ft. per second, independent of the waters of the affluents from the east. Thus, while making every allowance for the utilisation of such portions of the existing river channels as would fall in with the general plan, it is impossible to calculate the excavation necessary for the deviations of the Chagres and the Obispo, even after the construction of the regulating works at Gamboa, at less than from two to three times that of the volume required for the excavation of the maritime canal itself. From Colon to kilometre 45 this excavation is estimated by the officers of the company at 42 millions of cubic metres. The addition to be made to this mass for the river deviations, if no dam is made, must be much underestimated at 100 millions more, while only 20 millions are allowed not only for the deviations of the Chagres and of the Obispo, but also for that of the Rio Grande, on the Pacific slope of the Cordilleras.

In these two items alone, of the cutting at Culebra and of the river diversions on the Atlantic slope, the plans and contours published in volume v. of the *Bulletin du Canal Interocéanique* (pp. 996, 1000), give a sufficient amount of definite information as to levels and contours to lead to the conclusion that the estimated contents of 67 millions of cubic metres of cutting for this 47 kilometres of canal



specified would be more likely to be trebled than not before the work was complete and safe. As to the Pacific slope, much the same course of argument is applicable; and the remainder of the central mass of the hill, the sections of Obispo, Emperador, and Paraiso, are liable to the same class of comment as to the inadequacy of slopes set out at  $\frac{1}{2}$  to 1 for rock and 1 to 1 for soft material.

This question of the adequacy of the estimate of 150 millions cubic metres of excavation for the completion of a sea-level canal, receives an unexpected support from the report made by M. de Lesseps on the 21st of July in the present year. "It is certain," he says, "that no human power can guarantee us against the unforeseen, which resides in the geological mysteries of the central mass." And he proceeds to order "the substitution of a simple bank, directing the waters of the Chagres towards the deviations, for the construction of one immense dam," as "one of the principal simplifications effected in the programme." Such a substitution, the reader will see, would involve increasing the excavation necessary for the Chagres deviation to at least a four-fold amount, so as to take away 1,600 cubic metres per second, instead of 400.

The second "simplification" mentioned in the report is the abandonment of the tidal lock at Panama. The central siding of 5 kilometres long on the canal is also to be abandoned, and the ports of Colon and of Panama are to be reduced to what is strictly necessary. It seems further that the dredging at the Colon end of the line, which at present has gone no lower in a vertical direction than the surface of the rock, where this makes its appearance under water, is to be taken as sufficient for the opening of the canal.

As to the lock, a reference is made to the statement, previously cited in the columns of the *Builder*, of the "conclusions of M. Bouquet de la Grye" as to the difference of level which may exist between the two oceans. As to that the evidence is contradictory. But it matters very little whether the mean tide level be or be not the same at the two ends of a canal forty-six miles long. What does matter is the range of the tide. There is no controverting the statement that at Panama this range varies from 20 ft. to 27 ft. Nor can there be any doubt that such a tidal movement would be destructive to any canal into which it was allowed free admission. To abandon the tidal lock at Panama is only in other words to abandon the idea of navigating the canal.

We have been anxious in the foregoing remarks to avoid two things,—one is the expression, and, indeed, as far as possible the entertainment, of any private opinion on the subject; the other is any tendency to prophecy. We have based each statement on the definite information furnished by the *Bulletin du Canal Interocéanique*, and by the statements signed by M. Ferdinand de Lesseps. In the absence of any statement, in this sixth annual report, of the work done and to be done, according to the estimates of the company, we have grave reasons, which every engineer can appreciate, for the conclusion that the last estimate so given of the latter, although three times as much as the first, leaves out of account important and, indeed, controlling features of the case. We have shown what was the last annual amount of excavation of which the company have afforded the data, viz., 7,660,000 cubic metres in the year ending with June, 1885. We have shown that as to the sum for which the company are now responsible, if their obligations are reckoned at the price at which they have contracted to repay them, the present liability amounts to 57½ millions sterling, which the issue of the loan now offered will raise to 75½ millions sterling. How near that expenditure will bring us to the opening of a sea-level canal we leave to our readers to estimate.

**New Welsh Chapel, London.**—The Committee of Crosby-row Chapel have appointed Mr. Charles Evans to be architect for the new chapel about to be erected. The site selected is in Falmouth-road, out of New Kent-road.

## HARMONIC PROPORTIONS IN ARCHITECTURE.\*

BY W. WATKISS LLOYD.



ON OCCASION has occurred in the article on the Propylæa† to observe how the greatest Greek architects were careful to subordinate a secondary structure to a superior which was in obvious relation to it,—the Propylæa of the Athenian Acropolis to the Parthenon,—and also the secondary to the superior members of the same structure,—the wings of the Propylæa to the central portico. These differences, we can see by the result, were designed with consummate art. The impression of the magnitude and dignity of the chief subject is enhanced very wonderfully, and yet those which are subsidiary still vindicate their appropriate importance. The smaller columns of the Pronaos and Posticum of the Parthenon come into view perspectively with those of the porticos in front of them, and tell with the same effect upon the sense of gradation.

We have an example always before us how resources are worse than wasted when this principle is neglected. The elevation of the British Museum would only gain in dignity if the architecture of the wings, by reduction of the scale of the columns, supported rather than detracted from the majesty of the central design. At present the elevation is provocative,—provocative even in an irritating sense,—of suggestions of relief. How would it do, one says, to advance the walls of the building and keep down these obtrusive lateral columns by engaging them? Would the façade be improved by taking them away altogether? What of a scheme to re-arrange them as interior supports of a grand hypostyle hall upon the now vacant area, and fronted nearer to the street by the portico re-erected and released from the competition of the bullying blocking course of the flanks? Subordination,—happy subordination,—is the principle of the very best effects of Gothic architecture no less than Greek, and the Greek may have learned his lesson by observation of some of the great Egyptian temples. But what the Greek is to be credited with as original and exclusive seems to be his appreciation of the value of accurate and numerically simple proportions in adjusting sequences of magnitudes of architectural members and distributions. Even so the adoption of this principle required to be supplemented by fine taste in correction of solid judgment, to decide both the stages of such gradations and between what several structural and ornamental terms they were to be fitly applied.

Dr. A. Zeising, as long ago as 1854, published at Leipsic an elaborate treatise on Proportion, and enunciated a theory which might not be worth advertising to except as a specimen of laborious error, and that it continues to be adverted to from time to time by German writers as worthy of the subject. He set forth that all excellent proportion, both in nature and art,—in the human frame and that of animals generally, in the leaves and growth of plants, in music and in architecture,—depends upon the division of quantities by the so-called golden section. In a line so divided by a simple geometrical problem, the smaller part bears to the larger the same proportion that the larger bears to the entire line; the larger part is then to be divided again on the same principle, and so at last a series of divisions are obtainable which give a good chance of hitting leading points of a composition more or less exactly.

But the proportions of such divisions to each other are not to be expressed in simple terms, and the applications of the system have no such significance and preciseness as to make it reasonable or plausible that the vast variety of simple numerical proportions should be renounced in its favour,—in favour of one inflexible rule.

No theory of proportion in art can be of value which does not admit of infinite variations of schemes and systems of proportion,

—and which does not repudiate all pretensions to supply beauty automatically,—by the mere mechanical operation of a law. It is certain that the Greek architect had a definite theory; it is equally certain that he employed it as a musician may employ an instrument which he has perfectly in tune, with full confidence that it must depend upon his own judgment, taste, and manipulative skill whether he evokes from it harmony or discord. There is much appearance that the musical genius of the Greeks was far in advance of their musical science; that like many executants at the present and at all times, they could produce melodies which they could not write down,—and even that they explained some of their best successes not only imperfectly, but erroneously. It may have been much the same in architecture; the judge is proverbial who was always admirably correct in his decisions, and always grossly absurd in his account of how he arrived at and justified them. So it might be that the scheme of proportion employed by Ictinus in the Parthenon and by Mnesicles in the Propylæa had really nothing to do with their production of such admirable works; in this case, which is at least conceivable, the discovery of their system would have an historical interest, but not an artistic; it might be left to the students of pure archaeology as a matter more of curiosity than of scientific value. Enough, however, has been recovered concerning it to prove that this is not the case; the system is so coherent in itself, is found to come into application so universally, and at the same time so consistently with rational properties, that it is impossible to refuse to it the credit of being a true and valuable instrument in the hands of those who evolved and who were capable of using it.

A further question may be reserved,—whether it is as available in the practice of design in other styles than the Greek? Or, at least, what are the extensions or restrictions, the limitations or the developments, which are required by the complication of modern circumstances in order to make it so? This is a very considerable inquiry indeed; but the field of inquiry as to proportion in art is essentially considerable,—it is one that had better be left aside altogether unless a becoming consciousness is entertained of its scope and comprehensiveness. Proportional laws control the solar system itself, and in their search for them astronomers have had their noblest successes and most disappointing defeats. We may leave them to do the best they can to find a substitute for Bode's discredited law, and turn off in a direction of our own from what was their, and has been in all ages, a common starting-point.

It is certified beyond question that the study of music first brought home to the philosophical sense of the Greeks the conviction that precise numerical proportions were not more closely related to the problems of geometry than to the reactions of physical nature on the one hand, and on the other to the excitement of æsthetic sympathetic emotion. To the same Pythagoras were ascribed,—whether rightly or not,—the discoveries of the numerical relations of the sides of right-angled triangles, the very charter of trigonometry, and of the dependence of musical concord,—the basis of sentimental expression,—on the specific quantities of weight, tension, and lengths of vibrating matter. As regards music, they held for the most part to the true philosophical course of grasping the principle of definite proportions between concordant strings, but of relying on accurate observation and experiment to decide its particular operation. Thus it was that the school of so-called Pythagoreans settled the musical scale, which is that of civilised nations, upon a truly scientific basis. Plato might be shocked at such concession to concrete matter of fact. He has nothing but sneers for the men who thought to elicit truth by "putting musical strings to the torture as if they were slaves under examination," and laid down their ears to catch minute differences of interval; to him it was below the dignity of philosophy to search for the secrets of musical harmony otherwise than by study of the nature of numbers in themselves. It was by this

\* We are not, of course, responsible for the opinions expressed by Mr. Lloyd in this article.—Ed.  
† See *Builder*, p. 3, ante.



false track that the wits of many,—and among them many so-called Pythagoreans,—went wool-gathering. It is quite possible that spurious theories of architectural proportion may have so originated, and even have gained so much vogue as in some instances to have governed practice. Xenophon, in the "Memorabilia," represents Socrates asking a young man who affected to despise instruction,—“If you proposed to be an architect should you not think it reasonable to provide yourself with a store of books on the subject?” There was, therefore, no lack of writers on architecture; and, we may assume without argument, no lack of conflicting theories, some of them, no doubt, wild or pretentious enough. Good and bad,—same or supercilious merely,—all have alike perished. The only salvage from the wreck that can be hoped for is to be obtained from the study of the best remains, with the view to discover upon what theory their authors proceeded, and then with the resolution to put even these results to the best test of reasonableness that we can. We are bound to ask boldly, did the architects of such works as the Parthenon and Propylæa really find any true assistance in the proportionate theory which they are proved to have observed, or was it really indifferent to their success?

One of their applications of combined proportions has such remarkable analogy to the theory of musical chords that it is difficult to believe that we have in it only a case of casual coincidence. A musical triad consists of three notes, each of which is at a consonant interval from each of the others,—that is, any two notes of which taken together form a consonance. It will be seen at once that the case is directly analogous to a combination in architecture of three dimensions,—whether these are taken rectilinearly, that is, between three divisions of a straight line, or, more importantly, in the direction of the three dimensions of space,—the width, length, and height of an apartment, or of the exterior of a structure, which are presented quite as naturally in relation as the notes of the musical combination.

A protest is not unlikely to be heard here,—“the Greeks had no recognition of harmony,—they only regarded the consonance of notes in sequence,—not as sounded together.” To such a protest the reply is open that a different opinion may be sustained on very substantial grounds. True it is that in what Greek treatises remain “De Re Musica,” it would not be easy to find a definition of a chord,—but there are abundant classical passages which establish the fact (*vide* Chappell's History),—and this simple fact is enough, that those who tuned their instruments by sounding different strings together could not have been unaware of the value of the consonance of concurrent as well as of consecutive musical notes.

A consonance of three notes is that all-important constituent of harmony, the chord; and the principle of such consonance is the same both for the major and the minor scale.

The major scale supplies three perfect chords,—C, E, G; F, A, c; G, B, d, called respectively those of the tonic or key-note, the sub-dominant, and the dominant.

The agreeable effect which distinguishes such combinations is proved by experiment to depend on the number of vibrations which produce one note occupying precisely the same time as the different numbers of vibrations which produce the others. As matter of fact, six of the vibrations which produce the note G take place in the same time as five of the note E and four of C.

The same rule, but with different numbers, applies to the perfect chords of the minor scale,—A, C, E; D, F, a; E, G, b. In all these cases ten vibrations of the first note occupy the same time as twelve of the second and fifteen of the third.

Now it will be observed that both these systems agree in one respect, the index numbers of the concordant notes differ in the very simplest degree,—that is by unity.

Major concords.....  $\frac{4:5:6}{2:3}$

Minor concords .....  $\frac{10:12:15}{5:6:4:5}$   
 $\frac{2:3}{3:5}$

The superior value of simplicity appears in the lower numbers which effectuate the major concords, and it is still more apparent in comparison of those of chords of inversion, on which it is not necessary here to enter.

It is enough to instance those of the first inversion of the tonic-major:—

$\frac{12:15:20}{4:5:3:4}$   
 $\frac{3:5}{3:5}$

In this combination one ratio varies by a difference (3:5) between its terms in excess of unity.

This, however, was a system of proportions which had some remarkable applications in early Greek architecture. I have shown, in the appendix to Mr. Cockerell's work on “Basse and Ægina,” that the upper and lower diameters and breadth of abacus of the columns of both the temples at Ægina and of the very archaic temple at Corinth were so regulated by the terms 3, 4, 5.

Upper diameter : Lower do. :: 3 : 4  
Lower do. : Abacus :: 4 : 5  
Upper do. : do. :: 3 : 5

It is probable that this early predilection for the terms 3, 4, 5, was due to a supposition of some especial value derived from the celebrated theorem of Pythagoras, these numbers being the simplest expression of the relation of the square of the hypotenuse of a right-angled triangle to the squares of the other two sides.

Later Greek architects decided that the dimension of the shaft thus obtained was

2 : 7 Full height to length of top step.....	65:185 : 228:147	Measured. Error.
4 : 9 Breadth of top step : length of top step.....	101:341 : 228:147	0:006
9 : 14 ” ” : full height front.....	” : 65:147 (65:185)	0:124 0:038

far too quick, and adopted very different proportions; there is much appearance that they were guided in some important instances by proportions, not of diameters, but of the sectional areas of their columns above and below. In this connexion it is of interest to observe how early the notion of the squares of low numbers was brought into association with the designing of this important architectural member.

The Athenian example of the small temple on the Ilyssus furnishes us with what may be called a precise architectural chord; the upper diameter, 6 : lower diameter, 7 : breadth of abacus, 8.

$\frac{6:7:8}{3:4}$

The interior of the naos of this temple appears to have been an exact cube.

The largest dimensions which are brought into comparison are, of course, those of the height, length, and breadth of the temples on the exterior. Whether it was worth the while of the architects to bestow pains on effecting such precise adjustments is a matter with respect to which differences of opinion may possibly be entertained, and in any case it is worthy of discussion; but that such pains were bestowed can be fully established.

The small Doric temple of Artemis Propylæa at Eleusis had the proportions—full height of front, 4 : length of top step, 6 : breadth of ditto, 3 : giving the simple architectural chord:—

$\frac{3:4:6}{3:4:2:3}$   
 $\frac{1:2}{2:3}$

The constructive conditions enable us to recover the height of the naos interior, with fair probability, and we obtain,—

$\frac{8:9:12}{8:9:3:4}$   
 $\frac{2:3}{2:3}$

The temple of the Nike Apteros, as plausibly restored with pediment, gives the two following chords:—

Exterior  $\frac{6:8:9}{3:4:8:9}$   
 $\frac{2:3}{2:3}$   
Interior  $\frac{72:80:90}{9:10:8:9}$   
 $\frac{4:5}{4:5}$

It will be observed that these comparisons are taken exclusively from structures of moderate dimensions; when we examine fine examples of larger scale we find that the architects, true to the suggestions and exigencies of their own art, break away from the simple rule of unitary differences which would be imposed by the law of the perfect musical chord. They do so in two directions: first in that which is indicated by the chords of inversion, which do not repudiate one ratio of the triad with a difference of terms greater than unity; and then by combining with uniform difference between terms, and so far with analogy to the perfect chord, an admission of difference in excess of unity, and higher numbers.

It must suffice to adduce the case of the Parthenon,—the grandest of all examples of proportional architecture,—and, considering the novelty of the exposition, it is fair to give verification of good faith by juxtaposition of the theoretical and executed dimensions,—the latter taken from Mr. Penrose's work on Athenian architecture.

$\frac{65:147 : 101:341 : 228:147}{9:14 \quad 4:9}$   
 $\frac{2:7}{2:7}$

These three ratios, like those of the perfect chord in music, have a uniform difference between their terms, but a difference of five instead of only unity. They pertain to a scale or series, regulated by this common difference,—a scale which is exclusively resorted to throughout the design.

## NOTES.

THE Channel Tunnel hobby was ridden again by Sir E. Watkin on Wednesday night, and defeated by 153 to 107; not so large a majority as we should have liked to have seen. There was the usual tall talk about patriotism and public spirit; qualities which have been so remarkably displayed in the whole course of Sir E. Watkin's public career, and his assumption of which in regard to this scheme will, no doubt, be estimated generally at its true value. As to the military dangers of the tunnel we have, of course, no right to speak, but we may say that we are hardly so convinced of their formidable character as some critics appear to be, and we should be disposed to agree with Sir Wilfrid Lawson that this class of objection to it has been exaggerated, and that for your enemy to get into a hole 20 ft. square was not the most favourable position for him to act against you. The real objections are the doubtful character of the strata, the probability of faults, the exceeding practical difficulty, not to say impossibility, of adequate ventilation, and the still greater improbability of the enterprise paying even if accomplished. There is another question which we and others have asked, and which Sir E. Watkin appears to carefully avoid: will the slight difference between the French and English gauge ( $\frac{1}{4}$  in. in the North of France and  $\frac{1}{2}$  in. in the South) materially interfere with the rolling-stock of one country running on the metals of the other? If that is so, the whole tunnel would be practically useless for economic conditions of traffic. It is all very well for the Chairman of Committees to



talk of "bogeysism" and "fogeyism," but Mr. Courtney is not an engineer, and political aspirations will not alter engineering facts.

THE defeat of Lord Stratheden and Campbell's Smoke Nuisance Abatement (Metropolis) Bill was a foregone conclusion, though we hardly expected so large a majority against it as 30 to 12, by which majority the Peers voted Earl Wemyss's amendment, that "before the law for the prohibition of smoke is extended to private dwellings, it is desirable that the purpose and intention of the existing Acts be more fully carried into effect, either by their amendment or by their better administration." On the subject of London fogs and smoke, the Earl of Crawford and Balcarres brought a little common sense to bear, observing that during the last Whitsuntide recess an excessively black fog had hung over London for twenty-four hours; that fog he traced back to Holland, whence it got to Dover, and eight hours later to London; it could not therefore be occasioned by London smoke. Other people might see as much if they would open their eyes and understandings to take in facts and their meaning. It would, no doubt, be better to have no smoke at all; but the passing of such a Bill as was proposed would simply result in a kind of tyranny over the domestic hearth worthy of the days of the curfew.

DR. KITTO, the Rector of St. Martin's-in-the-Fields, has forwarded to us a printed statement of his views in regard to the proposed alterations of the church, which, we see, also appeared in a slightly different form as a letter in the *Times* of Thursday. Dr. Kitto goes into all the suggestions which have been made in a most clear, sensible, and impartial manner, and comes to the following conclusions:—

"1. That no such necessity [for widening the roadway] can be shown to exist on the ground of public convenience, so far, at least, as the present is concerned.

2. That if anything is needed to be done, the improvement can afford to wait until that time comes when the National Gallery is dealt with.

3. If, however, it is thought that something ought to be done at once, I suggest that by carrying down the steps in one continuous flight on the east, or St. Martin's, side, and by the sacrifice of the unused steps on the National Gallery side, as much space will be gained as by the alteration which the Board proposes.

4. Only in the very last resort, when public convenience is seriously interfered with, and when every other remedy has been tried and proved to be insufficient, should any alteration be allowed in the front of St. Martin's Church.

In regard to the question of the interruption of traffic, Dr. Kitto points out that the omnibuses select this as a stopping-place, which they could not desire or be allowed to do if the traffic were thereby impeded; and that it has never been found necessary to place a policeman here to regulate the traffic; in fact, any one can see with his own eyes that there is no block,—there is only the possibility that there may be some day. If ever there should be, Dr. Kitto suggests, as we have done, that the end of the National Gallery, and not the fine portico of St. Martin's, would be the proper building to be modified and altered. We may quote also Dr. Kitto's dismissal of Mr. Butterfield's singular proposal to mutilate the portico:—

"Mr. Butterfield proposes to cut down the portico to half its depth, and he justifies this proposal on the ground that it is so shown in a model of the church in the possession of the parish. This is perfectly true, but what does it prove? Mr. Butterfield clearly does not appreciate the value of the evidence of his own witness. The model, obviously, was not made after the church was built, or it would have been made to correspond with it, and would accurately reproduce the portico. No doubt it is a model which was prepared beforehand from the plans of Gibbs, in order to show how the design would look when completed. And when it had been so prepared and considered, it was evidently regarded as unsatisfactory, and it was decided to enlarge the original plan of the portico to its present dimensions in order to improve the general effect. The evidence goes to prove that Mr. Butterfield's proposal was considered and rejected before the church was built."

We hope here be truths.

THE fears that have been expressed that the Government would abandon the Railway and Canal Traffic Bill have been realised, the measure having been withdrawn on Monday. The regret expressed by the Leader of the House of Commons, in announcing that the Government found themselves obliged to take this course, will be echoed by all who are desirous of seeing the railway rates controversy settled, as it was admitted that the Bill went a long way towards putting at rest some of the questions involved. Although it is a severe disappointment to the agricultural interest in particular, to find the preferential-rate question still in abeyance, there are other points of great interest to both the trading community and the railways also again shelved indefinitely, which is equally disappointing and greatly to be deplored. With regard to the results achieved by the present attempt to legislate upon this subject, the various clauses have been fully considered and commented upon by different bodies interested; and although the anticipated debate in the House of Commons has not taken place, the views of those chiefly concerned have been prominently before the country, and amendments were forthcoming had the second reading been moved, which would, if accepted, have effected some of the reforms admittedly necessary. This will not have been altogether labour in vain, as, of course, the matter cannot now be lost sight of. Outside circumstances have prevented successive Governments from bringing the question to an issue, although it is clearly ripe for settlement; and, while refraining from comment upon the cause of these failures, we sincerely hope that the next attempt may be more successful.

A PAPER, in the June number of *Harper's Magazine*, by Mme. Jane Dieulafoy gives the fullest popular account yet attainable of the excavations carried on at Susa by that remarkable lady and her husband. It may not be so generally known that in the *Gazette Archéologique* an article by M. Auguste Choisy deals with the subject from a somewhat more technical point of view, without being at all unreadable to the general public. This article is accompanied by a beautiful chromograph plate, giving in *fac-simile* a portion of the enamelled frieze from the palace of Artaxerxes-Memnon. The ground is pale blue, delicately interspersed with dull green, yellow, and white. The architectural remains discovered have no wise disappointed the sanguine prophecies of M. Viollet-le-Duc, at whose instigation, in great part, the expedition was undertaken. No less than 302 engraved cylinders have been brought back. M. and Mme. Dieulafoy are still hard at work classifying and setting up their *trouvaille*. They told us they hoped the whole would be on view in the Louvre early next year.

A VERY interesting archaic bronze statue is published for the first time in the *Mittheilungen* of the German Archaeological Institute ("Romische," Abtheilung II, 2, 2). The statue has been, so to speak, rediscovered; it was dug up long ago in Bartoli's days, and passed into the Barberini Palace. Archaeologists paid it little or no attention till it was brought to light in the Exhibition of Bronzes held last year in Rome,—another instance, if one were needed, of the usefulness of these special exhibitions. It belongs now to the Prince Sciarra, who, with the utmost liberality, has allowed it to be examined and published. It was important that this should be done, as the Sciarra palace (in the Corso) is not open to the public. Dr. Studniska accompanies the plate with a detailed commentary. The statue is, in his opinion, of the first importance in the history of Greek sculpture. It represents a victorious athlete, a boy probably of Peloponnesian birth, for the statue is Sicyonian in style. It dates about the time of the Persian war. The pose is very like the well-known Stephanos statue of the Villa Albani.

IT is certainly very much to be regretted that the Government did not sanction the publication of full reports of the Colonial Conference during its sittings instead of publishing verbatim

reports in two enormous Blue Books, issued late in the month of July. Indeed, Sir H. Holland's report of the proceedings is only dated July 23rd. The subjects discussed are of the highest importance to business men as well as to politicians, being, among others, postal and telegraphic communications, merchandise marks and Imperial customs tariff, and uniformity of patent marks. To publish the doings of the Conference and the papers read, in two volumes, one costing 6s. and the other 3s. 6d., when the attention of the public has passed away, is one of the most absurd and short-sighted performances which even a Government department could accomplish. At any rate, it is not yet too late to make amends for this stupid management by republishing the most salient points and papers in a cheap form.

SIGNOR GIACOMO BONI, in a recent contribution to the *Riforma*, enters another energetic protest, this time against the disfigurement of the noblest buildings in Venice by sign-boards and advertisements,—a practice which has now reached a painful pitch, and calls loudly for repression. He reminds the Venetians that among the sumptuary laws of the Venetian Republic there was one forbidding the occupation of the palaces bordering the Grand Canal to those who made a traffic of their beauty, and it is noteworthy that this law was made at a time that Paul Veronese was immortalising these very persons on canvas, and Peter Aretino was chronicling their lightest actions. Nowadays, the palaces on the Grand Canal are being converted into hotels and *bric-à-brac* shops, or stores for the products of every conceivable branch of industry. "The Venetian Republic," says our enthusiastic Venetian, "excluded from the palaces on the Grand Canal those who bartered their persons for gain, and this was done, not in opposition to personal liberty, but from respect for the locality and its memories. The sale of oneself is less vile than speculating on the beauty of others, and the most infamous of trades is that which tends to destroy the honour of our common mother of that strip of land upon which we were born, whose sons have made it honoured and renowned by deeds which are attested by the fair and stately monuments which have been handed down to us for their preservation, and not that we should pull them down, scrape, or whitewash them, or plaster them over with advertisements or signboards. . . . Let it be absolutely forbidden to conceal or disfigure the architecture of our palaces (ours as Venetians, although they may be private property) by announcements that within these palaces are for sale the spoils of our one great and redoubtable and still lovely and venerable city."

THE case of *in re* the Oxford Benefit Building and Investment Society, which is published in the current number of the *Law Reports*, is profitable reading for directors in any company as well as for shareholders in building societies. One of the articles of association of the company has that "no dividend shall be payable except out of the realised profits arising from the business of the company." As a matter of fact, however, the directors paid dividends out of profits which were estimated by the secretary to be available. That is to say, the dividends came partly out of floating capital in the hands of the directors, and upon the assumption that the mortgage securities they had taken were sufficient to repay the loans they had taken with interest and costs. In many cases this was not the case, for by their own operation the company depreciated their own securities. Said the Judge, "It might easily have been anticipated that a company like this, having the command of large sums of money, which they were eager to lend for the purpose of encouraging building in the city of Oxford, would stimulate that branch of industry to such an extent as greatly to depreciate building property, and this was what actually occurred." The result was that the directors



were ordered to repay out of their own pockets the sums improperly paid as dividends, also the remuneration they had received, and interest at the rate of four per cent., the amount in which they were mulcted being 21,000*l*. This case, therefore, will serve as a necessary warning to directors to be careful how they pay dividends and estimate profits, and it also makes clear the danger which building societies run of depreciating their securities by unduly encouraging building enterprises.

THE Municipal Council of Paris, before separating for the year, has decided upon creating a new professional school for training apprentices in all the industries connected with book-producing, from paper-making and type-founding to binding and gilding, without neglecting the various methods of producing illustrations. This school will be housed, with the least possible delay, in a building to be erected upon a public site in the Boulevard d'Italie and the Rue de Gentilly, which will accommodate 300 students. The Municipal Council, with the approval of the Administration, has given the commission for the building to M. Charles Lucas.

ONE of the most striking and beautiful of the vases in the British Museum has just received a new and very interesting interpretation. The vase represents a Sphinx, painted in creamy white and finely modelled, carrying on her back a rhyton decorated with a very delicately-drawn red figured design. This design consists of six figures, which fall into groups of two each. The centre and most important group has the figure of a bearded man ending in a coiled tail. This figure has always been called a Triton, and hence the true interpretation has for fifteen years (the vase was found in 1872, and acquired by the Museum in 1873) been missed. Mr. Murray, now Keeper of Antiquities, is the new interpreter. From the simple observation that the tail is that of a serpent, not a fish, he saw that the bearded man was no Triton, but a far more important personage, old Cecrops, the serpent king, founder of Athens. The scene represented is, in fact, the birth of Erichthonios, a myth not uncommon on vases, but special interest attaches to the rhyton, because the manner of presentation is quite unique, as will readily be seen by those who are conversant with mythology. Mr. Murray publishes his views in the last number of the *Hellenic Journal*, and his article is accompanied by two coloured plates of the vase.

WE may note that the same number of the *Journal* is distinguished, not only by several articles of somewhat exceptional interest, but also by the addition of two new features, which we have long thought very desirable, and for the addition of which the *Builder* has more than once pleaded. We refer to the archaeological news and the reviews of books. The archaeological news of the present number consists of a Report by Mr. Penrose (Director of the British School at Athens), on "Excavations in Greece," most of the news in which we have already from time to time noted, but which is invaluable as a *résumé*; and a valuable paper by Mr. E. A. Gardner (the Director-elect of the School for the coming year), on recent discoveries in Sculpture and Epigraphy. The addition of such papers of general interest should widely increase the circle of readers of the *Journal*.

"MAKING a pie" is sometimes mentioned when the system of competition tendering is discussed, but it is always with breath a little bated, and the hope that all inconvenient things may be avoided. Contractors generally follow suit, and content themselves with judicious smiles,—capable of various interpretations. The Leyton Local Board, as we learn from the *East London Observer*, held an inquiry recently as to their contracts; and obtained some "startling revelations,"—submitted in writing in admirable detail, and with consummate candour. One contractor for roadmaking stated that he took money from "the man who

wanted the job," as a reward for sending in bogus tenders, and the successful competitor's version was very like that of his critic. Once, when good faith was kept, the enterprising contractor, Mr. Jackson, paid 25*l*. to each of the contractors who had obtained the quantities, and as a reward obtained 3,000*l*. for work priced at 1,750*l*. Last June perjury came to the rescue of the ratepayers, as Mr. Jackson found, to his great surprise, "that the old traitor had received the money, and not acted according to his promises." Mr. Carter had received 15*l*. as his honorarium,—5*l*. more than his fellow pie-makers,—but he actually filled in his tender at 556*l*., instead of 731*l*. 19*s*. 6*d*. (!), as requested,—and got the job. The Board happened to hear of a want of amity between the two contractors, and asked them to attend an inquiry and explain. They failed to attend, but they wrote very full explanations indeed. Of course, plenty of contractors play the game fairly,—win a contract at a fair price when they want it, or ask a high price when they are quite busy enough. No one wants a contractor who has more work than his personal energy, people, plant, and capital are fitted for. Apathy, blunders, jaded workpeople, delays, ill-will, and frequently litigation, are the results in such cases. The system of competition-tendering intelligently pursued might go on without any of them. Contractors of honour and character decline to tender when they have their hands quite full,—now and for a fair time ahead,—and then others can have a chance also. Contractors without honour and character will, of course, always do the best they can for themselves alone, and could just as well be dispensed with altogether. The Leyton Board have decided "to exclude both contractors from tendering in future, and to extend the area of their advertising." They had previously put their advertisements in one or two papers circulating in their immediate vicinity. Certainly one way of preventing any one "taking a bit to stand out" is to make the stress of competition genuine. Something might also be done by feeling and showing a steady preference for honest men.

IN reference to a Note in our last issue (page 162) about the address of the Chairman of Council of the Association of Sanitary Inspectors for the north-west of England, Mr. Albert Taylor writes to explain that he is the secretary, not the chairman, of the Association, and that the address was delivered, not by him, but by Mr. T. Styles Ainge, the chairman. We regret the mistake, but secretaries who wish their Societies to be correctly represented in the Press should be clearer in their own communications. We received the address in a MS. copy, a great part of which was barely legible, accompanied by a letter scarcely more legible, and with no indication on the MS. itself of either the author of it or the place where it was read. We have no doubt Mr. Taylor is an "energetic secretary,"—all secretaries are,—but one of the primary duties of a secretary is to furnish information in a clear and unmistakable manner.

#### LETTER FROM PARIS.

THE recent burning of the Théâtre Lafayette, at Rouen,—which happily occasioned no loss of life,—has again brought up the subject of the Opéra Comique disaster, which had already begun to pass out of mind. One cannot affirm that the innumerable restrictions imposed by the Prefecture of Police are everywhere observed; but as far as concerns the State and Municipal theatres the necessary alterations are proceeding steadily, and electric lighting especially is being everywhere installed.

The pickaxe has demolished all that remained of the Opéra Comique, but it will be long enough before it will rise from its ashes, and it is not known yet where the theatre will transport its Penates; there is talk of the Eden Theatre, others name the Vaudeville or the Châtelet, others the Galté. The two last-named belong to the City, which seems little disposed to let either of them to the Government,—though it would be an excellent speculation in a financial sense. In regard to acoustic properties, the Châtelet is the best,

and if it were only more central in position, would answer the new purpose admirably. The question must of necessity be quickly settled, and probabilities seem in favour of the Galté, which stands opposite the Square des Arts et Métiers, and only a step from the principal Boulevards. This building dates from 1862, and was designed by M. Cusin, and decorated externally with statues by MM. Doublemard and Vital Dubray. The interior is adorned with paintings by M. Jobbé Duval. The house will seat about 2,000.

We spoke doubtfully some months ago as to the success of the Jubilee Railway Exhibition, in which the large railway companies refused to take part. The event has confirmed our opinion, and this unfortunate enterprise has been the occasion of all kinds of scandals. The Municipal Council, which gave away much too lightly to the Exhibition a great part of the Bois de Vincennes, is perturbed about the matter; serious accusations have been made against several of its members, and the law has been invoked to throw light on a speculation which has made many dupes, and for which the questions of railway construction and progress were nothing but an open pretext. One consequence to the Municipality will be the spending of about 200,000 francs to put the Bois de Vincennes in order again.

The financial success of this year's *Salon* has been brilliant. Deducting 38,000 francs for pensions and for the victims of the Opéra Comique disaster, the Société des Artistes Français has cleared 323,000 francs; more by about 12,000 francs than last year. The Palais d'Industrie is now taken possession of by the Union Centrale des Arts Décoratifs. The mention of decorative art reminds us of a new experiment, owing, in the first instance, to the late Minister of Agriculture, M. Develle. Thanks to him, we can now see in the sumptuous hotel in the Rue Varannes, which the architect Brune left unfinished, a collection of designs in silversmiths' work by the most eminent artists of the day, and some of them not unworthy of the best days of the Renaissance. It is from among these that the Government will select the prize which, for ten years from 1888, is to be given for agricultural success. Twenty-three competitors have taken part in the competition, among whose works we may specially mention those of MM. Delaplancine, Falguère, Costant, and Longepied. The first has symbolised the "Fermo-Ecole," under the guise of a pretty peasant girl reading a book; the second has shown a group of little girls dancing round a cup. MM. Longepied and Costant, besides a series of beautiful miniature figures, personifying rural occupations, have exhibited two bas-reliefs commissioned by the house of Christofle, "Reaping," and "Vintage." Various artists have also exhibited animals, or groups of animals, treated in a modern spirit. M. Jacquemard's "Attelage des Bœufs" is especially remarkable, and M. Valton's "Porcher" is a statuette full of originality. By the side of these groups, in which the influence of Millet is so obvious, the Classic school is represented in this competition by the pretty group of M. Deloye, "Triptolème approchant Cérès l'Art de cultiver la Terre."

The national *fête*, as usual, has served as the pretext for conferring some artistic récompenses. M. Th. Ribot, and M. Busson, the landscape-painter, have received the cross of an officer of the Legion of Honour. The cross of Chevalier has been conferred on MM. Jean Béraud, Ingelbert, Longepied, and Champigneulle. The only regard we need make on these distinctions is in regard to the parsimony of the Government towards architects, who have also some little claim to official honours of this kind.

Turning from these rewards to artists arrived at maturity, we may note that the younger aspirants have just received judgment in the competition of the Ecole des Beaux Arts. The first prize to be settled was that for medal engraving, the subject being "Jason carrying away the Golden Fleece," and the "Prix de Rome" was awarded to M. Charles F. Vernon, pupil of MM. Cavalier, Aimé Millet, and Tasset. In sculpture, the subject was "Ismene and Antigone, daughters of Œdipus, brought to their father by Thesens." After a long examination, the prize was awarded to M. E. H. Boutry, pupil of M. Cavalier; the second prize to M. Charles Desvergues, pupil of MM. Chapu and Thomas; and an extra prize to M. Felix Soules, pupil of MM. Joffroy and Falguère. The ten bas-reliefs sent in showed very genuine



and serious artistic work. For painting, the subject given was the death of Themistocles, a subject which does not appear to have interested the competitors, judging from the cold and formal character of the work. The "Grand Prix" was gained by M. H. C. Danger, pupil of MM. Gérôme and Aimé Millet, and the second by M. J. A. Marieton, pupil of MM. Mailland and Gérôme, and an extra prize was given to M. L. G. A. Charpentier, pupil of MM. Bouguereau and Tony Robert-Fleury. The architectural competition was not adjudged till Monday last, when the "Grand Prix" was awarded to M. Georges Chedanne, pupil of M. Guadet; and the second prize to M. Henri Eustache, pupil of M. Gisors.

As we anticipated, the Institut has ratified the judgment of the Académie des Beaux Arts in giving the biennial prize of 20,000 francs to M. Mercié, who thus obtains, while in the full success of his career, the greatest artistic reward which is to be had in France. The Institut has awarded to M. Sul-Abadie, author of a very graceful "Idylle" exhibited there, the Deprez Prize, founded to be awarded to a sculptor of ability of less than thirty-four years of age.

Work has been going on diligently in the Champ de Mars, especially about the foundation work of the Palais des Machines, the difficulty of which has been increased by the nature of the ground, which does not afford a solid foundation at a less depth than 8 metres. In a few days the metal portion of the construction will be commenced, the contract for which has been taken at 1,100,000 francs. The metallic portion of the Eiffel tower, over which 400 men are employed, is already begun, and one can see, from the opposite bank of the Seine, the four large tubes, rising to the height of 6 metres, which are to receive the lower arches of the tower. The committee of management is considering the question of the power required to put in motion the machinery which is to do its work before the public as part of the show. It is calculated that 2,500 horse-power will be required, at a cost of 1,180,000 francs. For the Exhibition of 1878 the requirement was 1,960 horse-power, at a cost of 980,000 francs. Whether the Exhibition is to be opened in the evenings and to be lighted with electric light is another question to be considered. This question has been adjourned, however, for the present.

Unfortunately, there is a black spot in regard to the exhibition, the rejection of the Metropolitan Railway Bill by 298 votes to 221,—a decision which has given rise to very acrimonious discussions in the Paris journals, which have bitterly reproached the deputies from the provinces with having shown once more their jealousy of improvements in the capital. This, however, is hardly fair; for the fact is that the Governmental project had not been sufficiently developed. The Chamber having refused the project as a matter of general interest, the Municipal Council will probably take it up as one of local interest; but there is not time to get it completed by 1889.

The Government has been strangely inert about the matter of the Hôtel des Postes to which we have before referred; this great building having been completed for two years, and its practical occupation for working purposes appearing as distant as ever, owing apparently to differences of opinion about the furniture and fittings and mechanical appliances. The "Direction des Bâtimens Civils" is, however, to be congratulated on the measures it has taken in regard to the Palace at Versailles, the state of dilapidation of which had caused much anxiety to all those who are interested in our architectural monuments. The Government has asked the Chamber for a vote of 440,000 francs for the works required, among which the repair of the façade of the Louis XIII. wing will cost more than 100,000. The Minister in his report observes that the Republic owes it to itself not to let the works of the great artists of the seventeenth century go to ruin, and it is satisfactory to find that the high officials of the Republican Government, or some of them at least, are awake to the perception that architecture and art are not matters of political partisanship, and that fine architecture, even when produced under a monarchy, is worth preserving. Certainly, unless something is done without delay, the foreign visitors to the Exhibition who go to see Versailles will see only ruins.

The Ministry may also be congratulated on

having taken steps to have a proper catalogue made of the admirable tapestries of the Garde Meuble; when this has been done, it will be possible to distribute these almost priceless and little known treasures on loan among the national museums and public edifices.

There seems hope of the Pantheon decoration being really completed at last, which is matter for congratulation; and we may also mention with satisfaction the appointment of M. Deck, probably the first ceramic artist in France, to the post of director of the Sévres manufactory. M. Deck has created by his talent and energy a "fabrique de faïences" which has a European reputation; moreover, he has invented a turquoise blue which bears his name. No one could be better qualified to restore to the Sévres manufactory its ancient reputation.

At the Louvre the new Salle de la Colonnade has been prepared to receive the Dieulafoy collection, and three new rooms on the first floor are set apart for the enlargement of the marine museum.

The municipal administration is very busy about the decoration of the Hotel de Ville, a committee having been formed of painters, politicians, architects, and critics, to decide on the surfaces to be decorated, and their appropriation either to special artists of reputation or to public competition. The work is directed by the President of the Municipal Council, assisted by M. Bailly, and the secretaries are M. Armand Renaud, Inspector en Chef des Beaux Arts, and M. R. Brown, Chef du Bureau des Beaux Arts.

The decoration of the abattoirs of La Villette is one of the principal works in course of execution. The principal entrance is to have two groups of animals, with figures in bronze, designed by MM. Albert Lefevre and Deslongchamps. A new abattoir is to be constructed in the 15th Arrondissement. M. Moreau, architect of the abattoirs of La Villette, has been charged also with the designs of the new building, which will cost not far from four million francs. We may note also the construction at Fontenay-sous-bois of a new infirmary for aged men, and the completion of the Avenues Niel and MacMahon, abutting on the Arc de l'Etoile.

The City Service des Beaux Arts is busy with the completion of the topographical and archaeological plan of Old Paris, commenced in 1849 by the late architect, Berty, and which hitherto only included the region of the Louvre, the Tuileries, the city, and part of the University. M. Albert Lenoir has undertaken the mapping out of the other quarters and fanbourses down to the fifteenth century. The plan will give the line of the enceinte, and that of the old streets and public buildings. No one can be better prepared for the work than M. Lenoir, who knows the topographical history of Paris intimately, and is competent to enter into all further researches which may be requisite.

Paris has got some new statues. At the commencement of the month, the statue of the chemist Nicolas Le Blanc was erected in the Court of the Conservatoire des Arts et Métiers, opposite that of Denis Papin. A few days later the statue of Père Captier, one of the Dominicans who died in 1871 by the Commune, was erected at the École Albert le Grand, at Arcueil; this statue, in white marble, is the work of the sculptor Bonnaux. On Saturday last the statue of Paul Broca, by M. Chopin, was unveiled on the Boulevard St. Germain.

Art-criticism has lost two able representatives during the past month; M. René Ménard and M. Charles Clément. The first had been a painter, studying under Drolling, Couture, and Troyon, and subsequently became a writer on art. He is author of a much appreciated "Histoire des Beaux Arts," of "Art en Alsace-Lorraine," and of "Mythologie dans l'Art Ancien et Moderne," and was Secretary to the École des Arts Décoratifs. He died at the age of 60.

M. Charles Clément, who died at the age of 66, was a writer of great ability, who for more than twenty years filled the place of art critic to the *Journal des Débats*. Among his principal works were studies on the genius and works of Michelangelo, Leonardo, Raffaello, Géricault, and Decamps, also a remarkable book on "Artistes Anciens et Modernes."

The death is also announced, at the age of fifty-four, of the painter Auguste Perrodin, pupil of Hippolyte Flaudrin, whose principal work was the decoration of Notre Dame, under the direction of Viollet-le-Duc. His death is a great loss to decorative art.

We also record with great regret the death of M. Ronchard, Director of the National Museums, at the age of seventy-one. He belonged to an old and noble family of Franche-Comté, though he did not adopt the title to which he had a right. He was a man of letters, and a distinguished archaeologist and lecturer on archaeology. One of his great pleasures recently was in seeing the complete success of the Dieulafoy mission in Persia, which he had been largely instrumental in promoting; for it was at his instance that the Government voted the necessary funds for the expedition, as well as the ribbon of the Legion of Honour for Madame Dieulafoy, which M. Ronchard had asked for on her behalf.

#### A LOCH LOMOND WATER SUPPLY.

LOCH KATRINE is famed as a magnificent reservoir, whence the citizens of Glasgow are perennially furnished with an abundant supply of almost pure water; but it is not generally known that Loch Lomond, the greater neighbour of Loch Katrine, and the largest freshwater expanse of which the island can boast, has also been effectively tapped for purposes of municipal water supply. This is the case, however, and for the past three years, fully, the water of Loch Lomond has served the needs of one water district at least, and served these needs faithfully and well, to the not unwelcome disappointment of a few local critics who early made up their minds that the money expended on the Loch Lomond water-works would be money thrown away. Unlike the case of Loch Katrine, the outlet of whose conduct lies thirty miles away, the customers of Loch Lomond live in the immediate vicinity, though not exactly on the margin of the sheet itself. The loch, with a total area of twenty-eight square miles, is 23 ft. above the level of the sea. From its natural outlet at Balloch, by the River Leven, to the waters of the Clyde at Dumbarton, the distance is four miles on a very easy descent through the Vale of Leven. Originally but sparsely inhabited, the vale has of late years added greatly to its wealth and population, owing to a strong growth on the part of the dyeing industry which the purity of the overflowing loch-water two centuries ago enticed within its bounds. Exclusive of the ancient royal burgh of Dumbarton at the junction of the Leven with the Clyde, the valley has a string of rising townships dotting nearly the whole of its length, these comprising Renton, Alexandria, Bonhill, Jamestown, and Balloch, with a population of over 20,000, where not so long ago the whole ran barely to as many hundreds. Isolated family wells at first supplied the necessary watering; afterwards the springs of the hillside began to be methodically utilised, and less than ten years ago a comprehensive scheme to that end was formulated and carried through by the members and officers of the Local Authority concerned. This strained the capacity of the hillside sources to their utmost stretch, and when it was found that the combined water district of the upper half of the valley still continued growing beyond its equipment, it became manifest that some more liberal and elastic source of supply had to be discovered and organised. Loch Lomond was almost at the doors of the searchers, but the loch did not, till quite late in the quest, suggest itself as a possible solution of the difficulty. Many borings were made over adjacent uplands, and some samples of water, fair to look upon and sweet to the palate, were got, but these the Glasgow analyst, without knowing whence taken, practically condemned one after another. A sample of water from the great loch was also sent,—more, apparently, as a passing curiosity than out of any really serious design, for the loch has a large passenger traffic on its surface now, and many of its conditions would seem to preclude the possibility of a sufficiently high degree of purity. The analyst could tell that this was a pure lake or river water, and on detailed examination he pronounced the sample to be the only objectionable one submitted to him, being little, if at all, inferior to Glasgow's Loch Katrine water. A serious objection to the Lomond water still remained in the circumstance that, as many of the streets of the district occupied the flanking ascent of the valley on either side, the loch level was altogether relatively too low for an efficient supply on the gravitation principle. The Water Committee of the Local Authority, with Mr. J. E. Jones, of Dalmonach, at its head, determined, after carefully counting the cost,



to tap the loch by means of pumping. Proprietors on the banks were, for the most part, acquiescent; but some slight objection had, nevertheless, to be met and overcome so as to avoid the expense and delay of a Bill in Parliament. This partial opposition was founded on an apprehension lest continued pumping would drain the water away and appreciably affect the existing levels, to the detriment of all properties fronting the shore. It was shown, however, on the basis of a calculation by the engineer of the scheme, that even on the utterly wild supposition that no water at all came into the loch from the numerous tributaries within its sixty miles of shore circuit and 250 square miles of watershed, or from the heavens above, it would take one thousand days of pumping to reduce the loch level by just one inch, calculating a daily withdrawal by the pumps of four hundred thousand gallons. This was sufficient for the objectors, and the Loch Lomond water scheme at once took material shape, with the result that by the summer of 1883 the water of the loch was fully at the service of all the dwellers within the water area indicated.

The works of the Loch Lomond water-supply commence about 100 yards west of Balloch Pier, at the extreme foot of the lake and contiguous to its outfall by the Leven. About 10 ft. below the surface, so as to get it fresh and cool in the summer, and sufficiently to safeguard against damage from the Loch steamers and other craft at all times, the water is admitted into a 12-in. suction-pipe protected against the ingress of fish, or other undesirable intrusion, by a rose termination of copper, resting on a staging of timber. It flows by gravitation about 100 yards along this pipe to a straining well, 6 ft. 6 in. deep by 5 ft. 2½ in. diameter, sunk into the ground on a concrete foundation at the loch edge, where, after passing through a straining-frame of wove copper wire, it is operated upon by the pumping gear. The pumping-station, however, is situated not on the loch edge, but 700 yards distant from it, on the line of the public road which leads from Balloch down the vale on the western side of the Leven. From the straining well, over this distance of 700 yards, the water is drawn through a 12-in. suction main to the pumping-station, and is thence forced along a supply main, which for a mile and a half follows the public road spoken of, to where it reaches the first houses of Alexandria. At this point, the pipe mounts the hill to the artificial reservoir, situated at a satisfactory altitude, and capable of supplying by gravitation the entire district. The distance from the loch to the reservoir by the pipe line is a little over two miles. It is the function of the pumping-engines, by an average of about ten hours of work daily, to keep this reservoir filled with water freshly taken from Loch Lomond, full storage with partial assistance from the old hill-side spring being sufficient for a twenty days' supply in the event of accident to the waterworks of the loch. The reservoir is supplemented by filters for a further cleansing of the stream before final distribution from the attendant pure-water tank, but on an emergency the water may be sent direct from the loch to the houses without filtration. Half of the district is situated on the opposite or left bank of the Leven, service being performed upon it by a main pipe crossing on the bed of the stream at Bonhill Bridge. The whole was executed from the plans, and under the direction, of Mr. Wilson, C.E., Greenock.

The Vale of Leven supply (exclusive of Renton, which relies on a small hillside loch or tarn of its own) thus constituted on the Loch Lomond basis has continued to give almost full satisfaction to consumers, whether domestic or industrial; and neither prime cost nor current expenditure has exceeded the limits of moderation. The original outlay fell short of 10,000*l.*, and the current annual charges, exclusive of repairs to pipes and plant, are confined to the maintenance of a small but efficient staff of inspectors and works' caretakers. Engineers' reports were lately issued on the capacity of the loch-works supply, in view of a possible extension of the water district boundaries, and from these it appears that with a slight augmentation of strength, and improvement in the pumping machinery, the wants of fully 25,000 of the population might readily be served. At present, about two million gallons of water are taken from the loch weekly, and it is hardly necessary to add that not the slightest discernible impression has been made



*Link-holder, Siena: Fourteenth Century.*

on the level of the loch itself, or upon the volume of surplus water carried away from it by the Leven.

#### ELECTION OF A DISTRICT SURVEYOR.

At the meeting of the Metropolitan Board of Works on the 29th ult., thirty-five candidates applied for the appointment of District Surveyor for the District of Plumstead and Eltham. In accordance with the order of the Board of the 1st of April, 1887, the members of the Board proceeded to reduce the number of candidates to six, by one ballot, each member being entitled to vote for any six candidates. The result of this first ballot was ascertained by two members of the Board acting as scrutineers, together with a representative of the Clerk of the Board. When the scrutineers delivered their report, the names of seven candidates were returned, in consequence of a "tie" in the voting. The names and numbers of votes so returned were: Batterbury (T.), 35; Bridgman (H.), 13; Hardcastle (W. J.), 11; Pelly (H. A.), 11; Saunders (M. L.), 20; Spiers (W. L.), 18; and Stock (H. W.), 22. A ballot was next taken to decide the tie between Messrs. Hardcastle and Pelly;

the result was the retention of Mr. Hardcastle's name. The Board then proceeded to ballot on the remaining six names, with the following results, viz., Batterbury, 23; Bridgman, 0; Hardcastle, 3; Saunders, 7; Spiers, 5; Stock, 3. Mr. Batterbury having thus a clear majority of all votes cast was at once declared to be duly elected, and having thanked the Board for his election, he promised to faithfully discharge the duties of the office.

#### LINK-HOLDER, SIENA.

This is a good example of spirited design and execution in wrought iron, the best point about it being the ready manner in which a grotesque quasi-animal form is worked out of little more than a mere bar of metal, with forcible expression, though without any attempt at realism.

**The Buxton Reservoir.**—The Buxton Local Board have accepted the tender of the Arlesley Lime and Portland Cement Company for the supply of 1,000 tons of their "Eddystone Portland Cement" for the construction of the Hogshaw Reservoir.



# THE SALISBURY MEETING OF THE ROYAL ARCHEOLOGICAL INSTITUTE.

This year the Royal Archaeological Institute holds its annual meeting in Salisbury for the second time, but after an interval of nearly forty years; for it was in 1849 that the Institute held its first meeting in that city. Since then great changes in its *personnel* have taken place. In 1849 Professor Willis took an active part in the proceedings, and gave a most lucid description of the cathedral. This year his place in that particular respect was taken, not unworthily, by Precentor Venables, as we shall have occasion to mention further on.

The opening meeting was held at noon in the Council Chamber, where the members of the Institute were formally received by the Mayor and Corporation on behalf of the citizens. The Mayor read an address of welcome in which he congratulated the members on meeting in Salisbury under happier circumstances than in 1849. In that year, when the lamented scholar and statesman, Sidney Herbert, presided over the meeting, "the country, and Salisbury in particular, was suffering from a fearful visitation of epidemic cholera." Proceeding with his address, the Mayor quoted and endorsed the oft-repeated statement that few if any counties in England can vie with Wiltshire in the variety and interest of its ancient remains, "evinced the successive ages of Celtic, Roman, Saxon, and Norman occupations." Reference was of course made in the address to Old Sarum and to the cathedral, and in conclusion the Mayor expressed the hope that the visit of the Archaeological Institute to Salisbury might be as pleasant and instructive as its members could wish.

On behalf of the Wiltshire Archaeological Society, its President, the Bishop of Salisbury, read a second address of welcome. He said he welcomed the Institute to Salisbury in a double capacity—not only as President of the local Society, but as sixty-eighth Bishop of Salisbury and as sixty-second Bishop of New Sarum. Having remarked that he was glad that the visit of the Institute had come at a time when he had been long enough in residence to appreciate, to some extent, the wealth of interest in the land and the city over which it was his lot to preside, his lordship went on to say that it was impossible for a Bishop of Salisbury, whether he looked down upon the cathedral and city from the heights of Old Sarum, or looked up to the spire from the house in which his predecessors had lived in almost uninterrupted succession since the year 1220, or perceived the still needle-point of that same spire from the plain on which reposed the isolated sanctuary of Stonehenge, or drove along the green wooded valleys in which the little villages, with ancient churches and monasteries clustering along the sparkling streams like jewels upon a silver thread,—it was impossible for him, whether at rest or on a journey, to forget the debt that he owed to the past and to those who, like the members of the Institute, had linked the present and past together and made them a living whole. Passing on, his lordship said that as President of the Wiltshire Archaeological and Natural History Society, he had a yet more decided and special reason for welcoming the members of the Institute to Salisbury, for on the occasion of the last meeting of the Institute in the city, in 1849, the veteran John Britton, then about 78 years old, editor and in great part writer of the "Beauties of England and Wales," and of the "Architectural and Cathedral Antiquities of Great Britain," put forth a circular of some importance showing cause why the then Wiltshire Topographical Society should be transformed into a larger and more popular society. The proposal was not taken up at once, but in 1853 the Wiltshire Archaeological Society was inaugurated, and the foundation of its library and museum was laid by the purchase of Mr. Britton's collection of books, drawings, &c., which were deposited at Devizes. The Bishop concluded his address by saying that local antiquaries had perhaps, since the first visit of the Institute to Salisbury, learned something more than they then knew as to the true meaning and scope of antiquarian pursuits. They were now less, perhaps, of speculators, and less also of Mediævalists. They went further behind into the roots of things. They examined with as much care (in the person of General Pitt-Rivers) the isolated civilisation of little Romano-British villages as they would a great

and magnificent monument. They were as careful (under the guidance of Mr. Nightingale) to register and to treasure the pieces of plate presented to local churches in the Georgian era as they were in regard to rare pieces of pre-Reformation times. They had therefore gained something in method.

Earl Percy, as President of the Institute, expressed the thanks of the members to the Mayor and Corporation, and to the local society, for their addresses of welcome. He spoke of the antiquities of Wiltshire as unique, and told an amusing story (which he said he hoped was apocryphal) of a party of tourists visiting an ancient monument when the owner of it happened to be there; the tourists (not knowing him) politely requested him "to be good enough, if possible, to give them the loan of a hammer!" While the Institute and the Wiltshire Archaeological Society had no doubt done much to foster a loving care of local antiquities, he felt certain that Wiltshire must stand in a very exceptional position indeed if there was not ample room for the exertions of all antiquaries, local and general, in inciting the inhabitants to respect and protect the memorials of the past that existed in their midst. Having once more expressed the thanks of the members of the Institute for the addresses of welcome which had been presented, Earl Percy vacated the chair in favour of the "President of the Meeting," Lieut.-Gen. A. H. Lane-Fox Pitt-Rivers, F.R.S., F.S.A.

General Pitt-Rivers then proceeded to deliver the Presidential address, which was mainly devoted to that branch of archaeology to which his own attention had been principally directed, viz., the exploration of burrows and tumuli. The following is the concluding portion of the address:—No one now requires to be reminded of the great advance of knowledge that has been brought about by the study of the drift gravels, which, at the lowest computation, has quadrupled the time during which we are enabled to investigate the works of man. No longer confined to the last 3,000 or 4,000 years, the archaeologist has been carried back far into geological time and has been brought in view of the earliest struggles of our ape-like ancestors to become men. No individual amongst those who assembled here in 1849 had the least idea that beneath his very feet were to be found the relics of man's workmanship at a time when he was contemporaneous with the elephant, and other extinct animals. But the discoveries of M. Boucher de Perthes, in the valley of the Somme, were going on at that time, although they were not recognised by men of science until ten years later, when our countrymen, Mr. Evans and Mr. Prestwich, confirmed the opinions of the French savant. The valley of the Avon, near Salisbury, was one of the first places examined by Mr. Prestwich, after his return from France in 1859, but although the gravels had been well looked over by him, and their fauna duly recorded, no palæolithic implements were discovered until later by Dr. Blackmore\* and Mr. Stevens in the drift beds at Fisherton and elsewhere, where they were found in beds that had been deposited before the valley had worked its way down to the level on which Salisbury now stands. Since then, through the munificence of Mr. W. Blackmore, the Museum which bears his name has made Salisbury a place of reference for information on the antiquities of this period. Similar discoveries were soon made in the valley of the Thames, in which I had the privilege of taking part. Although not the first discoverer of palæolithic implements in the Thames valley, as they had previously been found by Mr. Leech, Mr. Prestwich and Mr. Evans on the seashore near Reculver,† I believe I may claim priority for the part of the river near London. Having carefully watched for the space of a year or more excavations in the drift gravel at Acton, I was able in 1872 to show by means of plans and sections, published in the quarterly journal of the Geological Society, the exact analogy of the palæolithic site there with that of the valley of the Somme, near Amiens and Abbeville. Other similar discoveries have since been made in the valley of the Exe and elsewhere in this country. The nature of the implements found in these gravels was such as to fully bear out the doctrine of evolution, being characterised by extreme simplicity as

compared with the stone implements of a later date, and they introduce us to a condition of the arts of man, in which a simple flake or a flint held in the hand at one end and trimmed to a point at the other, appears to have afforded the most advanced idea of a general tool for all the purposes of life, so that the palæolithic or earliest form of implements can be everywhere distinguished by their simplicity from the neolithic or stone implements of a later date, and they are more or less the same in all the localities in which they have been found. As regards the time necessary for the erosion of the valleys and the deposition of the beds belonging to this period, it is generally admitted that it cannot be computed in years. At first, geologists were inclined to demand an enormous time for it, but recently, in consequence of observations on the erosion of glaciers, less time has been thought necessary, and Mr. Prestwich, in a paper read lately before the Geological Society, has given his reasons for believing that the time estimated since the termination of the last glacial epoch may be greatly curtailed. But, although the sequence of palæolithic, neolithic, and bronze implements had been firmly established in the North and West of Europe, it had not been proved that the same sequence took place in Egypt, Assyria, and those countries in which civilisation dates back to a very much earlier time, for it seemed certain that the stone age of the North and West of Europe was contemporaneous with a very much more advanced civilisation in the south and east. The attention of archaeologists had therefore been turned for some time to the question of a stone age in Egypt. The valley of the Nile, it was found, was covered with flint implements which correspond in form to those of the palæolithic type of Europe, but this coincidence of form alone, though highly suggestive for the reasons I have given, was not in itself sufficient to determine sequence, because they had been found only on the surface, and in order to prove them anterior to Egyptian civilisation it would be necessary to adduce the same kind of evidence of their antiquity that had been shown in Europe, by finding them in the gravels in the sides of the valley and in places which could be proved to have been undisturbed since Egyptian civilisation commenced, and this was the more necessary because it was known that flints were used for embalming purposes in Egyptian times.

Here I may be permitted again to refer to a discovery of my own, although in introducing it into so brief and condensed an account of the history of the subject, I must again claim your indulgence as a lecturer. Being in Egypt in 1881, and having devoted particular attention to this point, I was fortunate enough to find flint flakes and an implement in parts of the gravel of the Nile near Thebes, into which gravel, after it had become nearly as hard as rock by exposure, the Egyptians had cut the square-topped chambers of their tombs, and I chiselled several of these implements out of the gravel beneath stratified seams of sand and loam in the sides of the Egyptian tombs themselves. These flints, I believe, afforded the first absolute evidence of the priority of the use of flint implements to the time of the building of Thebes, and to a time before the valley of the tombs of the kings had been completely eroded. At any rate, it was the first discovery of the kind which had been recorded. I have not been able to go to Egypt since, but I believe that by further search upon that site it may be possible to determine when flint implements were first introduced there, for I could not, after careful search, find them deeper in the gravel than a certain level. If this should prove to be the case, it will be an important additional item of evidence. As regards the osteology of the human skeletons discovered in the drift, our knowledge of them appears to develop slowly. If, as I have said, the skeletons of the Ancient Britons are rare, still less frequent must be those of quaternary man, our knowledge of which must depend on the accidental washing of them into drift deposits or the discovery of them in the floors of caves belonging to that period. For some time it was contended that no approach towards lower forms of life could be recognised in the skeletons of this period, and that the one or two abnormal skulls that had been brought to light were either those of idiots or were the result of disease. But in the presence of additional discoveries of similar skulls and skeletons that have since been made in different parts of the

\* Quarterly Journal of the Geological Society, vol. xi., 1884, p. 189.

† Quarterly Journal of the Geological Society, vol. xvii., 1861, p. 362.



world, and more particularly in Belgium, this position can no longer be maintained. Within the last year two additional skeletons have been discovered in the quaternary deposits of a cave at Spy, in the province of Namur, and have been reported upon by M. Fraipont in the *Bulletin de l'Académie Royale des Sciences* in Belgium. The following are reported by M. Fraipont to be the peculiarities in which these skeletons depart from the human form and approach that of the anthropoid apes. The superciliary ridges are more developed and the forehead more shelving than those of any existing race of men, in which respect they resemble the orang, gorilla, and chimpanzee. The chin is more receding than those of any existing race of men. The forward curve of the femur is also greater than any existing race of men, and the angle and size of the articular surface of this bone and the tibia is such as to show that the individuals must have walked with their legs slightly bent. In other respects the skeletons are pronounced strictly human. These appear to be the latest facts revealed to us by the earliest specimens of our race. If they militate against some cherished dogmas we have, nevertheless, no alternative but to accept them if they are established on sufficient evidence. I cannot myself see how human conduct is likely to be affected disadvantageously by recognising the humble origin of mankind. If it teaches us to take less pride in our ancestry, and to place more reliance on ourselves, this cannot fail to serve as an additional incentive to industry and respectability. Nor are our relations with the Supreme Power presented to us in an unfavourable light by this discovery; for if man was created originally in the image of God, it is obvious that the very best of us have greatly degenerated. But if, on the other hand, we recognise that we have sprung from inferior beings, then there is no cause for anxiety on account of the occasional backsliding observable amongst men, and we are encouraged to hope that with the help of Providence, notwithstanding frequent relapses towards the primitive condition of our remote forefathers, we may continue to improve in the long run as we have done hitherto.

On the motion of Earl Percy, the thanks of the meeting were accorded by acclamation to the President for his address.

After an interval for luncheon, the members assembled at the west end of the cathedral, and proceeded to inspect the building, under the guidance of the Rev. Precentor Venables. Passing through the cloisters, they made their way to the chapter-house, where

Precentor Venables gave an interesting lecture on the history and architecture of the cathedral. He said that on the former occasion when the Institute visited Salisbury the members had the advantage of being conducted over the building by that master of architectural exposition, especially in connexion with history, Professor Willis, by the kindness of whose nephew and literary executor, Mr. John Willis Clark, of Cambridge, he (the Precentor) was enabled to have the use of the notes and illustrations used in 1849. With their aid, then, he would proceed to sketch the architectural history of that magnificent cathedral—"magnificent" was not the proper word, perhaps, as it implied a degree of richness and opulence which we did not find in Salisbury. He would rather speak of it as an exquisitely simple and charming building, for it was exceedingly graceful, and perfectly harmonious and symmetrical. Its spire, though not the tallest, was perhaps in point of design the most perfect in the world. As an architectural composition, he regarded Salisbury Cathedral,—more especially as seen from the outside,—as the first of the cathedrals of England. He knew that it was often said, and said with some degree of truth, that Salisbury was one of the least interesting of our cathedrals, but in so far as that was true it was only so because the cathedral (with the exception of the tower and spire) was the continuous development of one design from east to west, carried to completion within a comparatively small number of years. This circumstance was no doubt due to the fact that the foundation of the cathedral on its present site only dated from 1220, the first cathedral of the diocese having been at Old Sarum. Precentor Venables then went on to narrate the story of the transference of the cathedral from the one site to the other, and described the building of the present cathedral, the subsequent addition of the Decorated tower and spire, and the

special expedients which had been found necessary to ensure the stability of this part of the cathedral. He of course spoke of the havoc wrought by Wyatt, but pleaded, in extenuation of harsh judgment on his deeds, that in Wyatt's time the idea of the historic value of an old building or an old monument had not dawned: hence the ruin that was effected by well-intentioned custodians of buildings who regarded themselves as perfectly free to make such changes as seemed called for by the necessities, or fancied necessities, of the hour. Having spoken with regret of the pulling down, at the end of the last century, of the detached campanile which stood to the north-west of the cathedral, Precentor Venables devoted a few words to the chapter-house and cloisters. The chapter-house he regarded as in some respects more beautiful than the one at Westminster. The sculptures running all round the building above the arcading were very curious, and would well repay careful study. The present appearance of the chapter-house was in marked contrast to that which it bore when the Institute visited Salisbury in 1849. It was then in a dreadfully dilapidated and neglected condition, and the only thing to regret in connexion with its restoration was that the decorative wall-painting was executed before the walls were perfectly dry: hence much of it had peeled off. Under the conduct of the lecturer the visitors next proceeded to inspect the cathedral, beginning with the Lady-chapel, where the slender Purbeck marble columns supporting the vaulting were commented upon as being part of a somewhat daring constructive feat. The way in which tombs, arcades, and other features had been removed, altered, and placed in different positions by Wyatt, as if they had been so many pieces of furniture in a drawing-room, was also pointed out. Much of this work of alteration was very unintelligently done, several monumental effigies being at the present time placed on substructures which certainly never belonged to them. The Precentor also referred to the wanton destruction of much of the thirteenth-century grisaille glass which formerly filled the numerous windows of the cathedral. On this subject we may quote from a little pamphlet,\* written by Mr. J.E. Nightingale, who says:—"Considerable and important pieces of this interesting grisaille glass, which originally decorated the windows of the cathedral (with the exception, probably, of the eastern and more important windows, where the richer medallions were used), has been for many years placed in the three lower windows of the south-east transept. Quite lately all the remaining fragments have been brought together by the care of the present Dean and Chapter, and now form the glazing of the remaining windows in this transept. These windows now contain a mine of wealth of ancient examples of thirteenth-century plain glazing, the loss of which is so painfully felt in the present state of the cathedral, and the reproduction of which has not hitherto been successfully attained. The following letter, which was found during the researches of the Historical MS. Commissioners, will show to what extent this reckless destruction of ancient work was carried on during the 'restorations' at the end of the last century. It was written in June, 1788, by John Berry, glazier, of Salisbury, to Mr. Lloyd, of Conduit-street, London:—

"Sir,—This day I have sent you a Box full of old Stained and Painted Glass as you desired me to due which I hope will suite your Purpose if his the best that I can get at Present. But I expect to Best to Possess a great Deal very sune as it his of now use to we and we Due it for the lead if you want any more of the same sorts you may have what thear his, if it will pay for taking out, as it is a Deal of Trouble to what Besting it to Fecuss his you will send me a line as sune as Posibl for we are goin to move ore glazing shop to a Notber Place and thin we hope to save a greatt Deale more of the like sort which I ham your most Ombie Serrant John Berry."

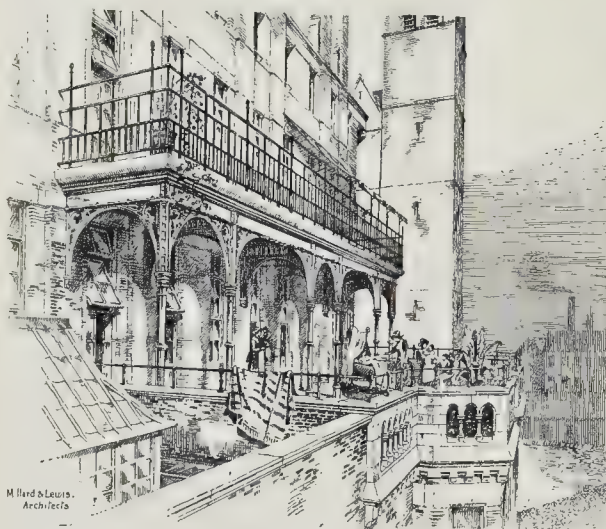
Subsequently a visit was paid to the hospital of St. Nicholas, which shows some considerable remains of Early English work, which were remarked upon by the Rev. Mr. Moberley, the Master. They next proceeded to Harnham Bridge, adjoining, with its chapel, now converted into a dwelling-house. Finally, they visited the Bishop's Palace, under the guidance of the Bishop. Here remarks on the architectural character of the buildings were made by Mr. J. T. Micklethwaite, F.S.A., and Mr. Ponting. To quote from Mr. Nightingale, "The Bishop's Palace has some very ancient portions, but it has been so frequently altered by

\* General Notes upon the Places visited during the Meeting. Salisbury: Bennett Bros., Journal Office.

successive prelates that it is not easy to distinguish which they are. In the cellars were some early arches, in a great measure hidden; these have lately been opened up by the care of the present bishop, and a fine chamber or undercroft of thirteenth-century work has been developed. During the Civil Wars this building was much injured, and the great hall destroyed. It was extensively repaired by Bishop Seth Ward soon after 1608, and it is to this prelate, probably, that a good deal of the existing work must be attributed. Other additions and alterations were made by Bishop Harrington at the end of the last century."

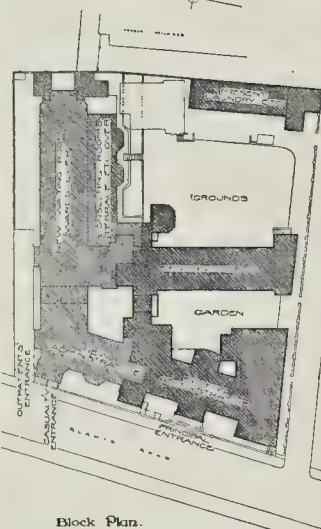
The Antiquarian Section held its opening meeting in the Council Chamber in the evening, when the President of the Section, the Bishop of Salisbury (Dr. Wordsworth), delivered an interesting address on "The Seals of the Bishops of Salisbury." He said that when first he began to have a practical interest in the matter of bishops' seals, some two years ago, he made inquiries whether anything had been written on the subject, and he learnt, somewhat to his surprise, that it was one which was almost wholly untouched. He was shown, indeed, an excellent book on Scottish Seals, in two vols. 4to, by the late Henry Laing, of Edinburgh (published in 1850 and 1866), which contained a catalogue of as many as 223 seals of Scotch bishops; but he could not learn that there was a similar book for England, even of that general character. One or two articles in encyclopedias, and a few scattered papers in learned periodicals, seemed to exhaust the literature of the subject. He was, therefore, led to examine such seals as were accessible in the British Museum and in the Bodleian Library, and formed certain general conclusions which were not difficult to gather, even from such a hurried and partial survey as he then had time to make. He was now glad to find that his friend Mr. W. H. St. John Hope, Secretary of the Society of Antiquaries, had collected a much larger store of information, and drawn much more precise and practical conclusions from the fine series of seals in the possession of the Society last-named, formed, his lordship believed, by the late highly-esteemed Mr. Albert Way. Mr. Hope's paper was read in two divisions on February 3rd and 10th of the present year, and had been recently printed in the "Proceedings" of the Society. To that paper all succeeding inquirers would naturally refer, and it had been of the greatest possible service in the preparation of the present memoir. His lordship said he did not think that Mr. Hope made any comparisons between English seals and the corresponding Scottish series, but otherwise his work seemed to be very complete. The interest of the subject was considerable. As works of art, illustrating the improvement, the decay, and the caprices of public and private taste, they yielded to few of the smaller monuments of the class to which they belonged, and they had the great merit of being subject to strict classification in the order of time, and of forming an almost continuous series, if a sufficient number of examples were examined. Mr. Hope appeared to have had before him 168 examples of pre-Reformation seals. He (the Bishop) had before him thirty-six seals (large and small), belonging to twenty-one individuals out of the thirty-four pre-Reformation bishops of Salisbury; and thirty-three seals belonging to twenty-seven out of the thirty-four post-Reformation bishops,—making a total of sixty-nine seals,—a very considerable number, having regard to all the mischances which were apt to befall such objects, though he did not despair of being able to render the series much more complete. To the theologian the study of seals was of some interest, as showing the types of devotion which were popular in the centuries immediately preceding the Reformation, and the changes of feeling which succeeded it. To the Ritualist (using the term in its proper sense), seals offered certain useful indications of ecclesiastical dress, ornament, and custom, but not, perhaps, as much as might be hoped, owing to the small size of the representations. To the local historian and herald they were naturally of very high value, especially as the arms figured by no means always agreed with those given in the books which dealt with the subject,—e.g., Rev. W. R. Bland Bedford's very useful "Blazon of Episcopacy,"—and in that field they raised many interesting and difficult questions. To the epigraphist the continuous series and development of the lettering ought to be very





TERRACE AND BALCONY.

East London Hospital for Children.



helpful in determining the epoch of other undated inscriptions. Such being the different studies to which these objects ministered, he had no need to apologise to his audience for the subject he had chosen for his address. He trusted that before the paper was printed *in extenso*, the interest which had lately been aroused in that branch of antiquities would stimulate friends far and near to assist himself and other bishops to complete their sets of seals. He might mention that the Archbishop of Canterbury and the Bishop of Durham had, like himself, called in the aid of the veteran Mr. Robert Ready, of the British Museum, to lay a foundation, and they would be grateful for any help that could be rendered them in filling up gaps in that collection and in the Way collection of the Society of Antiquaries. His lordship then proceeded to deal in detail with the classification of seals of different kinds and periods, and described *seriatim* those belonging to the See of Salisbury. The paper, which was illustrated by impressions of nearly all the seals mentioned, was listened to with great interest, and after a few remarks from the President of the meeting, General Pitt-Rivers, thanks were tendered to the author.

Mr. H. J. Moule, of Dorchester, next read an interesting and learned paper entitled "Description of the Vetus Registrum Sarisburiense, with a Short Notice of some of the other MSS. at Salisbury." In concluding the paper, Mr. Moule

paid an eloquent tribute to the writers of these and kindred Mediæval MSS., many of which, he lamented, had been in later times burned or wantonly destroyed.

After a few remarks from Mr. J. T. Micklethwaite, F.S.A., the meeting broke up, and thus terminated the first day's proceedings.

We will continue our report of the Congress in our next.

#### EAST LONDON HOSPITAL FOR CHILDREN, SHADWELL.

This hospital was built in 1875, since which time its usefulness has been so appreciated that it is now necessary to nearly double the size of the original building. The new wing, which is to be erected as a Jubilee memorial, includes a new out-patients' department, and two wards for twenty-four beds each. The former is the more immediately needed, and will be commenced as soon as the funds allow. It consists of a waiting-room, 129 ft. by 24 ft. 6 in., with dressing and consulting rooms on the south side. Over these will be constructed a terrace and balcony, with access from the ward windows, as shown in the view we publish. A new dispensary is also provided to serve the whole hospital.

The addition to the front block towards the street comprises two isolation rooms and a new casualty room, with a separate entrance from

the street. The basement contains boilers for heating the whole of the buildings, engineer's rooms, a new kitchen with the usual offices, dining-hall, store-rooms, &c.

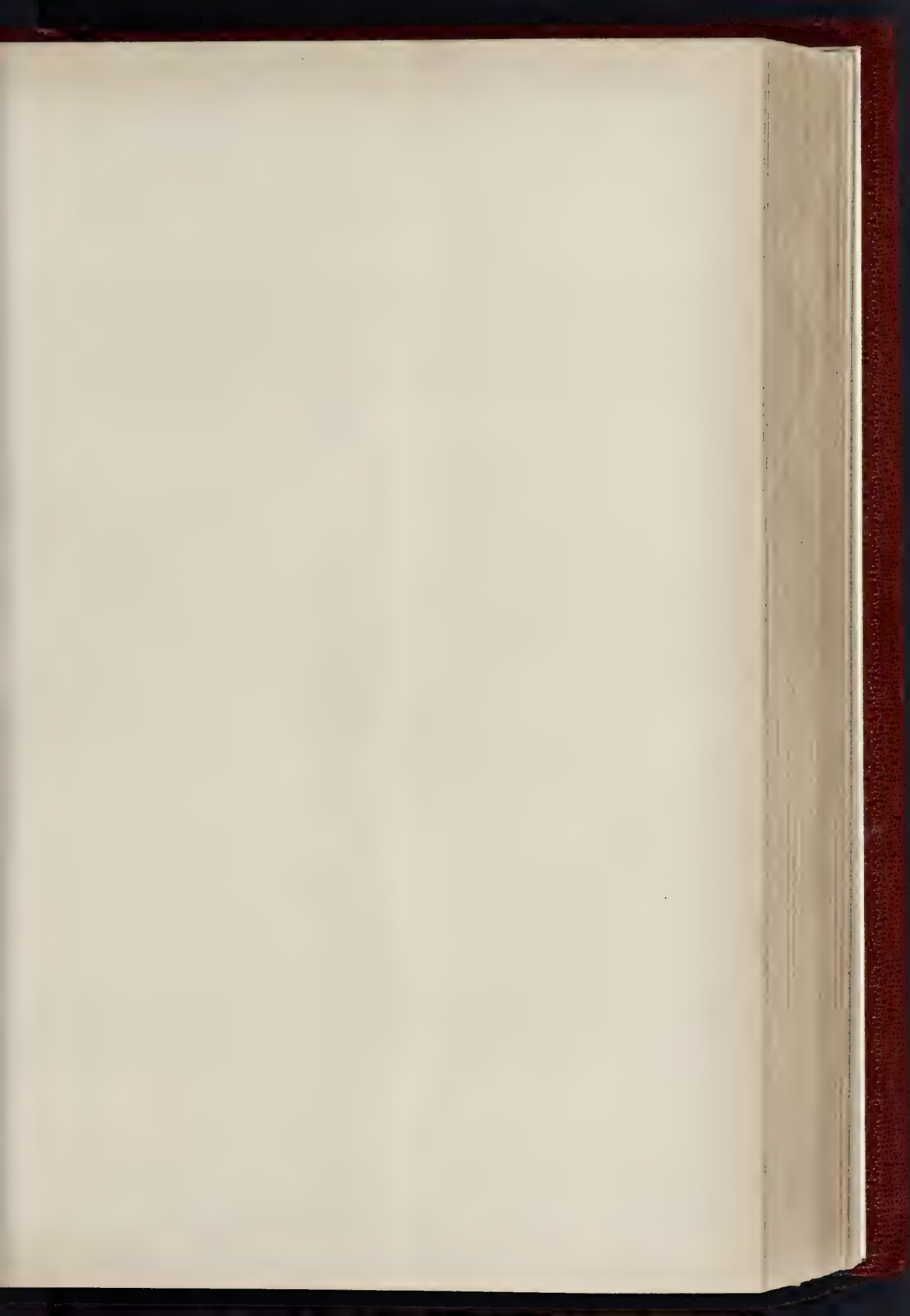
The architects are Messrs. Walter Millard and Wm. G. B. Lewis.

#### COMPETITIONS.

**New Church Tower, Heavitree.**—The successful competitor for the Heavitree church tower competition is Mr. E. H. Harbottle, of Exeter. The two next competitors whose designs were considered as of about equal merit, were Messrs. W. & W. B. Barrett-Smith, of London, and Messrs. Packham Croote & Stuart, of Exeter. The committee were advised by Mr. Ewan Christian, late F.R.I.B.A.

**The Victoria Hospital for Sick Children, Hull.** The design submitted by Mr. Samuel Musgrave, Hull, has been selected; premiums of 15l. and 10l. respectively being awarded to Messrs. Botterill, Son, & Bilson, and Messrs. Smith & Brodric, of the same town.

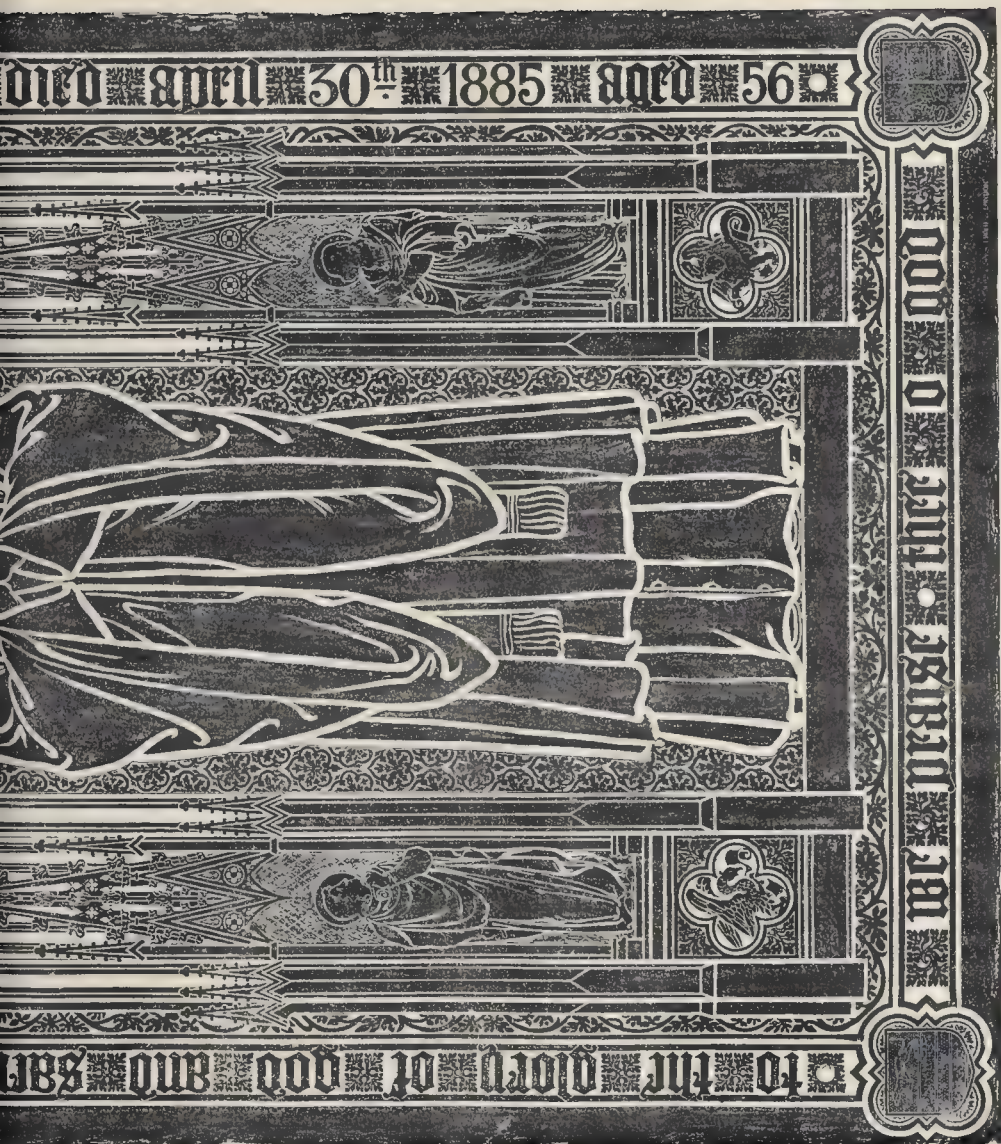
**Sheffield.**—On Monday last the Mayoress of Sheffield (Lady Stephenson) laid the foundation-stone of new Sunday schools, &c., at Carbrook, of which Mr. C. J. Innocent, of Sheffield, is the architect.









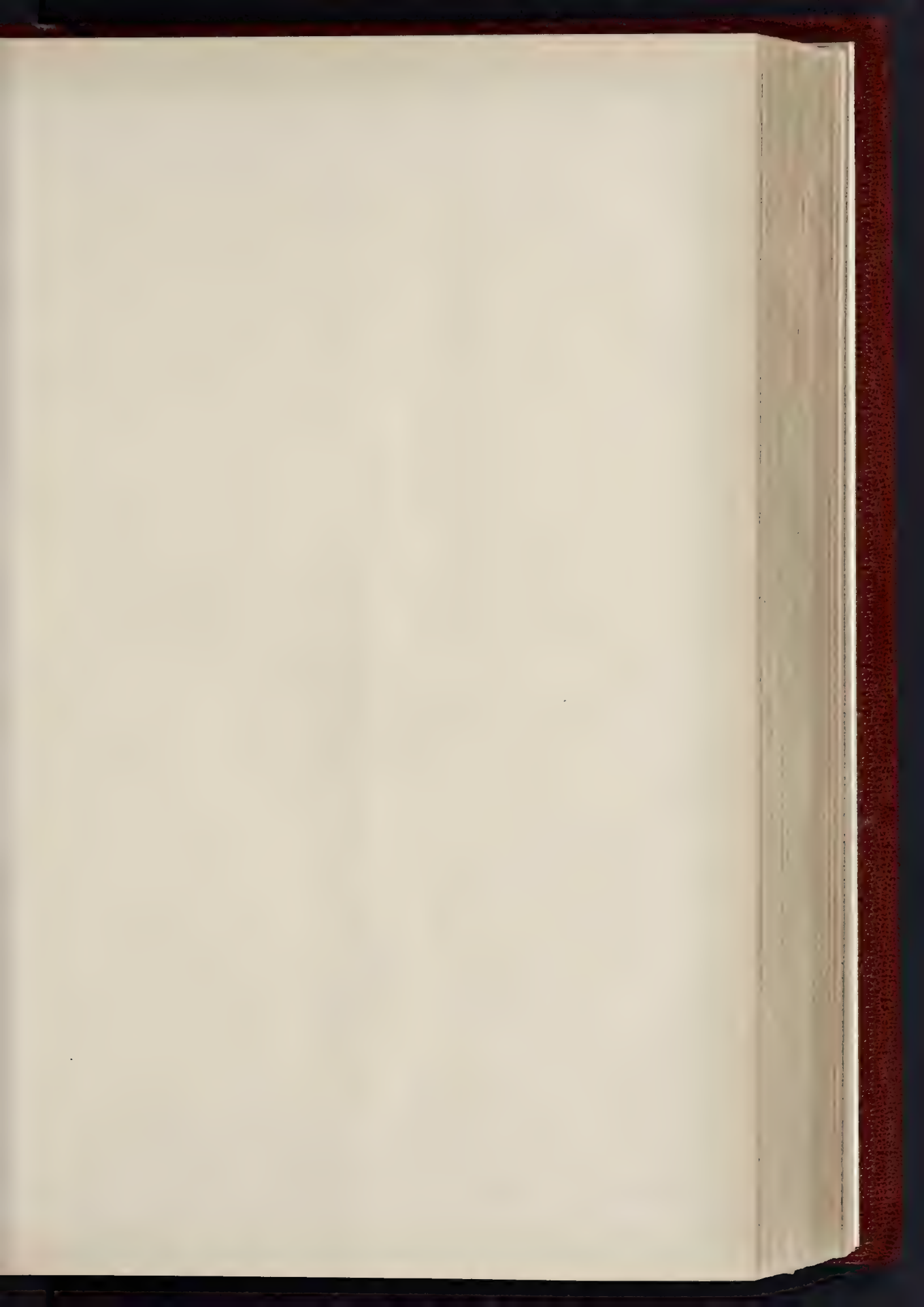


MEMORIAL TABLET (SIZE 7ft. 6in x 3ft. 9in.) IN MEMORY OF THE LATE REV. JORDAN ROQUETTE PALMER-PALMER,  
ERECTED IN BRISTOL CATHEDRAL.

DESIGNED AND EXECUTED BY MISSKS. J. W. SINGER & SONS, FROME, AND 3, DUKE STREET, ADELPHI, W.C.

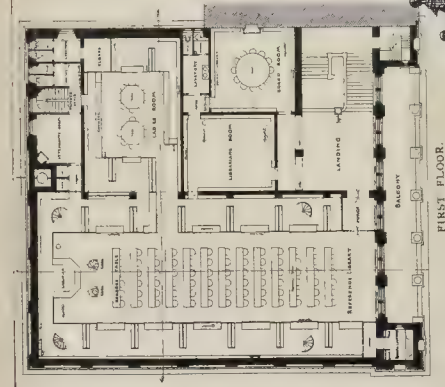




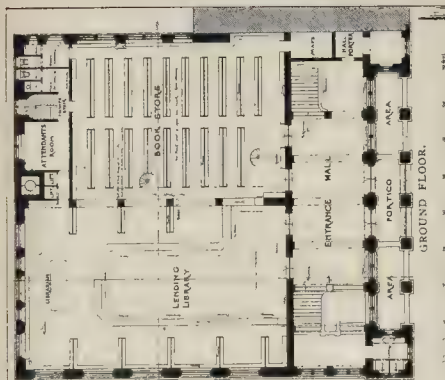




THE BUILDER, AUGUST 6, 1887.



FIRST FLOOR.



GROUND FLOOR.



VIEW FROM GEORGE IV. BRIDGE.





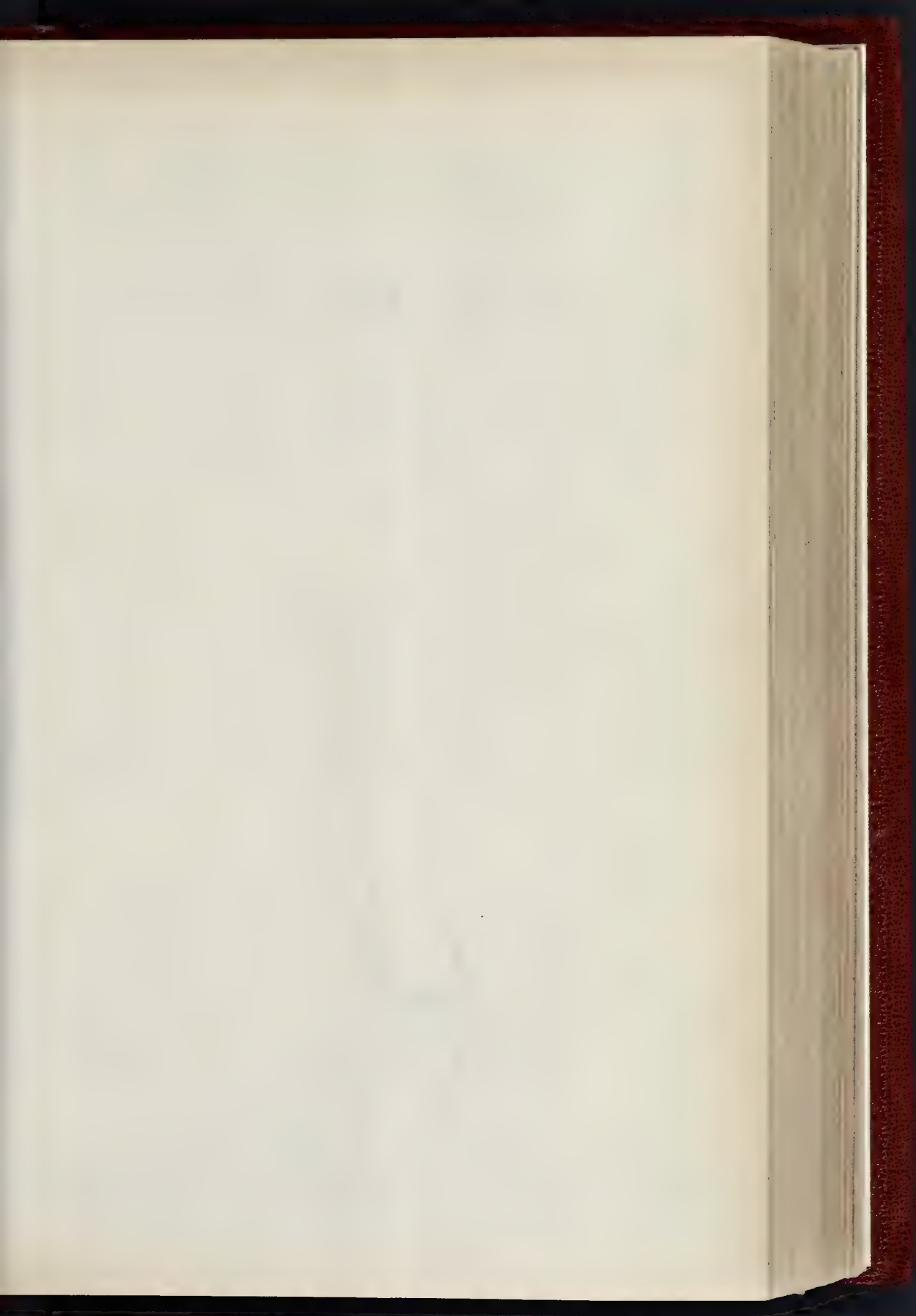
INTERIOR OF REFERENCE LIBRARY.

EDINBURGH PUBLIC LIBRARY COMPETITION.

DESIGN BY MR. T. P. MARWICK, A.R.I.B.A.

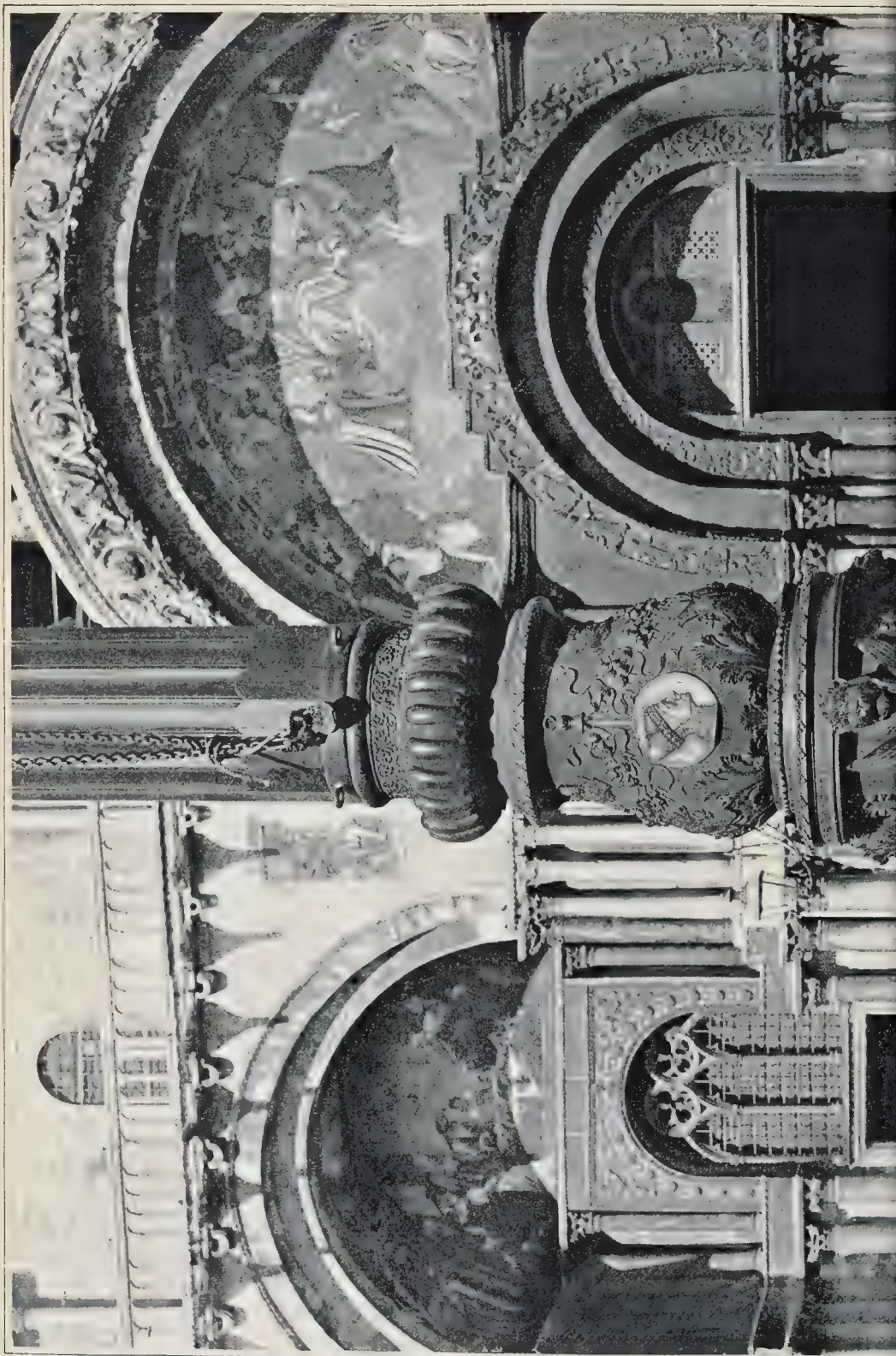


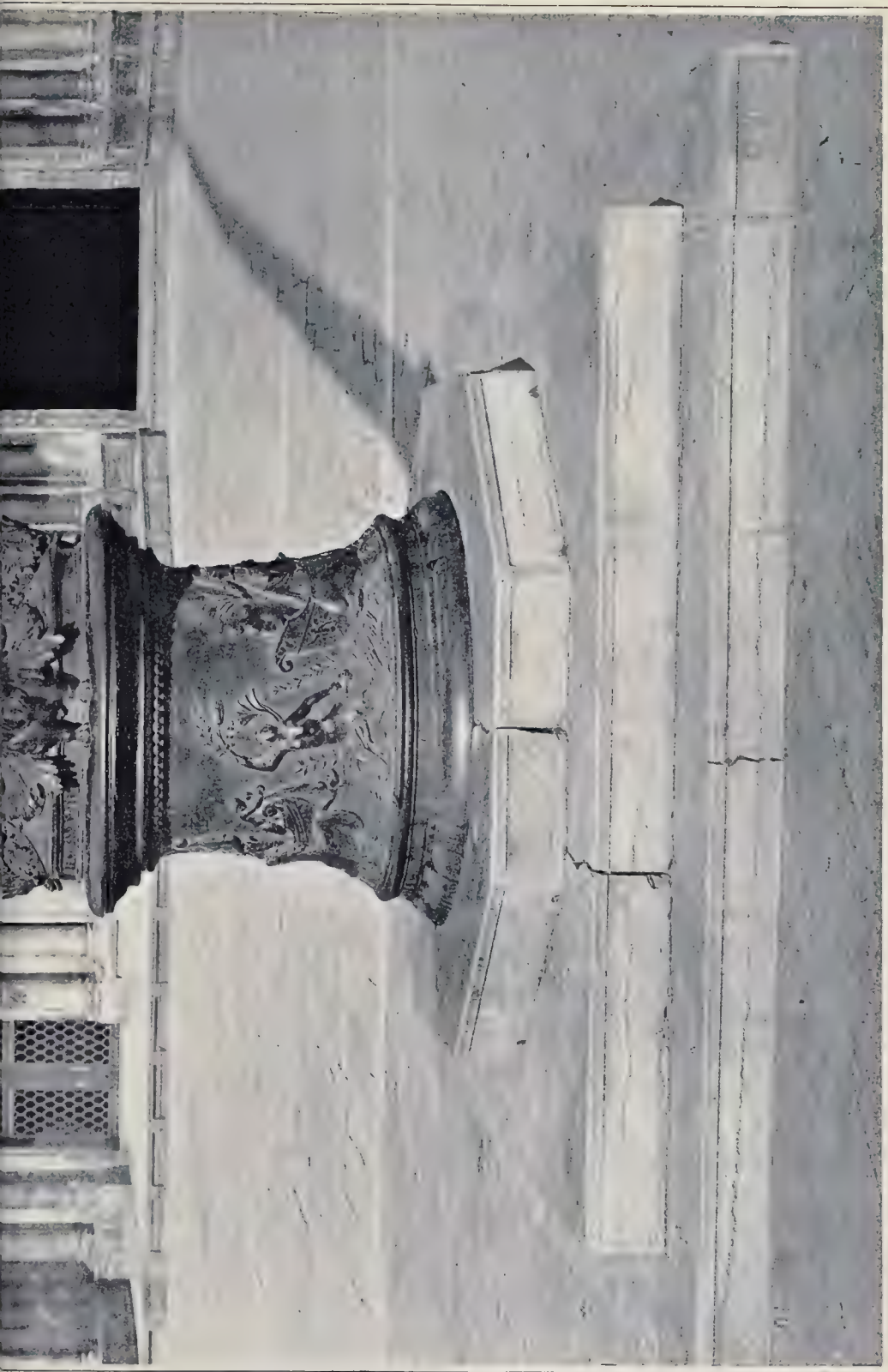
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THE BUILDER. AUGUST 6, 1887.

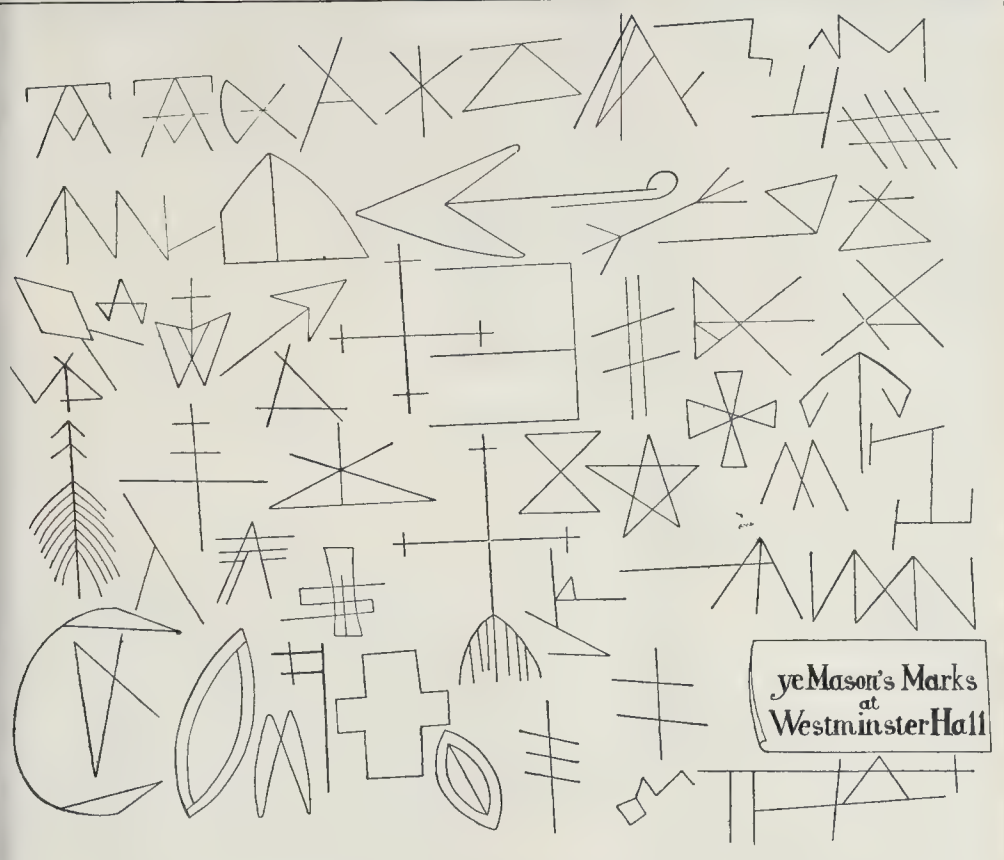




BASE OF FLAG MAST IN THE PIAZZA DI SAN MARCO, VENICE.







### Illustrations.

#### BASE OF FLAG-MAST IN THE PIAZZA, VENICE.

**T**HIS is one of the beautiful bronze pedestals in which are stepped the three scarlet masts from which there used proudly to float the gonfalons of silk and gold emblematical of the three dominions of the Venetian Republic, Candia, Cyprus, and the Morea. The pedestals were erected in 1501 and 1505, by Paolo Rabbo, a procurator of St. Mark, and the Doge Loredano, whose portrait it probably is that adorns the medallion on the upper part of the pedestal we illustrate. The elaborately-finished reliefs of sea-nymphs and tritons are the work of Alessandro Leopardi.

#### MURAL BRASS MEMORIAL TABLET.

The mural brass, of which we give an illustration, is one of the largest that has lately been engraved in England. It has just been erected in Bristol Cathedral to the memory of the late Rev. Jordan Roquette Palmer, and is on the south pier of the tower. The work is incised, the background being sunk and then darkened so as to give effect to the bright foreground. The figures of the Evangelists and the Angels are added on the upper part, to give further effect and support to the principal figure of the priest in vestments. The brass was designed by Mr. E. R. Singer, of the firm of Messrs. J. W. Singer & Sons, by whom the work was executed.

#### EDINBURGH PUBLIC LIBRARY COMPETITION.

This week we illustrate one of the designs selected for special consideration, by Mr. Thomas P. Marwick, A.B.I.B.A. In our issue

of June 18 we said "this was one of the best designs exhibited, the plans good, and the architecture characterised by great taste and refinement."

The designer writes that his aim was to secure a library-like building. He has brought the front forward to the line of the bridge, so as to enable the building to be seen from some distance going north or south.

The rooms below the loggia were to be devoted to inferior purposes.

#### MASONS' MARKS ON WESTMINSTER HALL.

We are indebted to Mr. T. Shelmerdine for the annexed sheet of mason's marks on the walls of Westminster Hall, as observed and drawn by him. Mr. Shelmerdine says:—

"Nearly all the accompanying marks are on the three first bays at the north-west end of the hall. The marks occur in different positions on the wall, some on the lower course, and similar marks on different courses higher up. If these marks are the work of separate masons, there must have been a great number at work, for this could only represent a small portion employed at the time. Some of the marks seem to represent monograms, others the cross, axe, level, arrows, &c.

I noticed the other day, on some of the remains of Roman London at the Guildhall Museum, similar marks, but not on the face of the stone."

**Iron Building at Morden.**—Messrs. North & Son, of London-road, Southwark, having back a large iron building which had been lent on hire to the National Agricultural Hall Company, Kensington, have erected it on ten acres of freehold land fronting on the Epsom-road, Morden, and recently inaugurated it by placing it at the disposal of the workmen and wives of Messrs. Field & Sons, estate agents, Borough, for their annual outing.

#### THE TESTING OF HYDRAULIC MORTARS.

Attention has been directed in Germany to the above subject by conferences held in 1884 and 1886 at Munich and Dresden. In compliance with a resolution adopted at the latter assembly, a series of definitions and propositions has, according to the *Thonindustrie Zeitung*, been elaborated in anticipation of the Conference to be held at Berlin during the autumn of 1888, embracing the following leading points:—

##### A.—GENERAL REMARKS.

Tests should be made in such a manner as shall closely represent the purposes for which the articles will be used. The strength of extension and resistance to pressure of cement mortar, as now usually defined, are not the sole indications of the durability of buildings; resistance to the weather, brittleness, resistance to water, strength of adhesion and constancy of volume being other points of importance.

As the degrees of strength now obtained in mortar are not altogether utilised, it is not required to arrive at higher results. The question whether the mixing of mortar materials shall in future be according to volume instead of weight, is referred to the new permanent Commission.

##### B.—DESIGNATIONS.

1. *Hydraulic Limes* are products obtained by burning limes containing more or less clay (or silicic acid), which on being moistened with water are slaked wholly or partially into powder. According to local circumstances, they are sold in piece form or hydrated in powder.

2. *Roman Cements* are products obtained from lime marls rich in clay by burning below the limit of slagging. These are not slaked with water, but have to be pulverised by mechanical processes.

3. *Portland Cements* are products obtained



from natural lime marls or artificial mixtures of substances containing clay and lime by burning up to the limit of slagging, and by subsequent pulverisation. For the regulation of properties of technical importance, an addition of foreign substances up to 2 per cent. of the weight is permitted without the name being changed.

4. *Hydraulic Fluxes* are natural or artificial substances which do not harden, as a rule, independently, but in combination with caustic lime; such as Puzzolan earth, Santorin earth, trass of suitable volcanic origin, blast-furnace slag, burnt clay, &c.

5. *Puzzolan Cements* are obtained by the intimate mixing of lime hydrates in powdered form, with hydraulic fluxes reduced to the fineness of dust.

6. *Mixed Cements* are products obtained by the intimate mixing of prepared cements with suitable fluxes. Such binding substances are to be distinctly called mixed cements, according to the fundamental substance and the flux.

#### C.—TESTING.

1. *Weight*.—In obtaining the specific weight (that of the grains) a cylindrical litre vessel (0.22 gallon) of 4 in. height is used, into which the substance is sifted or shaken.

2. *Fineness of Grinding*.—The fineness of grinding is defined by sieves of 900 and 4,900 meshes per square centimetre (0.155 square inch) for Portland cement, and 900 and 2,500 meshes for other hydraulic binding substances. For each trial the quantity used should be 100 grammes (3.527 oz.). The thickness of the wires of the sieves should be—

Per square centimetre (0.155 sq. in.).		
Meshes	4,900	2,500
	in.	in.
	.00197	.00269
		.00394

It is recommended to have the sieves all of the same make.

3. *Conditions of Setting* are to be tested at a temperature of 59° to 65° Fahr., except for Puzzolan (trass), by the normal needle and the apparatus for defining consistency. To carry out this test, 14 oz. of the hydraulic binding substance are worked up with water to a stiff paste; the time occupied being three minutes for slow-binding qualities and one minute for quick-binding descriptions. The cylindrical box of the apparatus, 1.56 in. high and 3.12 in. wide (of an impervious substance not conducting heat), is filled with the mixture. A normal consistency allows the testing appliance to stop at a height of .234 in. from the bottom of the box. The normal needle used for testing the setting weighs 10.58 oz., and has a circular sectional surface of .0015 square inch, the box employed being the same as before. The commencement of hardening has taken place when the needle no longer penetrates the entire substance, and the mixture has set as soon as the needle makes no impression. A similar test can be made with a cake on a glass plate. It is suggested that tests with higher proportions of water than in the normal consistency would be of value. Puzzolana is dried at 212° to 230° Fahr., is subjected to a trial for its loss from heat (defining the proportion of water it contains), and is tested for its initial hardening under water at 59° Fahr. The mixture consists of two parts by weight of Puzzolana (trass), one part of powdered hydrate of lime, and one part of water. The mortar (in the box as previously explained) is placed under water and tested after two, three, four, and five days to find the weight necessary to make the needle penetrate it deeply.

4. *Constancy of Volume*.—Portland cement is tested by being mixed with water to a normal consistence, and made on a thin glass plate into cakes of 3 in. to 4 in. diameter and  $\frac{1}{2}$  in. thick. Two of these cakes are, after twenty-four hours, put on a metal plate and subjected to a temperature of 230° to 248° Fahr. for at least an hour, until no more aqueous vapours escape. If the cakes show no curvatures or cracked edges, the binding substance may be considered as being constant in volume. Should the contrary be the case, the result of the test on glass plates is decisive. If more than 3 per cent. anhydrous sulphate of lime be present (or a corresponding quantity of unburned gypsum), this test is not conclusive. The most reliable test consists in stirring 3.52 oz. of cement with water into a normal consistence, a cake of 0.78 in. thickness being formed of the mixture on a glass plate. Two of these cakes (protected from drying so

as to avoid cracks) are placed under water after twenty-four hours, or after setting has taken place. The binding substance of which they are composed is regarded as being of constant volume if the cakes after twenty-eight days, exhibit no curvatures or cracks at the edges. Hydraulic limes and Roman cements are tested in the same manner. Puzzolana (trass) mortar is tested with a mixture of two parts by weight of Puzzolana (trass) and one part by weight of water, by means of the box and normal needle, as already explained. After the ring which serves to close it has been loosened, the box is placed in a vessel with level bottom, into which water is carefully poured up to at least 0.78 in. above the upper edge of the box. The hardening mortar should not in any way separate the two parts of the box, nor should it protrude at the top. The investigation of abbreviated methods for defining the constancy of volume in air of cement and other hydraulic binding substances is referred to the new permanent Commission, the test by boiling being also left for examination by that body.

5. *Tests of Strength*.—For all hydraulic binding substances, with the exception of Puzzolana, tests are to be made with three parts by weight of sand and one part of the binding substance. It is suggested that additional tests should be made with a higher proportion of sand. The sand used is the so-called normal description consisting of quartz sand in as pure a condition as possible; the size of the grains being such that with three sieves of 64, 144, and 225 meshes to 0.155 square inch, half of the weight passes the first and remains on the second, while the other half passes the second and lies on the third. The thickness of wire in the three sieves should respectively be .0156, .0117, and .0078 in. The question is referred to the new permanent commission whether wire sieves should be replaced by those made of perforated metal, as well as the defining of the diameter of the perforations which would correspond with the above thicknesses of wire. The reliable test for strength is that of pressure which is carried out with blocks of 7.75 square inches sectional surface. The usual test of quality is that of extension, effected by the normal apparatus upon trial blocks of the normal shape with 0.77 square inch surface of fracture. The Commission will, it is suggested, define the normal consistency of mortar and seek an effective method of making the trial blocks by machinery with a view to uniformity. Meanwhile they are to be made by hand. For ascertaining the strength of extension and the resistance to pressure, six trial blocks are required of each stage of hardening; the average of the four highest results obtained in each case giving the official result. The blocks have to be kept during the first twenty-four hours in air in a room saturated with steam, and for the remainder of the time until the tests under water, at a temperature of 59° to 64° Fahr. The results after twenty-eight days are regarded as decisive. Portland cement mixed in the proportion of 1 to 3 can even be tried after seven days. The testing of strength of Portland cement of normal consistence, made on a non-absorbent foundation, and that of normal sand after three days, are left for the new Commission to deal with. The general question of the testing of hydraulic binding substances in a shorter time than is now customary will also be discussed by that body. The testing of Puzzolana (trass) mortar is effected with a mixture of two parts by weight of Puzzolana, one of powdered hydrate of lime, three of normal sand, and one of water. The test is carried out as previously explained, but in some cases the blocks are placed under water immediately on being made, it being recommended in such cases to add one-tenth more of water in preparing the mortar. The due observance of the prescribed temperature is of importance in these tests, as well as the purity of the lime used; the strength of the composition being greatly dependent upon the last-named ingredient.

6. *Strength of Adhesion*.—It is suggested for the consideration of the new Commission that the strength of adhesion of hydraulic binding substances shall be tested by the normal apparatus for testing strength of extension. The testing surface is 1.97 in.  $\times$  1.97 in. = 3.88 square inches. The samples to be tested must be kept in a room saturated with moisture, in the same manner as explained regarding the extension tests. In order to arrive at a right comparison

of the strength of adhesion all subsidiary effects of the binding substances on the objects to be united must be excluded. Thus, with all calcareous binding substances bricks must not be used which would produce the formation of a Puzzolana cement through combination with lime. It is also recommended that the appliances used in testing should resist the action of lyes and acids, opaque ground glass and biscuit porcelain being spoken of as particularly suitable. The former, being relatively cheap, is specially approved. All the glass plates used should be ground or roughened to the same extent.

7. *Yield of various hydraulic binding substances in the Preparation of Mortar*.—This is ascertained either by the usual volume-measuring appliance or by Stahl's method.

#### MR. DIBDIN'S EXPERIMENTS IN TREATING METROPOLITAN SEWAGE.

MR. R. W. PEREGRINE BIRCH, M. Inst. C.E., read a paper at the Leicester meeting of the Association of Municipal and Sanitary Engineers and Surveyors, entitled "An Examination of some Recent Experiments on Sewage Treatment made by W. J. Dibdin, Esq., F.C.S., F.I.C., for the Metropolitan Board of Works." In the course of it he said,—Many members present are responsible for the treatment of sewage by chemical precipitation, and there are probably few who have not tried numerous chemical reagents, or who have not been invited to do so by various patentees, or persons interested in pushing the sale of some particular material. It will be remembered that at the Institution of Civil Engineers at the beginning of the year, an admirable paper was read by Mr. Dibdin, Chemist to the Metropolitan Board of Works, upon sewage sludge and its disposal, in which he sets forth the process about to be put into operation by that Board, for the treatment of the sewage of London. The Metropolitan sewage is to be treated with 3.7 grains of lime and 1 grain of sulphate of iron per gallon, and Mr. Dibdin produced the results of a large number of experiments to show that although greater purification might have been effected by a greater expenditure of chemicals the improvement would not have been worth its cost. Great difference of opinion was expressed in the discussion as to the capability of such homeopathic treatment, and it is not proposed here to say anything about the relative merits of different precipitants; but the 575 analyses made by Mr. Dibdin, besides showing the relative merits of different agents, also show the relative unsuitabilities of the samples tested, and it is in order to call attention to the importance of this difference that the author has ventured on this occasion to address the Association of Municipal Engineers and Surveyors. It must be clearly understood that in this communication there is nothing but what could be extracted from Mr. Dibdin's paper; but the object in the two cases not being the same, it has been thought worth while to utilise the large mass of well-authenticated facts obtained by the Metropolitan Board of Works to teach a lesson which on the former occasion was not emphasised as the present author considers it might have been with great advantage. Mr. Dibdin took twenty-three samples of sewage from the Metropolitan Outfall at Crossness, and having extracted from them the matter in suspension, treated each sample in twenty-five different ways. He used lime alone in quantities varying from 3.7 to 15 grains per gallon, sometimes in solution, sometimes as milk of lime. He used lime in conjunction with sulphate of iron in various proportions, lime together with sulphate of alumina, lime supplemented by both sulphates, and also lime, sulphate of iron and animal charcoal together. The chemicals necessary for these treatments were estimated to cost from 51 of a penny per head per annum to 48s. per head per annum, and it is obvious from Mr. Dibdin's figures that the use of the larger quantity of chemicals would, independently of the expense of dealing with the increased quantity of sludge, have cost a great deal more than their worth. It is to be learned from Mr. Dibdin's figures that whether he added 4.7 grains of chemicals or 108 grains to the gallon at costs respectively of 14d. per head and 4s. per head, it did not make more than 20 per cent. difference in the amount of organic matter removed. This is very strong, if not conclusive, evidence in support of the opinion



arrived at by the Board of Works, namely, that it was best to limit the amount of chemicals used as proposed by Mr. Dibdin. But although the difference between the effect of one precipitant and another precipitant upon any one of the samples tested is small compared with the cost, the difference in the extent to which the dissolved organic matter contained in them is very striking, and this brings the author to the point he wishes to impress upon the members of this Association having the management of sewage precipitation works, viz., that more is to be expected from experiment and research into the question of what are the influences affecting the susceptibility of sewage to chemical precipitation than from any number of trials of different chemical agents.

Mr. Birch exhibited a diagram showing the results of one treatment upon twenty-three different samples of sewage, as well as the results obtained from treating one sample in twenty-five different ways.

From the diagram it was apparent that there is a much greater uniformity in the latter set of results than in the former ones, showing that the results arrived at depended more upon some quality or condition of the sewage at the moment of treatment than upon the character or quantity of the precipitant used. The diagram also showed that certain samples have yielded up their impurities far more generously to all of the treatments than other samples have to any, and that certain samples yielded more dissolved organic matter to 15 grains of lime than they did even to a greater quantity of lime together with a considerable addition of sulphate of iron and alumina.

It is obvious, said the author in conclusion, that when certain samples of sewage yield generously to twenty out of twenty-five different treatments, but in the other cases resist reagents which have been effective with other samples of the same sewage, the strength of sewage is not the only factor to be considered, and that the variety of result must be due to some varying physical condition, possibly age or temperature, or degree of decomposition of the sewage when treated, or may be to the temperature of the atmosphere or the barometric or photological conditions prevailing at the time. The author knows that Mr. Dibdin has not at present satisfied himself as to the meaning of the facts collated on the diagram further than was necessary for the question he had in hand at the time he made the experiments; but the author believes that if the science of sewage precipitation is to be advanced it must be through investigations, by gentlemen in this Association, of the nature and extent of the outside influences which affect the action of precipitating agents upon sewage.

In the course of the discussion which followed Mr. Strachan (Chelsea) said that the results of Mr. Dibdin's experiments would only the more strongly incline engineers to cease to put their trust in chemists for the solution of the sewage problem, and Sir Robert Rawlinson strongly condemned the costly expedients which the Metropolitan Board of Works is adopting in order to palliate the evils arising from the discharge of the London sewage into the Thames, expedients which, he predicted, were doomed to fail. Mr. Eacchus, Mr. A. M. Fowler, Mr. McKie, Colonel Jones, and the President, continued a very interesting and practical discussion.

#### WOOD-DRYING EXPERIMENTS.

The Chicago, Burlington, and Quincy Railroad Company has had carried on at its shops at Aurora some interesting experiments to determine the fluctuations of moisture in various woods during seasoning, the first series of which has just been closed. The chief object of the experiments was to discover the laws of seasoning, if such laws existed, and thus to ascertain in what months the greatest amount of seasoning takes place, and whether wood thus seasoned re-absorbed moisture during the wet months of the autumn and winter. The work, according to the *Railway Review*, from which the particulars given are taken, was undertaken in a systematic manner, the following mode of procedure being adopted. The experiments were commenced on December 21, 1885, and ended on February 28, 1887. Three pieces of rough dressed oak, ash, and Norway pine,

thoroughly green, were piled loosely, with cleats between, with a board overtopping them, in a situation where they were protected against drip and direct rain, but where they were open to rain, snow, and the sun on their sides. The conditions were, as nearly as possible, those to which timber piled for out-door seasoning is usually subject. The dimensions of these pieces at the commencement of the experiments were as follows:—Oak,—cross dimensions, 8½ in. by 5½ in.; length, 9 ft. 6 in. Ash,—cross dimensions, 8½ in. by 4½ in.; length, 7 ft. 6 in. Pine,—cross dimensions, 9½ in. by 5½ in.; length, 14 ft. 2 in. In each alternate week, pieces of wood were sawn from these timbers off the same end every time, and borings taken from the centre of the sawn-off blocks. From the oak, 5 in. were sawn off each time for the first eleven tests, and 3 in. for the remaining fourteen tests. From the ash, 4 in. were sawn off for the first eleven tests, and 3 in. for the remaining thirteen tests. From the pine, 5½ in. were sawn off every time. The borings taken from these pieces were carefully weighed, then thoroughly dried, and again weighed, which process gave the percentage of moisture in each piece. The results of each fortnightly test were tabulated, and show the fluctuations of moisture during the whole period of one year, two months, and one week. The exact percentages of moisture thus obtained are given in the following table:—

Date.	Percentage of Moisture.		
	Oak.	Ash.	Pine.
December 21, 1885.....	40.93	27.66	24.25
January 4, 1886.....	40.76	27.38	23.35
January 19, 1886.....	41.01	28.27	23.53
February 1, 1886.....	42.38	28.31	23.84
February 15, 1886.....	42.63	28.98	23.88
March 1, 1886.....	42.14	28.87	23.25
March 15, 1886.....	42.83	29.25	23.13
March 29, 1886.....	42.03	27.26	22.62
April 12, 1886.....	42.25	26.66	22.44
April 26, 1886.....	41.73	24.68	21.63
May 10, 1886.....	39.45	25.98	20.83
May 24, 1886.....	37.29	22.79	19.40
June 7, 1886.....	37.05	20.78	17.81
June 21, 1886.....	36.79	20.58	18.14
July 5, 1886.....	36.79	17.73	16.14
July 19, 1886.....	36.77	16.84	15.74
August 2, 1886.....	34.99	12.74	12.65
August 16, 1886.....	35.91	13.64	14.02
August 30, 1886.....	35.03	14.08	14.04
September 13, 1886.....	34.65	13.26	13.33
September 27, 1886.....	36.66	13.00	15.36
October 11, 1886.....	33.54	12.02	12.48
October 25, 1886.....	33.50	13.77	14.28
November 8, 1886.....	33.33	14.02	14.41
November 22, 1886.....	Stolen.	13.78	14.68
December 6, 1886.....	.....	.....	14.55
December 20, 1886.....	.....	.....	14.92
January 4, 1887.....	.....	.....	14.49
January 17, 1887.....	.....	.....	14.10
January 31, 1887.....	.....	.....	14.01
February 14, 1887.....	.....	.....	14.35
February 28, 1887.....	.....	.....	14.61

The above figures indicate that there was a slight increase in all three kinds of wood between January 4 and February 15, 1886. The seasoning,—that is to say, loss of moisture,—began practically February 15, with all three woods, and ended August 2, 1886, with the ash and pine, but in the case of the oak October 11 appears to be the closing time. The results with the oak were not altogether satisfactory to the experimenters. The proposed second series of trials will, it is hoped, throw more light upon this kind of wood. From February 15, 1886, to August 2, 1887, the percentage of moisture in the ash dropped from 29 to 12½ per cent., a loss of 16½ per cent. From August 2 to December 20 the fluctuations in the moisture were between 12 and 14 per cent., the exact average being 13.27 per cent. The moisture in the pine from February 15 to August 2 dropped from 24 to 12½ per cent., a loss of 11½ per cent. From August 2, 1886, to February 28, 1887, its fluctuations were between 12½ and 15½ per cent. From October 25 to February 28 the exact extremes of moisture were 14.1 and 14.92 per cent., a difference of only 0.82 per cent. The extreme fortnightly fluctuation was 0.61 per cent. The average fluctuation was 0.3 per cent. The average moisture for that period was exactly 14.5 per cent. These experiments, although they do not at present supply infallible data, in a general way lead to the conclusion that, as regards oak, ash, and pine woods in a green condition, seasoning begins in very early spring (depending, of course, largely upon the kind of weather), and ends in midsummer. The provisional limits of this drying season may be fixed at March 1 and August 1,—in other words, including the months from March to July. It has also been shown that, as regards ash and pine, after seasoning is effected, the wood will not take back water,—that is, not beyond slight amounts during the wet and cold seasons. These con-

clusions are true, however, only for the interior parts of the woods in question, and of the size, experimented on. Variation in the character of the wood, condition at the time of cutting down the tree, treatment between that time and the first time of testing, sizes of pieces, and other influences, may alter the conclusions; but it is not likely that they would do this to a material degree.

#### THE HARWICH AND DOVERCOURT WATER SUPPLY.

ACCORDING to the *East Anglian Daily Times*, the most important feature in the Jubilee celebration at Harwich was the formal opening of a supply of pure water, the want of which has so long pressed upon the inhabitants of the neighbourhood. Down to the early part of this century the inhabitants of the town and the shipping frequenting the harbour had to depend upon such precarious and at best dubious supplies as could be obtained from the storage of rain-water from house-tops, spring water brought down in wherries or barges from Ipswich or Mistley, and the yield of a few local shallow wells. In 1819 an Act was obtained for the appointment of Commissioners for paving, lighting, and watering the town, with general provisions for such purposes. Boring into the chalk in search of water was resorted to in 1820-2, and in 1826, and again about the year 1840, but in neither case did it appear that water was obtained in any useful quantity that was not absolutely salt. In 1854 Mr. P. Bruff, the engineer for the works under the Commissioners' "Improvement Quays and Pier Act, 1851," as well as for the railway to Harwich, deeming it probable that the difficulty might be overcome by more care and outlay than had previously been resorted to, entered into an agreement (May 16th, 1854), with the Corporation, which was duly confirmed by the Commissioners under the Act of 1819. In consideration of the obligations and conditions thus undertaken, the Corporation granted him the exclusive concession of the water supply for seventy-five years. After various unsuccessful efforts to accomplish what was required and an extension of the limit of time in such agreement, the chalk and underlying strata were pierced to the depth of 1,098 ft., when a hard slaty rock was encountered, and proceedings were then suspended, without obtaining any water whatever. In 1862, the agreement having been revised and extended, Mr. Bruff obtained a supply of water at Dovercourt by means of a well and artesian boring, and commenced supplying the town and borough in 1865-6, and has since continued to do so. Although limited in quantity, and not all that could be desired in quality, having a considerable excess of chlorine in its composition, it proved to be the best obtainable within or anywhere near to the borough, and was thankfully accepted by a large number of the inhabitants as a great improvement upon the former state of things. In 1881, in order to meet the requirements of the Public Health Act, 1875, application was made to the Board of Trade, and a provisional order was conditionally granted, under which efforts were made to effect an improved supply, but were unsuccessful, notwithstanding further large outlay. The order was rescinded, and the agreement between Mr. Bruff and the Corporation reverted to, subject to the conditions imposed by an award made in an arbitration held in accordance with its provisions. Finding that in every case where attempts have been made within the limits of the borough only failure had resulted, it was resolved to carry out a scheme of bringing water of approved quality and in sufficient quantity from the nearest spot where it might be obtainable, and in 1884 and 1886 applications were made to Parliament to authorise works to be established at Bradfield and Mistley, and Acts of Incorporation were obtained by the Tending Hundred Water Works Company, after considerable opposition, a previous application in 1883 having failed. A site having been acquired at Mistley, a capacious well and boring into the chalk were made, from which the present supply of water is obtained. Buildings have been erected at Mistley, and duplicate engines and pumps fixed, and a main is laid to Harwich, a distance of about twelve miles, and in addition the company have acquired the existing works at Harwich, Dovercourt, and Walton-on-the-



Naze, as well as sites for enlargement of Works and establishment of reservoirs at Bradfield and Dovercourt, and by arrangement with the Great Eastern Railway Company they expect to have a site placed at their disposal for a similar facility at Parketown, for the use of that locality. On subscription of the further necessary capital it is intended to proceed with the extension of the conduits from the nearest points of junction at Wix Cross to the town and district of Walton-on-the-Naze. After many arduous efforts and large expenditure, extending over a period of more than thirty years, and until recently carried on single-handed by the pioneer of the undertaking (Mr. Bruff), with little encouragement from success of any kind, and sometimes against active opposition, the community of the borough and district are placed in possession of a good and abundant water supply. The wells, borings, and pipe-laying have been carefully and expeditiously carried out by Messrs. Thomas Tilley & Sons, Artesian Well and Hydraulic Engineers, of Walbrook, London, under the direction of Mr. Peter Bruff, Mem. Inst. C.E. The erection of the buildings at the pumping station at Mistle, including a chimney-shaft 82 ft. in height, was entrusted to Mr. F. B. Capon, of Manningtree; and the engines, boilers, and pumping machinery have been fixed by Mr. A. G. Mumford, of Colchester.

#### BUILDERS' ACCIDENT INSURANCE (LIMITED).

THE sixth ordinary general meeting of the above company was held at the Registered Offices on Friday, the 29th ult., Mr. Stanley G. Bird in the chair. The minutes of the meeting of the 7th of July, 1886, being taken as read, the Secretary, Mr. E. S. Henshaw read the report and balance-sheet for the year ending May 31st, 1887. We subjoin a portion of the report:—

"The Directors, in presenting their sixth annual report, have the pleasure of stating that, notwithstanding the increasing competition, the general slackness of trade, and the efforts made by other insurance companies, whose policies are (as the Directors consider) far less favourable to the insured, to draw away members, there has been during the past year a marked increase in the premium income of the Company.

During the past year notice was given to the Company by policy-holders of four hundred and nine accidents, and among these two were of a serious nature, involving injuries in the one case to five, and in the other to eleven men, but although this number greatly exceeded the number of which notice was given during the previous year, the amount paid in claims is somewhat less, and the financial condition of the Company, as will be seen from the accompanying accounts, is very satisfactory.

The Select Committee upon the Employers' Liability Bills appointed last session made the following amongst other recommendations:—

1. That the employer shall be liable to sub-contractors' men in respect of injuries resulting from defects in ways, works, &c., of the employer, if such defect had not been remedied owing to negligence of the employer or his foreman.

2. That in Section 8 of the Act the words 'person whose sole or principal duty is that of superintending and who is not ordinarily engaged in manual labour' should be repealed.

3. That the Court may allow an action to proceed, though no notice should have been given, if the Court is of opinion that there was reasonable excuse for the want of notice.

4. Extension of the term 'workmen' to tramway servants, &c.

The Government have stated that it is their intention to introduce a Bill during the present session of Parliament presumably to give effect to the recommendations of the Select Committee, and your Directors will carefully watch any such Bill, and take such steps as they may be advised are necessary in the interests of the policy-holders.

Two Bills to extend the provisions of the Employers' Liability Act have already been introduced by independent members during the present session, but your Directors have reason to believe that neither of such Bills will pass into law.

In view of the additional liabilities which may be thrown upon employers of labour, the directors have thought it more advisable to add to the fund held in reserve rather than to recommend a larger bonus, and believe that in so doing they will have the cordial approval of the policy-holders.

The question of issuing policies under which a workman would be entitled to compensation for injuries received in any accident, although he might have no right to compensation at law for such injuries, was carefully considered by the directors in conjunction with the actuary and solicitors, but after mature consideration the directors did not see

their way to adopt any system which would be alike feasible and attractive."

In the course of some remarks on the report, the Chairman said that the Act was every year becoming more known and appreciated by workmen and lawyers, and there was no doubt it had become a very fruitful source of income to the latter. He considered that they settled many cases for which they were not legally liable, he should say that at least fifty per cent. of their cases were settled in this way, cases which they would contest if they could only be sure of their being tried and settled on their merits, but the sympathy of juries generally went with the workmen. He thought, however, that as a rule they settled their cases in a way which not only gave satisfaction to the insurers but impressed the men with the fact that they were not harshly dealt with.

The report and balance-sheet as audited and presented to the meeting were adopted.

Mr. J. Franks and Mr. George Burt, J.P., having retired from the directorate, it was resolved "That the maximum number of directors be reduced from twenty to eighteen, and that Article 50 of the Articles of Association be and is hereby altered accordingly."

The following retiring directors, Messrs. H. H. Bartlett, S. G. Bird, J. Bradney, W. Brown, W. H. Cowlin, and T. F. Rider, were re-elected.

#### CHURCH-BUILDING NEWS.

**Ditchingham (Norfolk).**—A new organ has been placed in the parish church. It is divided, and one half is placed against each side of the chancel. Handsomely moulded standards separate each lower case into two bays, the priests' door opening through one of the bays on the south side, and the keyboard occupying one of the bays on the north side. Above the standards, and corbelled beyond them, are the upper cases containing the bellows and pipes. These project only 26 in. from the wall; they are arched in three bays, carved and crocketed. The design was made to avoid building an organ-chamber. The only sort of chamber for which funds were forthcoming (and which the architect declined to sanction) was a plain lean-to recess. Such recesses are a disfigurement to the exterior of our country churches, whilst two cases inside are better for the tone of the organ, and furnish and enrich the chancel, and the cost of dividing the organ is but little more than that of a recess. Mr. R. Morris, of Ditchingham, executed the cases in English oak; Mr. Godbold, of Harlestone, the carving; the whole being the design of Mr. Augustus Frere, architect. Dr. Bennett, of Norwich, undertook to arrange the specification and supervise the mechanical construction of the organ, and the work was entrusted to Messrs. Norman, Bros., of Norwich.

**London.**—The last of the Bishop of Rochester's ten churches, St. Bartholomew's Church, Camberwell, has lately been consecrated by the Bishop. The church is built in brick, lined with red brick externally, and internally with red brick in the lower portions, and yellow intermixed with a few red bands in the upper portion. The nave piers and other columns are in Dumfries stone. The nave is 40 ft. from floor to wall-plate, and is covered with a lofty roof in pitch-pine, and open to the apex. The chancel roof is curved and divided into panels, which are decorated. The tower, which contains the two vestries (one above the other) is at the east end of the north aisle, and the morning chapel is at the east end of the south aisle. Marble mosaic has been used for the chancel floor and passages, and wood blocks to floors under the seats. The chancel stalls and pulpit are in oak, and the nave and aisle seats are of pitch-pine, and fitted with "Butterfield kneelers." The accommodation is for 700 people, and the cost (exclusive of the upper portion of the tower, not yet built) about 7,500l. The whole has been carried out from the designs of Mr. W. Taprell Allen, architect, and executed by Messrs. Stephens, Bastow, & Co., builders, of Bristol and London.

**Manchester.**—St. Barnabas Church, Pendleton, was consecrated last week by Dr. Moorhouse, Bishop of Manchester. In the construction brick and terra-cotta have been used with stone only where absolutely necessary. The church is of simple detail, but substantial throughout. The contract has been carried out by Messrs. W. Southern & Sons from the designs and under the superintendence of Mr. W. H. Booth, of

Manchester. The cost has been under 3,500l., and the accommodation provides 516 sittings.

**Monkton-Wyld (Dorset).**—The Church of St. Andrew, Monkton-Wyld, has been enlarged, at the cost of the Rector, the Rev. J. B. M. Camm, by the addition of a sacristy on the north side of the old choir vestry. It has a stone altar, after the example of old English sacristies, and will also have a lavatorium carved in stone, and chests carved in oak to contain the numerous and highly valuable collection of altar frontals, dossals, &c., richly embroidered in silk and beset with jewels. The whole of the structure is in the Early Decorated style, harmonising with the church. The sacristy has been presented to the parish "to commemorate the Jubilee of Queen Victoria, 1887." A new pulpit has just been placed in the church. The base, hexagonal in plan, is of red Mansfield stone, with polished Devonshire marble columns at the angles, from which spring the groined and sculptured Mansfield stone canopy, which supports the superstructure. The pulpit, from the floor over the stone canopy to the top, is in oak, carved and enriched with buttresses, columns, pinnacles, and niches, with boldly projected crocketed canopies. In the niches stand the figures of four saints sculptured in gycamore wood. The Saints are St. Andrew, the patron of the church, St. Cecilia, crowned with roses bearing the organ and listening in rapture to the songs of the angelic hosts; St. Mary Magdalene, bearing her costly gift of spikenard; and St. Elizabeth of Hungary, with a nun's veil and a crown on her head. A fold of her dress holds a cluster of roses, and a beggar-boy kneels at her feet, to whom St. Elizabeth is in the act of giving bread. The steps to the pulpit are in red Mansfield stone and the balustrading and handrail in polished brass. The pulpit bears an inscription showing that it was erected in memory of Elizabeth Hodson, foundress of the church, at the joint cost of the Rev. Canon Hutchings, M.A., first vicar of this church, and the present Rector. The whole of these works has been executed by Messrs. Luscombe & Son, of Exeter, from the designs of Messrs. Hayward & Son.

**Ringland (Norfolk).**—The church here, dedicated to St. Peter, was lately re-opened, after considerable restoration works. The whole fabric was in a deplorable state, and the exquisite nave roof was in such danger of falling that it was almost beyond repair. However, with great care every unsound piece of timber has been removed, and the roof is now in a thoroughly efficient state. It is an interesting example of a hammer-beam roof, concealed by groined ribs springing from sixteen columns supported on carved heads, and was erected in the fifteenth century, based upon the design of, and probably built by the same architect as, the roof of St. Peter Mancroft, at Norwich. The north and south aisle and porch roofs have also been renewed in oak, and the whole lead roofing has been relaid. Much repair in the masonry was needed, as trees grew out of the weathering of the buttresses, and the tower was covered with ivy, which seriously weakened it. These were all cut down, the growths removed from under the flint work, and all walls re-pointed. The stonework of nearly all the windows was renewed: In the north clearstory the original glass, representing the various donors, the angel Gabriel, St. John the Baptist, the Virgin Mary, and many devices and monograms, has been replaced. This part of the work had suffered much from wind and weather and the patching of village glaziers. Messrs. J. & J. King, glaziers, of Norwich, have taken great trouble to carefully refix all this glass. The seats in the nave are renewed in oak, and all the floors are laid in pitch-pine blocks, with tile borders, the monumental slabs being left in their original positions. The entire cost of the works, including pulpit, reading-desk, and chancel seats, will be 2,000l., and they have been executed by Mr. Wegg, of Norwich, from designs by Mr. E. Preston Williams, diocesan architect, Norwich.

**Scholes Church, near Cuckfield.**—In connexion with the Jubilee celebrations a reredos was erected in Scholes Church, near Cuckfield. The structure is of oak, consisting of three panels, filled in with emblems painted on zinc on a gold ground. A brass lectern was also placed in the church at the same time. Both these works were executed by Messrs. Jones & Willis.

FIGURE 1

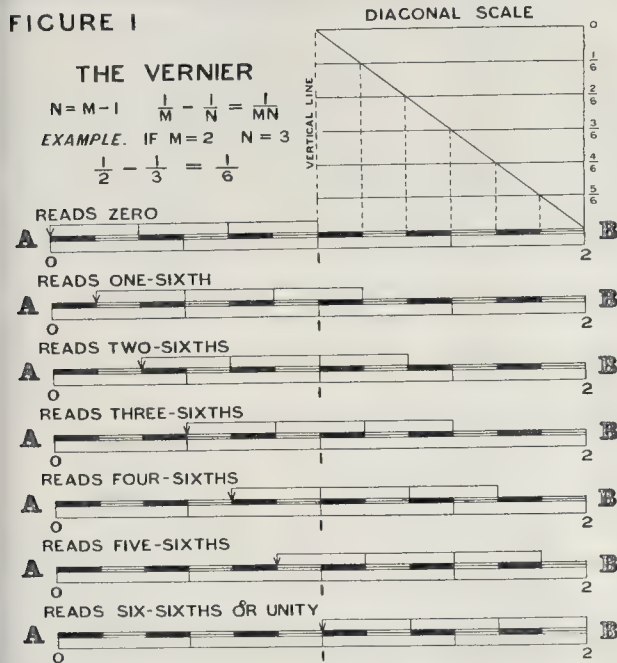


FIGURE 2

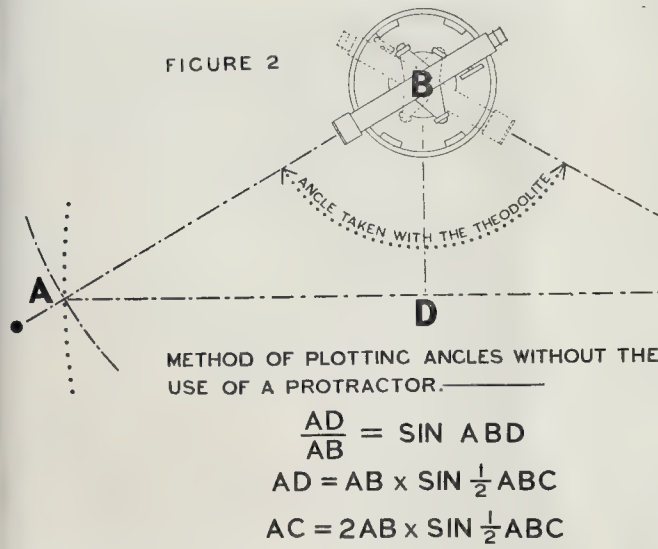
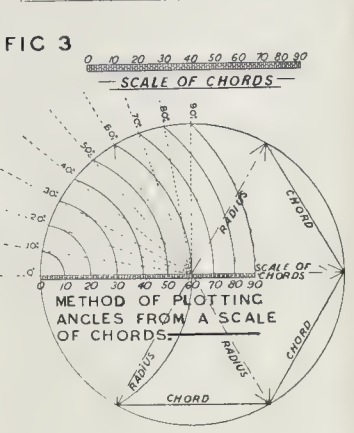


FIG 3



is furnished by the number of the subdivisions which appears to coincide with a division upon the primary scale. Thus when the zero point indicated by the arrow upon the vernier has travelled towards B, a distance of one-sixth of a main division from A, the coincidence appears at the first division from the arrow. For a reading of two-sixths the coincidence appears at the second division from the arrow; and for three-sixths or one-half of a main division the arrow itself coincides with the subdivision upon the primary scale. For a reading of four-sixths the coincidence is similar to one-sixth, but as the arrow in travelling from A towards B has passed the first half subdivision from zero, the one-sixth must be added to the one-half, which gives four-sixths; and, in the same way, two-sixths added to one-half gives a total of five-sixths. For further detail explanation of the vernier, we must refer our readers to p. 102, *Builder*, Jan. 8, 1887.

It will be thus seen that the same result is obtained by means of the vernier scale as would be furnished by the plotting of a diagonal scale upon paper, as shown in the diagram.

**The Student's Column.**  
LAND SURVEYING AND LEVELLING.  
VI.—BASE LINES (continued).

THE repetition of the angles taken at the intersection of the base lines as indicated in our previous article (*Builder*, July 30th, p. 188), it will in practice be found that both the second and third operations give a result slightly varying from the first angle read. The amount of difference when divided by the number of repetitions should, however, never exceed the value of one sub-division upon the vernier plate, if the first angle has been correctly recorded. The mean of the different results will furnish the true angle to be plotted. The advantage of recording the first reading is that it serves as a check upon the number of degrees and minutes in the final result.

The subdivisions are read by means of a vernier, the general principle of which is illustrated in fig. 1. If the line A B represents the length of two divisions upon a continuous circle, or upon a straight line of any required length, and if, for example, each of these main divisions be subdivided into two equal portions, as shown, a sliding scale of the length of these two subdivisions containing equal divisions amounting to one more in number than the number of subdivisions upon the primary scale, will enable us to read to amounts equal to one-sixth of a main division upon the primary scale. To render the application of this clear, each main division upon the line A B is shown subdivided into six equal parts, and the sliding scale is represented in seven different positions along the line A B. The vernier or sliding scale is read in each case at the coincidence of one of its subdivisions, with a division upon the primary scale, and the number of the sixths to be taken

The most accurate way of plotting angles is by the intersection of arcs, having calculated, as shown in figure 2, the length of an hypotenuse to a triangle the sides of which are taken of equal length. For rough purposes the scale of chords found upon the short plain scale which accompanies nearly every box of instruments is sufficient. The application of this scale, as shown in fig. 3, depends upon the fact that the chord which subtends an angle of 60° at the centre of the circle is equal to the radius, so that by describing a circle with a radius equal to the chord of 60° other angles can be set out by intersecting this circle with a chord equal in length to that given upon the scale for the required angle; and drawing the angle at the centre of the circle which subtends that chord. But for important surveys a circular protractor having a primary scale of divisions and verniers similarly divided to the theodolite is usually adopted.



## A HYGIENIC BAKERY.

IN James-street, Westminster, Messrs. W. Hill & Son have just opened a new bakery, in which hygienic conditions in bread-making appear to be fully observed. The bread is made by machinery, as at their bakery in Alexander-street, Westbourne Park, which we noticed three years ago. The building at Westminster has been designed by Mr. Thomas Verity, architect, and is Renaissance in character. The builders were Messrs. Green & Lee, contractors, of Anton-street Works, Amhurst-road, Hackney. The façade is adorned with four plaques, modelled by Mr. Harry Bates, whose "Socrates teaching in the Agora," exhibited in the Academy in 1884, gained him the Gold Medal, the Travelling Studentship, and the personal congratulations of Sir Frederick Leighton, P.R.A. Mr. Bates has modelled four life-size figures in high relief, emblematical of "Ploughing," "Sowing," "Reaping," and "Milling," with subsidiary figures in each plaque that are full of life and spirit. Entering, the visitor is conducted in a hydraulic lift to the third floor; here is stowage for at least a thousand sacks of flour. The different flours required for daily use are shot into a large bin, and conveyed by means of an endless screw into a hopper; when this contains 280 lb. (a sack), by a self-acting process the screw ceases to work, the bottom of the hopper opens, and the flour runs through a sieve at the rate of a sack a minute into the dough-rollers on either the first or second floor, as may be desired. By running exactly a sack at a time through the hopper, a check is kept on the flour used, and therefore on the bread made. Upon the third floor are two large reservoirs, each holding some 1,200 gallons. The water used in bread-making runs from one of these cisterns into a Johnson Press Filter, passes through a series of carbonised discs, and is discharged into the tempering cistern. This cistern, fitted with a thermometer, has a measured glass gauge running its whole length. By this means 10, 40, or 200 quarts can be drawn at a time, whilst with the aid of steam from boiler, and ice pockets, the temperature can be easily regulated. Upon the second floor is a German oven, built for Messrs. W. Hill & Son by Mr. Albert Wirtz, of Bochum-on-the-Rhine. It has a very low interior and a sharply-sloping floor. It is this sharply-sloping floor and low interior forcing the steam evolved in baking on to the goods that gives German bread the delicate glazed appearance it presents. The drainage,—carried out by Messrs. Dent & Hellyer,—has been carefully studied. The engines and different machinery have been supplied by Messrs. Werner & Pfleiderer, of Upper Ground-street, Blackfriars.

## TECHNICAL EDUCATION.

SIR,—You truly say that the attempt to introduce a system of technical education as shadowed forth in the Government Bill is disappointing and feeble, but in your remarks as to placing the artisan of England on a level with those of Germany, you are at issue with the Report of the Royal Commission on Technical Instruction, which states that the resources of Continental countries for the technical education of workmen outside of the workshop are much more limited than has been supposed to be the case, and the facilities offered for evening instruction in science and technology are inferior to what our own workmen possess. The advantages of the German workman consist in the general diffusion of elementary education, and in his being compelled to attend during his apprenticeship, for a certain number of hours per week, a continuation school, where the studies of the ordinary elementary school are continued. In many industrial centres there are societies for promoting the technical instruction of the workman in the evening. Then there are the excellent building schools, supported by the State, at nominal fees, but these are held in the day, and can only be attended by those workmen who are able to sacrifice their employment for the purpose,—a sacrifice which many make.

## TECHNICAL.

**Kensington Gardens.**—We are glad to learn, from Mr. Plunket's answer to a question asked on Tuesday, that Her Majesty has conceded to the Commissioner of Works a portion of Kensington Palace grounds adjoining the Bayswater-road, in order to make a better and more ornamental approach to Kensington-gardens from that point. The brick wall adjoining the road will be removed.

## Books.

*Land and Engineering Surveying.* A rudimentary treatise by T. BAKER, revised and corrected by J. R. YOUNG, of Belfast. London: Crosby Lockwood & Co.

NEW edition, the fourteenth in number, of this well-known book has lately been issued, revised, and corrected by the late Professor Young, whose ability as a mathematician fully entitles the work as a compendium of mensuration to our best respect. Previous editions have been revised by civil engineers, and the original text came from the pen of that distinguished civil engineer, Mr. T. Baker. The book forms No. 60 in Weale's series, and, chiefly on account of its reasonable cost (it is sold for 2s.), it is one of the first books that a student who aspires to become a surveyor resolves to purchase. It contains many useful introductory hints, but leaves the student in the position of realising that he knows just enough to need some actual practice in the field before he could undertake any work with confidence, and then he discovers that, while the information acquired from the perusal of the book has done him no harm, there are many methods of work not included in the book which he must learn in the field, and which are absolutely essential qualifications for a land and engineering surveyor to possess. At the time Mr. Baker's book first appeared in print, it supplied a much-needed want for young students. Several similar works, some more elaborate, and nearly all more expensive than this little book, have likewise been issued from the press. We are, however, bound to admit that the general impression left upon a student's mind after reading these books, until he seeks practice in the field, is that lines are measured with the chain, solely to arrive at the measurement of areas; whereas in practice survey lines are run to measure offsets from, to defined points and boundaries, these lines being connected together in the most expeditious manner for the purposes of plotting; and the areas required are usually subsequently calculated from a very accurate plan. The notes upon plane geometry, and the office instruments used in plotting are practically expressed. The hints given upon the measurement of gaps and obstructions in chain lines are good. The descriptions given of the prismatic compass and of the box sextant are well written, but under the pages which illustrate the theodolite we should like to have seen the transit form as well as the plain form of instrument given. The levelling instruments described in this book have been considerably improved by such makers as Messrs. Elliott and Messrs. Troughton & Simms during recent years. There are, however, many useful remarks upon the principle of levelling, although we cannot commend the method of keeping a level book, which enters a foresight in the same line as the previous backsight taken upon the same point. Thus, upon p. 145, the system would be clearer to the student if all the figures in the backsight column were raised one line, so that the backsight reading 13.71 would come upon the same line as the reduced level, 100.00, to which it refers. The backsight reading 9.40, and the foresight reading 7.88, are both taken at 519 links from the commencement of the section, and therefore would be better booked upon the same line as this distance is booked. We also should have preferred to see a column for intermediate sights to avoid the addition of the readings taken without shifting the instrument when checking the reduction of the levels in the usual way. Thus the reading, 10.96 at the centre of the road, half-way down the page, would here have been entered as an intermediate sight. In taking sections over very rough country, considerable labour in the final reduction of the level book is saved by the introduction of a column for intermediate sights.

The excellent chapters at the end of the book, upon the laying out of railway curves, turn-outs, crossings, the setting out the surface widths of railways, tunnelling, and the methods adopted for running contours, are clear and precise, and contain most valuable information for the railway engineer. A comprehensive index is, we are glad to observe, added at the conclusion of the work.

*Cottage Building.* By C. BAUCE ALLEN, Architect. Tenth edition, revised and enlarged; with a chapter on Economic Cottages for Allotments, by EDWARD ELLIS ALLEN, C.E. London: Crosby Lockwood & Co.

A BOOK dealing with a subject upon which many books have been written may surely claim exemption from detailed criticism on reaching a tenth edition. The date of the first appearance of the work is not stated; but many of the recommendations so eloquently urged have been carried into effect, both as regards the education of the poor and the improvement of their dwellings, and much of the author's pleading is now happily unnecessary. A great deal, however, remains to be done, and such works as this falling into the hands of landowners and others cannot fail to have a beneficial effect. There are portions of the book which require careful revision, such as the section on drainage, which appears to rely upon *double* *trapping* wastes from sinks, &c. (p. 27), instead of the modern and more effectual plan of disconnection. The proposal to flush the drains and cisterns by cistern wastes is, if we read it aright, not one to be commended; and we cannot approve of a cottage plan which gives no fireplace to any room but the one used as a kitchen. Every bedroom *should* have a ventilation, and as a possible necessity in case of serious illness. The designs for cottages are the least satisfactory portion of the book. Some are far from what they should be, and, indeed, might well be made better with the same expenditure; and others we should be sorry to see newly erected in any case. An additional chapter on economic cottage building promises a five-room cottage, to be erected in sections or panels of iron standards with corrugated iron filling and wood lining, at 125l., furnishing a return of 6 per cent. upon the outlay, although it is not clear that the proposal has been put to a practical test. One of the recommendations given is that such a cottage could be taken to pieces and rebuilt in a new situation. We doubt the comfort of a cheap cottage so constructed. But every attempt towards so desirable an object as the healthy housing of the poorer classes should have a hearing, and if possible an experimental trial. In conclusion, we can only say that the book is extremely well written, and shows in every page that the author is in entire sympathy with the class whose claims he so warmly advocates.

*Shoring and its Application: a Handbook for the Use of Students.* By GEORGE H. BLACKVOE. London: Crosby Lockwood & Co. 1887.

THERE is no portion of an architect's duty which makes a greater demand upon his scientific knowledge and readiness of resource than the design and employment of the various forms of shoring, often required at short notice to meet dangerous emergencies, and hampered in its application by troublesome conditions.

This addition to Mr. Weale's well-known series of handbooks gives clear information on the principles of shoring, which the student will find not only useful but necessary, and descriptions of accomplished works of special importance and difficulty which he cannot but find interesting. The little book might have been advantageously extended and more copiously illustrated, but, so far as it goes, it may be safely recommended to those for whose use it is more particularly designed.

*Civil and Mechanical Engineering Popularly and Socially Considered.* By J. W. C. HALLANE, C.E. and M.B. London and New York: E. F. & N. Spon. 1887.

THIS is an attempt to write a popular book of engineering gossip somewhat lighter than even its title would imply. It is written in a lively manner, and contains some good stories, also some rather poor ones, and gives a certain amount of popular information as to what goes on in an engineering and ship-building yard (the book deals principally with marine engineering) in a very desultory kind of manner. A popular sketch of engineering work is a quite possible kind of thing to be done, but it is not so easy to do it well, and requires rather more literary grasp and power than the author seems to possess; the book hardly gives information enough for one class of readers nor amusement enough for another class; the volume is a collection of gossip rather than a book; and, like one of



engineering inventors he describes, the author goes in for too much of the "slap-bang!" style. Those who are thinking of sending any youth into the engine-building profession may, however, pick up some hints from the book as to the nature of the life and the work he has to look out for, amid a good deal of padding. Among the good stories (we do not affirm that it is new) is that of an old yachting pilot who was taking a yacht through a dangerous channel, and being asked by the owner whether he was sure he knew the place well, replied "I ken every rock a this coast, from Cape Wrath to the Mull of Alloway,—there's one of them," he added, as the ship struck on a sunken reef.

**Journalist's Guide to the Ways and its Neighbourhood.** By G. PHILLIPS BEVAN, F.S.S. With maps and plan. London: E. Stanford. 1887. This is a conveniently small-sized guide-book, containing good maps, indications as to routes, and a great deal of information in a small space as to objects of architectural and topographical interest, better than is usual in a guide-book. A plan of Hereford Cathedral, which is of course the central object of this portion of the work, is appended.

# RECENT PATENTS.

## ABSTRACTS OF SPECIFICATIONS.

**8,310, Spray Ventilators.** J. Janka. This invention consists essentially in a U-shaped pipe, the leg of the tube being in communication with the room, the other opening to the outer air. Two sprays are employed, one to introduce fresh air into the room, the other to suck air out of the room to be ventilated. Regulation is effected by means of an appliance for widening or spreading the spray. The force of water and the discharge is reduced in a certain manner under control; it can be regulated, or entirely shut off, by the button attached.

**10,730, Ornamental Fillets.** E. A. Brinkmann. The object of this invention is to cheaply imitate decorative fillets heretofore engraved by hand. Soft wood is covered with a paste of chalk and glue, and, before the paste hardens, patterns are impressed upon it, and the whole is gilt, painted, or otherwise decorated.

**10,917, Glazing, &c.** D. Brown. By this invention two bars are combined, each having a single curl, which supports the glass, and also forms a drip-water channel. Sometimes a covering of lead is placed over the whole astragal; this then further fixes the glass, and obviates the use of putty.

**10,920, Bolts for Double Doors.** F. Henson. An arrangement of spiral spring and screw allows the bolts at the top of the double doors to be easily actuated and unfastened.

**11,086, Portable Buildings.** J. C. Gaotbauer. According to this invention, buildings designed for transport are carried so that horses or other draught animals are not required. If for cold climates, the boards are doubled or covered outside with tiles or hurdle work filled in with clay.

**14,312, Cement Briquettes.** T. Arnold. By this invention the briquettes are moulded in a dry state under heavy pressure. Water is then added and absorbed by the briquette, the object of this being to avoid the formation of air bubbles and consequent weakness of the briquette.

## NEW APPLICATIONS FOR PATENTS.

**July 22.**—10,244, J. Rigby, Cement.—10,250, C. Rogers, Wood Screws.—10,251, G. Backus, Combined Stoves and Chimney-pieces.

**July 23.**—10,284, J. Wilson, Walls, Buildings, Flooring, &c.—10,292, J. Rhodes, Door-bolts.—10,324, W. Matthews, Portland Cement.

**July 25.**—J. Phillips, Ventilation of Sewers.  
**July 26.**—10,377, W. Voutien, Fireproof Floor Construction.—10,380, T. Duncan and D. Mills, Breasting Land-say, &c.

**July 27.**—10,426, T. Moore, Lifters and Fasteners for Skylights, Window-sashes, &c.—10,446, C. Howe, Plaster of Paris.—10,449, P. Beatie, Boring Bits.—10,461, T. Bray, Syphon Water-waste Preventer for Water-closets.

**July 28.**—10,493, H. Howes and H. Howes, jun., Combined Door Spring and Buffer.—10,511, W. Swettenham, Flushing Apparatus for Water-closets.

## PROVISIONAL SPECIFICATIONS ACCEPTED.

8,685, H. Johnson and T. Wilson, Ventilators.—3,660, E. Verity and Others, Attaching Combined Springs and Air Checks to Doors, &c.—9,999, T. Weston, Wood Screw.—9,434, J. Easby, Automatic Apparatus for Dry-closets and Water-closets.—9,489, W. Lee, Circular Saw Spindles.—9,622, J.

Jones, Concrete Pavements, Floors, &c.—4,800, A. McKee and G. Wicks, Plumbers' Traps.—3,678, A. Caldwell, and J. Burnett, Warming and Ventilating Buildings, &c.—8,849, S. Bastow, Door Cramp.—9,448, H. Allen, Service Cistern for Water-closets.—9,783, A. Bayer and C. Mott, Cramp for Flooring and Woodwork.—9,815, A. Douglas Hamilton, Cows or Wind-guards.

## COMPLETE SPECIFICATIONS ACCEPTED.

### Open to Opposition for Two Months.

9,808, W. Thompson, Plumber's Portable Furnace.—12,189, J. Watkins, Tapes for Measuring round Timber.—2,291, E. Young and G. Bainbridge, Ventilation.—7,755, E. Breuer, Water-supply in Houses.—2,013, R. Little and J. Hall, Timber Roofs.—9,767, W. Pilditch, Hanging Doors and Casements, 7,854, W. Ducker, Sheathing for Buildings or Structures.—9,172, L. Sagenodorph, Machines for Making Metallic Roofing.

## RECENT SALES OF PROPERTY.

### ESTATE EXCHANGE REPORT.

#### JULY 25.

**Brixton**—Ground-rent of 1,000*l.* a year, reversion in 33 years ..... 42,500

By G. A. WILKINSON.  
**Englefield Green**, St. Jude's-road—An enclosure of freehold land, 4*ac.* 0*r.* 36*q.* ..... 1,680

**Woolwich**—A plot of land, with erections thereon, area 38,370 ft., freehold ..... 5,100

5 to 9 and 14, Harden's-lane, and a plot of land, freehold ..... 690

A plot of freehold land, with erections thereon, area 37,000 ft. .... 3,500

**Glas-yard**—A coal store and stabling, 65 years, ground-rent 6*l.* ..... 145

By F. L. L. MOORE, & FULLER.  
**Mitcham**—A plot of land, 4 *acres*, freehold ..... 1,230

A plot of market garden land, 1*ac.* 1*r.* 10*p.* ..... 203

By ROBINSON & RUDKIN.  
**Beckenham**—13, Ravenscroft-villas, freehold ..... 200

**Row**—30, 34, Paul's-road, 72 years, ground-rent 5*l.* 10*s.* ..... 910

**Eltham**—5, High-street, and 2 *ac.* 3, Court-yard, freehold ..... 990

The residence, Whitworth House, and two shops, freehold ..... 1,335

1*a.* and 1, 2, and 3, Elizabeth-terrace, freehold ..... 715

7, 8, and 17 to 24, Elizabeth-terrace, freehold ..... 1,620

Eleven freehold cottages in Sunyard ..... 325

Ground-rent of 3*l.* 10*s.* in perpetuity ..... 70

4 to 7, Weston Park, freehold ..... 1,310

11, Weston Park, 40 years, ground-rent 12*l.* 10*s.* ..... 200

Ground-rent of 12*l.* 10*s.*, reversion in 49 years ..... 250

Ground-rent of 3*l.* 15*s.*, reversion in 37 years ..... 110

Ground-rent of 4*l.* 5*s.*, reversion in 44 years ..... 450

By PARTIS, SON, & BRYAN.  
**Westminster**—19 and 20, Newstreet, 74 years, ground-rent 10*l.* ..... 430

#### JULY 26.

By BROAD & WILTSHIRE.  
**New Cross-road**—No. 238, term 54 years, ground-rent 10*l.* 15*s.* ..... 550

**Calcedonian-road**—No. 306, term 57 years, ground-rent 6*l.* ..... 730

By T. TURNER.  
**Lincoln-grove**—84, Earl-street, 23 years, ground-rent 8*l.* 6*s.* ..... 300

**Paddington**—73, Hall-place, 51 years, ground-rent 7*l.* 7*s.* ..... 420

**Kennington**—4, W. Ham-street, 62 years, ground-rent 5*l.* ..... 320

By H. RUTLEY.  
**Tottenham-court-road**—The lease of 67 and 69, Whitfield-street, term 41 years ..... 705

**Oakley-square**—37, Charingcross-street, 36 years, ground-rent 5*l.* 5*s.* ..... 505

By A. & A. FIELD.  
**Bethnal-green**—68 and 70, Royston-street, 35 years, ground-rent 6*l.* 10*s.* ..... 340

**Stepney-green**—15, Copsey-street, 55 years, ground-rent 4*l.* ..... 320

By A. RICHARDS.  
**Fulham**, Peterborough-lane—Vine Cottage and Holly House, freehold ..... 703

**Tottenham**, Northumberland Park—Windor Lodge, 82 years, ground-rent 10*l.* ..... 380

**Enfield Highway**—4, Hope-cottages, freehold ..... 150

**Enfield**—12 and 13, Coast-road, freehold ..... 300

By DENHAM, TAYSON, & CO.  
**Essex**, near Haverhill—Great and Little Walton's Farm, 300*a.* 0*r.* 17*p.*, freehold ..... 5,600

**Broad Green Farm**, and 127*a.* 1*r.* 26*p.*, freehold ..... 1,700

**Kennington**—17, Camden-grove, 66 years, ground-rent 7*l.* ..... 4780

**Baywater**—14, Garway-road, 33 years, ground-rent 6*l.* 15*s.* ..... 490

By W. A. BLAKEMORE.  
**Upton Park**—Carlos Cottage, and two plots of land, freehold ..... 1,180

**Upton Park**—Upton House, freehold ..... 165

**Sydenham**—47, Kent House-road, 78 years, ground-rent 8*l.* ..... 175

By HOBSON, RICHARDS, & CO.  
**Edmonton**—1 to 24, Tramway-avenue, 62 years, ground-rent 67*l.* ..... 1,080

By PHILLIPS, LISA, & DAVIES.  
**Nunhead**—2, Barfoot-road, 70 years, ground-rent 6*l.* ..... 330

**City**—8, Ludgate-hill, 23 years, ground-rent 6*l.* ..... 4,210

**Southeast**—13, Pritwell-square, 71 years, ground-rent 6*l.* ..... 910

By FERRIS, PRICE, & FURBER.  
**Bermondsey**, Upper Grange-road—Ground-rent of 23*l.* 15*s.*, reversion in 14 years ..... 1,430

Ground-rents of 6*l.* 6*s.*, reversion in 23 years ..... 175

Ground-rent of 27*l.*, reversion in 24 years ..... 1,035

125 to 152 even, Long-lane, freehold ..... 1,695

**King's-cross**, Copenhagen-street—Ground-rent of 14*l.*, reversion in 18 years ..... 730

**Copenhagen-street**—Ground-rent of 18*l.*, reversion in 18 years ..... 1,000

**Buckingham-street**—Ground-rent of 30*l.*, reversion in 27 years ..... 885

**Buckingham-street**—Ground-rent of 45*l.*, reversion in 30 years ..... 1,180

**Buckingham-street**—Ground-rent of 4*l.* 10*s.*, reversion in 15 years ..... 165

8, 12, and 14, Buckingham-street, freehold ..... 1,115

43, Brewery-road, 60 years, ground-rent 6*l.* ..... 650

#### JULY 28.

By D. WATNEY & SONS.  
**Tunbridge Wells**—The freehold residence called Broomhill Park, and 12*ac.* 3*r.* 2*p.* ..... 15,000

**Brighton**—8 and 10, Second-avenue, freehold ..... 8,800

By O. C. & T. MOORE.  
**Romford-road**—The freehold residence, St. Helen's Bethnal-green—70 and 72, Arbery-road, 64 years, ground-rent 11*l.* ..... 655

By FLEMMING & SON.  
**Islington**—32, 33, 34, and 42, Essex-street, freehold ..... 2,890

**Barnes**—1, Castellan-gardens West, 42 years, ground-rent 6*l.* ..... 380

**Bloomsbury**—13 and 14, Lancelotti-place, 12 years, ground-rent 40*l.* ..... 130

By H. C. WOOD.  
**Southwark Park-road**—Nos. 331 and 333, 30 years, ground-rent 7*l.* 4*s.* ..... 300

By PARKES & CHESAR.  
**Southwark**—9, Maze-pool, freehold ..... 405

By C. D. FIELD & SONS.  
**Borough**—37, High-street, freehold ..... 2,840

By LYM & CO.  
**Kilburn**—10, Goldsmith-place, 57 years, ground-rent 6*l.* ..... 480

By H. J. BLISS & SONS.  
**Bethnal-green**—2 and 3, Albert-road, 67 years, ground-rent 5*l.* ..... 630

5 and 6, Albert-road, 68 years, ground-rent 5*l.* ..... 675

**Hackney**—7 to 14, Cross-street, 69 years, ground-rent 26*l.* ..... 1,130

By E. STIMSON.  
**Lambeth**—59, 101, and 103, Vauxhall-walk, 55 years, ground-rent 10*l.* ..... 650

Old Charlton—15, 17, and 18, Victoria-road, 54 years, ground-rent 22*l.* 6*s.* ..... 1,240

**Kennington-road**—124 and 125, Prince's-road, 21 years, ground-rent 13*l.* 8*s.* ..... 290

**Denmark-hill**—20, Daneville-road, 76 years, ground-rent 5*l.* 10*s.* ..... 380

16, Selborne-road, 76 years, ground-rent 5*l.* 10*s.* ..... 380

By NEWSON & HARDING.  
**Hackney**—43, Gore-road, 68 years, ground-rent 7*l.* Upper Holloway—23 to 40 even, Brunswick-road, freehold ..... 1,370

**Prospero-road**—Freehold land, 2*a.* 3*r.* 18*p.* ..... 3,390

By W. EDYMAN & SON.  
**Acton**—2 to 8 even, Grove-place, freehold ..... 870

62, 64, and 66, Park-road North, freehold ..... 1,745

101, 103, and 105, Park-road North, freehold ..... 860

34, 36, and 38, Osborne-road, freehold ..... 1,630

74 and 76, Bello Bridge-road, ..... 330

The Gladstone public-house, freehold ..... 3,100

**Saville-road**—Two plots of freehold land ..... 130

#### JULY 29.

By ST. QUINTELL & SON.  
**Mitcham**—A plot of copyhold land, 1*a.* 2*r.* 16*p.* ..... 160

By F. C. KATTELL.  
**Epping**, Station-road—The freehold residence, Laurel Bank ..... 1,650

By DENHAM, TAYSON, & CO.  
**Worcester Park**, Avenue-road—The Bungalow, with stabling, and 2*a.* 2*r.* 23*p.* ..... 1,500

2, Redcross-road, freehold ..... 380

**Hyde Park**—38, Southwick-road, 43 years, ground-rent 11*l.* ..... 630

6, Porchester-place, 45 years, ground-rent 10*l.* 10*s.* ..... 1,100

**Clapham**—9, The Pavement, 18 years, ground-rent 67*l.* ..... 800

**Shepherd's-bush**—27, The Lawn, 4 years, ground-rent 6*l.* 8*s.* ..... 100

By PRICKETT, VANALAN, & CO.  
**Ponder's End**, South-street—Freehold residence ..... 1,030

**Highgate**—15, Cromwell-place, 94 years, ground-rent 10*l.* 10*s.* ..... 800

By BECKLAND & CO.  
**South Kensington**—10, Prince's-gardens, 57 years, ground-rent 70*l.* ..... 10,000

By REYNOLDS & EASON.  
**Bexley Heath**, North-street—A plot of freehold land ..... 60

1 and 2, Lexington-villas, freehold ..... 350

1 and 2, Warwick-villas, freehold ..... 315



## MEETINGS.

**SATURDAY, AUGUST 6.**  
*Royal Archaeological Institute (Salisbury Meeting).—*Excursion to Wardour Castle, Tisbury Church, Wilton House and Church. Sectional Meetings in the evening.

**MONDAY, AUGUST 8.**  
*Royal Archaeological Institute (Salisbury Meeting).—*Excursion to Boyton Church and Manor House, Scratchbury Camp, Heytesbury Church, Knoke Church, and Heytesbury House. Sectional Meetings in the evening.  
*Clerks of Works Association (Carpenters' Hall, London Wall).—*Mr. Linn Dillon on "Technical Education and its bearing on Clerks of Works." 8 p.m.

**TUESDAY, AUGUST 9.**  
*Royal Archaeological Institute (Salisbury Meeting).—*Excursion to Farnham Museum, Woodcuts (Romano-British) Village to Rushmore, returning by way of Rotherly Wood (Romano-British) Village, Winklebury Camp, and Fenne. (Concluding day).

**SATURDAY, AUGUST 13.**  
*Architectural Association.—*Visit to the Seat of Mr. B. W. Currie, near Farnborough, Hants. (See advertisement on p. 211.)

## Miscellanea.

**The Sanitary Condition of Margate.**—Margate and its sanitary condition continues to engage public attention, and the Town Council have published a report by Professor Corfield on the mortality returns of the borough during the six months ended June 30th of the present year. The report shows "that the borough has been during the past half-year remarkably free from zymotic disease of any kind"; but no one is content with this fact if Margate retains conditions which are liable at any moment to be a source of danger to the inhabitants and visitors. Families visiting the seaside for the benefit of their health do not desire to inhale the exhalations from hundreds of cesspools, however much these may be diluted by the sea breezes. Last year showed Margate to be the seat of a considerable prevalence of typhoid fever, and the town still has about it all the conditions to foster this disease. It would be a misfortune if the public mind were quieted before the Town Council have recognised the necessity of performing the most elementary duties of a sanitary authority, viz., the provision of a safe water supply and of a proper system of excrement disposal. As a mere matter of pecuniary investment, the necessary outlay would have an ample return in the security it would give to the health of the many persons who annually frequent this locality. Until the Town Council have fully complied with the recommendations contained in Dr. Page's report to the Local Government Board, and are able to assert that the conditions which are therein properly condemned no longer exist, it is impossible for intending visitors to think of Margate as a town in which proper precautions are taken to secure them from disease.—*Lancet.*

**The Health of Ramsgate.**—The Medical Officer of Health for Ramsgate, in his half-yearly report to the Sanitary Authority, stated that the birth-rate of the borough was 25.6, the death-rate 14.3, and the death-rate from zymotic diseases '3 per 1,000 for the past six months. He reported that the general sanitary condition of the town was good, and that there was a marked absence of those diseases which are attributed to defective drainage. He considered that the satisfactory state of the district was due to the completion of the extensive new drainage works, and to the alteration of the sewer outfall, which together cost the town upwards of 20,000*l.*, and which must still further enhance its salubrity, although it has long been one of the healthiest towns in the kingdom.

**Iron, Hardware, and Metal Trades' Pension Society.**—At the semi-annual general meeting of this Society, held at the offices in London last week, the following pensioners were elected, viz.:—Men (four).—George Brown, Rotherham, 660 votes; Richard Farmer, London, 650; John Bettridge, London, 538; and John Finch, London, 480. Women (two).—Charlotte McKenzie, Birmingham, 2,504; and Mary Aldous, London, 2,070. Mary Holley, Sheffield, being the highest unsuccessful candidate, received the Falkirk Iron Company's gratuity of 5*l.* 5*s.* John Bettridge was awarded a pension of 20 guineas; the remaining five received pensions of 25 guineas, they or their late husbands having been subscribers to the Institution.

**Ferry & Co., Limited.**—The directors of this company have resolved to pay on the 1st September, out of profits, an interim dividend on the ordinary shares for the first six months of this year at the rate of 6 per cent. per annum, free of income tax, being at the same rate as for the corresponding period last year.

**The Belgian Girder Competition.**—The Belgian girder competition question has just taken an important turn which should be to the advantage of English makers. Excitement exists among buyers at the circumstance that the prices of Belgian, French, and German rolled joists delivered into this country have just been advanced about 10*s.* per ton, the result of the increased number of orders being received at the works. London importing merchants are also advised that a further advance of 8*s.* per ton is contemplated, since Continental makers are determined to make the most of the present enlarged demand. The fact that the Continental girder-makers have been getting scarcely any profits during the last year or two had led to the expectation by English merchants that a rise would be declared at the first opportunity. Scarcely any of the Continental companies paid a dividend last year, and the highest that was paid by any one concern was 1*l.* per cent. The advanced prices of Belgian rolled joists delivered into the Midlands, if delivered promptly from stock in London, and allowing a small middleman's commission, are—12 in. by 5 in., lengths to 30 *ft.*, 6*l.* 12*s.* 6*d.* per ton, and 10 in. by 5 in., 6*l.* 10*s.* If consumers are prepared to wait for from five to six weeks for the execution of orders so as to allow of the prices are very much lower, namely, 5*l.* 12*s.* 6*d.* for 12 in. by 5 in., and 5*l.* 11*s.* 10 in. by 5 in. Small sizes, such as 6 in. by 3 in., are about 5*l.* 14*s.* 6*d.*, brought from stock and delivered into the Midlands. The fact that English ironmasters have given up the manufacture of rolled iron joists in competition with the imported goods, and that they are now confining their attention to rolled steel joists, makes it much easier for the foreigners to command the advances just declared than would have otherwise been the case. English architects are, however, becoming acquainted with the circumstance that native makers are now giving their attention to steel, and are specifying steel joists in building erections. Messrs. Dorman, Long, & Co., Middlesbrough, who have taken the lead as makers, report that they have lately found the demand for steel joists increasing. Prices of English joists of this description delivered into the Midlands are now 6*l.* 10*s.* per ton up to 8 in. deep, 7*l.* per ton up to 10 in., 7*l.* 5*s.* up to 12 in., and 7*l.* 15*s.* up to 16 in., which is the maximum size at present manufactured.—*Iron.*

**Local Government Board Inquiry at Birmingham.**—An inquiry was held at the Council House, Birmingham, on the 27th ult., by Mr. J. D. Harrison, to consider an application by the Corporation to borrow 6,000*l.* for sewage purposes. The Town Clerk, in supporting the application, said the money was required to construct a sewer which was necessary to prevent a great difficulty that had been experienced with regard to the flooding of a portion of the borough. The proposed sewer would commence at the River Rea, and the storm-water would pass into it, near Montague-street Wharf, and from this point would be continued through the Corporation Wharf, along Glover-street, Bond-street, Bordesley, along the Midland Railway Embankment, and terminating in Lawden-road, at which point it would be connected with the brook course. It would not, however, have any influence with the brook's course, except during heavy flooding. The Borough Surveyor (Mr. Till), in exhibiting the plans, said he had seen water lying to a depth of 2 *ft.* 6 in. above the roadway. The full length of the proposed sewer would be 1,667 yards, and of these 1,035 yards would have a diameter of 4 *ft.* and 632 yards a diameter of 3 *ft.* 6 in. Mr. Till said that a provisional arrangement had been made with the Midland Railway Company, and the Warwick Canal Company would have no cause for complaint, as the proposed sewer would benefit their property. In answer to Mr. Pollock, of London, who acted on behalf of Lord Norton, Mr. Till said it was not intended to connect the new sewer with any other sewer. The Inspector said he quite understood that the new sewer would be perfectly distinct from the ordinary sewage system, and would only carry storm water. In answer to another question, Mr. Till said he did not intend to have storm outlets in the course of the sewer. The Borough Treasurer, in answer to the Inspector, stated that the population had increased by 25,000 since 1881, and that the loans borrowed under the Sanitary Act amounted to 969,853*l.*, of

which sum 144,799*l.* had been paid off. The Inspector thought the work proposed to be done was very necessary, and after a vote of thanks to him the proceedings terminated.

**The High School for Girls, Stroud Green.** which has been erected here for Miss Emily Mills, was opened on Tuesday afternoon, the 26th of July. The design is an adaptation of the "Queen Anne" style. The walls are of yellow bricks, with red dressings and arches, relieved with a light brown stone from the New Biggen quarries; and the gables are finished in rough cast ornamental plaster, upon which is worked the date of the foundation and the title of the school. Over the side porch for pupils is carved the motto of the school, "Do ye nexte thynghe." The school contains accommodation for 300 scholars, in four large apartments known as the lecture-hall and third-form room on the first floor, and gymnasium and kindergarten-room on the ground-floor, in addition to which there are three music or class-rooms and a dressmaking-room, also housekeeper's rooms, cellars, and other domestic offices, principal's room, dressing-room, and lavatory for professors on each floor, and a bath-room, each fitted with hot and cold water. The total cost of the building and fittings has been 2,400*l.*, or 8*l.* per scholar. The building was designed by Mr. W. S. Wilson, in conjunction with Mr. J. W. Stevens. The work has been carried out by Messrs. Lansdowne & Co., of Richmond, Surrey. Mr. Bagless, of Honeymey-road, has executed the internal school fittings.

**The Home of Mercy, Lostwithiel.**—The Home of Mercy stands upon rising ground over and above this pretty Cornish town, and commands a superb view. It was built some twenty years ago from the designs of the late George Edmund Street, R.A., and attached to it is a chapel dedicated to St. Faith. Some few years ago a special gift was made to this chapel in the shape of a fine reredos in polished alabaster and marbles, designed by Mr. R. Medley Fulford, F.R.I.B.A., architect, of Exeter, and made by Mr. Harry Heems, of the same city. Additions to this reredos have just been made at either side. Niches have been placed in the east wall, within which stand life-sized statues of SS. Peter and Paul respectively. They are set upon corbels held up by angels. The canopies are delicately groined, and terminate with lofty crocketed spires. The new work, like the surroundings, is of early character, designed by Mr. Fulford and carried out in its entirety by Mr. Harry Heems.

**A Working Men's Flower Show.**—We hear that the Co-operative movement will be well represented at South Kensington on August 23rd, on the occasion of the National Co-operative Flower Show, held under the auspices of the Royal Horticultural Society, which will be an exhibition of the products of *bona-fide* working men's gardens, grown from seeds sold in penny packets, through the medium of the twelve hundred co-operative stores which now exist. The show cannot help being interesting and instructive, as it will so thoroughly represent the gardening capabilities of small cottages throughout the length and breadth of the land. Cheap excursions are being organised from all parts of the kingdom, and the Conference, which is to be held in the afternoon on the "Possibilities of Co-operative Allotments and Associated Gardens," will doubtless be well attended, and give rise to an interesting discussion.

**Road Surveyors' Association for Scotland.**—A meeting of this Association was held within the pavilion of the Highland and Agricultural Society at Perth, on the 28th ult., at which there was a large attendance. Mr. Mitchell, Dundee, President, occupied the chair. The office-bearers elected for the ensuing year were, Mr. Rankin, Carronbridge, President; Mr. McLennan, Dunfermline, and Mr. Laidlaw, Linlithgow, Vice-Presidents; Mr. Stevenson, Ayr, Secretary and Treasurer. After the ordinary business had been completed, papers on "Bridges and Culverts," by Mr. Aitken Cupar, and "Amendments suggested on the Road Act," by Mr. Laidlaw, were read and discussed.

**Romano-British Remains.**—The new volume of the "Gentleman's Magazine Library," to be issued by Mr. Elliot Stock immediately, will contain the completion of the section on "Romano-British Remains." In it we are promised a record of the discoveries of Roman remains in all parts of the country, classified into counties.



**Northern Architectural Association.**—A Monday number of the members of this association, including Mr. G. G. Hoskins, R.I.B.A. president; Mr. W. Glover, vice-president; and Mr. Frank W. Rich, hon. sec., visited Leeds and the Earl of Carlisle. The mansion, the design of Sir John Vanbrugh, was commenced in 1702, and, with the exception of the east wing, was completed by him. The entertaining rooms are small, but for the comfort and convenience of the house as a habitation many improvements have been made since the time of Vanbrugh. The members, after making an inspection of the building, viewing the valuable collection of pictures, and taking photographs of the north and south façades, returned to Malton for dinner, and thence left by train for Newcastle.

**Architectural Association.**—Messrs. Herbert S. Wood, Herbert G. Lidstone, and V. Lanchester have been awarded the first, second, and third prizes respectively in the examination held in June last, in connexion with R. H. Lovegrove's lectures on "Construction," the Architectural Association.

**PRICES CURRENT OF MATERIALS.**

TIMBER.		£. s. d.	£. s. d.
Heart, B.G.	ton	5 10 0	7 10 0
Oak, E.I.	load	8 0 0	12 0 0
Quoin, U.S.	foot cube	0 2 8	0 3 0
Red, Canada	load	3 0 0	4 10 0
Red, " "	load	2 0 0	3 0 0
Red, " "	load	3 10 0	4 10 0
Red, " "	load	1 10 0	4 0 0
Red, " "	load	2 10 0	4 10 0
Red, " "	load	3 0 0	6 0 0
Red, " "	load	2 0 0	3 10 0
Red, " "	load	2 10 0	4 10 0
Red, " "	load	3 0 0	5 0 0
Red, " "	load	4 0 0	5 10 0
Red, " "	load	0 0 0	0 0 0
Red, " "	load	2 10 0	3 0 0
Red, " "	load	7 0 0	8 0 0
Red, " "	load	6 10 0	6 10 0
Red, " "	load	6 10 0	7 0 0
Red, " "	load	8 0 0	13 0 0
Red, " "	load	7 0 0	8 0 0
Red, " "	load	6 10 0	8 10 0
Red, " "	load	0 0 0	0 0 0
Red, " "	load	7 0 0	16 0 0
Red, " "	load	10 0 0	24 0 0
Red, " "	load	10 0 0	15 0 0
Red, " "	load	6 0 0	9 0 0
Red, " "	load	8 0 0	9 0 0
Red, " "	load	6 0 0	7 0 0

TIMBER (continued).		£. s. d.	£. s. d.
New Brunswick, &c.	ton	5 0 0	8 10 0
Battens, all kinds	ton	4 0 0	10 10 0
Flooring boards, sq., 1 in. prepared, first	ton	0 8 0	0 11 0
Second	ton	0 6 0	0 7 0
Other qualities	ton	0 4 0	0 6 0
Cedar, Cuba	ton	0 0 32	0 0 34
Honduras, &c.	ton	0 0 3	0 0 34
Australian	ton	0 0 2	0 0 3
Mahegany, Cuba	ton	0 0 4	0 0 7
St. Domingo, cargo average	ton	0 0 4	0 0 8
Mexican	ton	0 0 34	0 0 4
Tobacco	ton	0 0 4	0 0 8
Honduras	ton	0 0 34	0 0 6
Maple, Bird's-eye	ton	0 0 5	0 0 7
Rose, Rio	ton	8 0 0	11 0 0
Bahia	ton	7 0 0	9 0 0
Box, Turkey	ton	5 0 0	13 0 0
Satin, St. Domingo	ton	0 0 5	0 0 9
Porto Rico	ton	0 0 6	0 0 10
Walnut, Italian	ton	0 0 34	0 0 6

METALS.		£. s. d.	£. s. d.
Iron—Bar, Welsh, in London	ton	4 7 6	4 15 0
" " in Wales	ton	4 2 6	4 7 6
Staffordshire, London	ton	5 10 0	6 0 0
Sheet, single, in London	ton	6 15 0	8 10 0
Hoops	ton	6 0 0	7 0 0
Nail-roads	ton	5 15 0	6 10 0
COPPER—			
British, cake and ingot	ton	43 15 0	44 0 0
Best selected	ton	44 10 0	46 10 0
Sheets, strong	ton	50 0 0	0 0 0
Chili, bars	ton	39 17 6	40 5 0
YACHT METAL	lb.	0 0 0	0 0 0
LEAD—			
Pig, Spanish	ton	12 2 6	12 3 6
English, common brands	ton	13 10 0	0 0 0
Sheet, English	ton	13 7 6	13 13 6
SPELTER—			
Silesian, special	ton	14 12 6	14 15 0
Ordinary brands	ton	14 19 0	14 12 6
TIN—			
Straits	ton	105 10 0	0 0 0
Australian	ton	105 10 0	0 0 0
English ingots	ton	105 5 0	0 0 0
ZINC—			
English sheet	ton	0 0 0	0 0 0
OILS.			
Linseed	ton	20 10 0	20 12 6
Cocanut, Ceylon	ton	30 0 0	33 0 0
Ceylon	ton	24 0 0	0 0 0
Palm, Lagos	ton	20 0 0	20 10 0
Bayonet, English pale	ton	23 15 0	23 0 0
" brown	ton	21 5 0	20 10 0
Cottonseed, refined	ton	20 10 0	21 0 0
Yellow and Olive	ton	25 0 0	45 0 0
Lubricating, U.S.	ton	5 0 0	8 0 0
" refined	ton	5 0 0	13 0 0
TURPENTINE—			
American, in casks	ton	1 5 0	0 0 0
TAR—			
Stockholm	ton	0 14 0	0 14 6
Archangel	ton	0 9 6	0 10 0

<b>BRISTOL.</b> —For Easton-road Board School, Bristol.	
Messrs. Hansom & Bond, architects, Clifton, Bristol.	
Quantities supplied:—	
Cowlin & Son	£2,170 0 0
W. Church	4,995 0 0
Eastbrook & Son	4,959 0 0
G. Humphreys	4,943 0 0
H. A. Forre	4,930 0 0
Stephens & Bastow	4,875 0 0
Howell & Son	4,850 0 0
S. Turner	4,870 0 0
J. E. Davis	4,857 0 0
J. Wilkins & Son	4,550 0 0
A. J. Beaven	4,390 0 0
J. Perrott	4,324 0 0
T. E. Lewis (accepted)	4,200 0 0

<b>BROMLEY (Kent).</b> —For new road, Queen's Mead, Bromley, Kent, for the Bromley Local Board. Mr. Hugh S. Cregeen, surveyor:—	
J. G. B. Marshall	£899 0 0
W. Mowlem & Co.	785 0 0
T. Lansbury	780 10 0
Woodham & Fry	769 0 0
A. J. Catley	744 0 0
E. Paul & Sons (accepted)	754 0 0

<b>BUNTINGFORD (Herts).</b> —For alterations to two houses, for Mr. T. J. Swarder. Mr. Russell Austin, C.E., Hereford:—	
Willmott & Son	£895 0 0
F. Cates	455 0 0
T. Nevett	447 0 0
* Accepted subject to reduction.	

<b>CARLISLE.</b> —For house and shops, Hart and Broad streets, for Mr. S. Neilson. Mr. H. Higginson, architect, Carlisle and Preston:—	
G. Hill	£222 12 0
Bricklayer and Mason.	
W. Latimer	110 0 0
Carpenter and Joiner.	
M. Newson	13 0 0
Slater.	
G. Sowerby	10 10 6
Plasterer.	
S. Ferguson	18 0 0
Painter and Glazier.	
H. Harkness	14 14 6

<b>PINSBURY.</b> —For erecting new water-closets for the boys and girls at the Penton-grove school (Pinsbury A.I.), and for erecting a wall (in lieu of the present railing) to enclose the playgrounds, for the School Board for London. Mr. T. J. Bailey, architect:—	
W. Howie	£264 18 7
Davis Bros.	686 0 0
J. Wells & Son	332 0 0
C. Deering & Son	288 0 0
* Recommended by the Works Committee for acceptance.	

<b>HACKNEY.</b> —For removing the old water-closets at the Bonner-street school (Hackney O.), and erecting new water-closets for boys, girls, and male infants, at a further distance from the school, for the School Board for London. Mr. T. J. Bailey, architect:—	
W. Howie	£268 18 0
Davis Bros.	687 0 0
W. Johnson	328 0 0
* Recommended by the Works Committee for acceptance.	

<b>ISLINGTON.</b> —For laying down new granite carriage-ways, York stone footways, and about 143 ft. in length of 18-in. pipe sewer, and executing other works in connexion therewith, for the purposes of widening Upper-street, Islington, for the Metropolitan Board of Works. Sir J. W. Bazalgette, engineer:—	
Nowell & Robson	£2,475 0 0
Thomas Adams	8,191 0 0
H. R. Trehearne	8,169 0 0
J. J. Biggs	8,150 0 0
J. J. Griffiths	7,884 0 0
G. G. Rutty	7,875 0 0
J. Mowlem & Co. (accepted)	6,000 0 0

<b>KIRKHAM.</b> —For the erection of a Wesleyan school. Mr. H. Higginson, architect, Carlisle and Preston:—	
Croft, Preston	£288 0 0
Smith, Blackpool	825 0 0
Riley, Fleetwood	817 3 4
Baldwin, Preston	796 0 0
Gerdaer, Kirkham	796 0 0
Singleton, Kirkham	780 0 0
Haslam, Kirkham (accepted)	718 10 0

<b>LAMBETH.</b> —For the erection of temporary school buildings, on the Victoria-road site (East Lambeth X), for the School Board for London. Mr. T. J. Bailey, architect:—	
F. Brady & Co. Limited	£2,580 0 0
C. Kent	1,390 10 0
Croft & Co.	1,255 0 0
W. Harbrow	1,183 0 0
North & Son	1,168 0 0
I. Dixon & Co.	1,152 0 0
G. B. Ash	1,105 0 0
J. Lyaght & Co. Limited	1,080 0 0
T. Bondon	1,073 0 0
* Recommended by the Works Committee for acceptance.	

<b>LAMBETH.</b> —For rebuilding the infants' water-closets at the New Park-road school (West Lambeth A.J.), for the School Board for London. Mr. T. J. Bailey, architect:—	
J. W. Roy	£139 0 0
E. Triggs	130 0 0
King Bros. & Co.	121 0 0
* Recommended by the Works Committee for acceptance.	

<b>LONDON.</b> —For alterations to the Mitre Hotel, Chancery-lane, for Mr. W. Drew. Mr. H. J. Newton, architect, 17, Queen Anne-gate, Westminster:—	
J. Woodman	£238 10 0
Jackson & Todd	318 0 0
F. Mark	299 0 0

**COMPETITIONS AND CONTRACTS.**

*Epitomes of Advertisements in this Number.*

**COMPETITIONS.**

Nature of Work.	By whom required.	Premium.	Designated to be delivered.	Page.
Bathing, Private, and Turkish Baths.....	Gloucester Cor.....	50l. and 25l.....	October 1st	i.

**CONTRACTS.**

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
erection of Shelters, &c.....	Eastbourne Cor. ....	Official.....	August 8th	i.
Painting and Pointing Works.....	Chelsea Vestry .....	do. ....	August 9th	ix.
erection of Footpaths, Fencing, &c. ....	Met. Board of Works. ....	do. ....	do. ....	ii.
erbing, Tarpaving, Metalling, &c. ....	Levisham Bd. of Wks. ....	do. ....	do. ....	ii.
Dividing Buildings, Alterations, &c. ....	Brighton Town Council ..	P. C. Lockwood .....	August 15th	ii.
Water Pipes, &c. ....	Brentford Local Board ..	" Lacey .....	August 16th	ix.
ewal of Two Draw-Bridges .....	War Department.....	Official .....	August 20th	ix.
lection of Refuse .....	Tottenham Local Board ..	do. ....	August 23rd	ix.
ear Beam Pumping Engines .....	Leicester Corporation ..	do. ....	August 25th	ii.
onware Pipe Sewer, &c. ....	Walthamstow Local Bd. ..	H. S. Ridings .....	August 28th	ix.
st-Iron Outfall Sewer .....	Lymington Local Board ..	J. Lemon .....	August 30th	ix.
wers, Depost Tanks, &c. ....	Ashford Local Board .....	Official .....	Sept. 7th	ii.

**TENDERS**

**ANDOVER.**—For mansion and offices, Eham Place, at Andover. Mr. S. Knight, F.R.I.B.A., architect.

Quantities supplied by Messrs. Stoner & Sons:—

Luscombe & Son, Exeter	£7,800 0 0
Bird, Edgware-road, London	7,625 0 0
Ratcourt, Gloucester	7,431 0 0
Grove & Son, Islington, London	7,393 0 0
Stephens, Bastow, & Co., Bristol	7,084 0 0
and London (accepted)	6,949 0 0
Beale, Andover	6,628 0 0

**BERMONDEY.**—For repairs to roofs and parapet walls, at the Bermondsey Workhouse, for the Guardians of St. Olave's Union. Messrs. Newman & Newman, architects, Tooley-street, London Bridge:—

White	£240 0 0
Greenwood	397 0 0
Stephens	377 0 0
Potter	375 0 0
Bullers	360 0 0
Shepherd	354 0 0
Pritchard (accepted)	290 0 0

**ASHTON-ON-MERSEY.**—For a reading-room at Ashton-on-Mersey, for Sir William Brooks, bart., M.P. George Truett, architect, 5, Bloomsbury-square, London:—

Benjamin Haywood	£1,783 2 10
Southern & Sons	1,490 0 0
Cross & Bell	1,386 0 0
Wilson, Toft, & Huntley (accepted)	1,386 0 0

**BRISTOL.**—For taking down kilns, stacks, buildings, and clearing the site of New Day Industrial School, for the Bristol School Board, under the supervision of Messrs. J. W. Trow & Sons, Broad-street, Bristol:—

	Credit.	Debit.
Renolds	—	£200 0 0
Turner	—	147 0 0
Ridgewood	—	120 0 0
Balmont	£55 0 0	—
Hollbrook (accepted)	87 10 0	—
[All of Bristol.]		



**LONDON.**—For alterations and additions to the office of the English and Scottish Law Life Assurance Association, 13, Waterloo-place, S.W. Mr. Mark H. Judge, architect:—  
 Albert C. Bolding ..... £2,300 0 0  
 Hampton & Sons ..... 2,945 0 0  
 Joseph Hume ..... 2,895 0 0  
 Charles Earle ..... 2,384 0 0  
 H. Totten & Sons ..... 2,200 0 0  
 Wm. King & Sons, Pimlico ..... 1,740 0 0  
 \* Accepted.

**LONDON.**—For pulling down and rebuilding No. 16, York-street, Covent-garden, for Mr. J. Galsworthy, Messrs. William Reddall & Son, architects and surveyors, South-street, Finsbury:—  
 Clarke & Bracey ..... £1,171 0 0  
 Wm. Bras & Son ..... 1,110 0 0  
 Hall, Biddall, & Co. ..... 1,062 0 0  
 Woodward ..... 1,070 0 0  
 Nightingale ..... 1,033 0 0  
 Kilby & Gayford ..... 1,030 0 0  
 S. G. Bird ..... 963 0 0  
 J. Sanders & Sons ..... 966 0 0

**LONDON.**—For alterations to 39, Porchester-terrace, Hyde Park, for Mr. S. Scarborough Johnson, Mr. W. Hilton Nash, architect:—  
 J. Waddington (accepted) ..... £486 0 0

**LONDON.**—For gasfitters' works, at the Star and Garter, Kingleland-gate:—  
 Buckley & Beach ..... £108 0 0  
 J. Bight ..... 200 0 0  
 W. Winn (accepted) ..... 195 0 0

**MARYLEBONE.**—For erecting a new staircase, &c., for the Pupil Teachers' Centre, on the Brecknock site (Marylebone Q.) for the School Board for London, Mr. T. J. Bailey, architect:—  
 T. Lye ..... £279 0 0  
 G. Wilkinson & Son ..... 280 0 0  
 \* Recommended by the Works Committee for acceptance.

**NEWMARKET.**—For house and offices at Newmarket, for Mr. C. Louisa, Messrs. Holland & Son, architects:—  
 Kerridge & Shaw ..... £1,898 0 0  
 King ..... 1,701 15 0  
 Blyth & Hunt ..... 1,611 0 0  
 Mills ..... 1,600 0 0  
 Linze ..... 1,579 0 0  
 Hook & Tebbitt ..... 1,557 17 0  
 Plummer ..... 1,435 0 0  
 Mason & Son (accepted) ..... 1,300 0 0  
 Saint & Sons (withdrawn) ..... 1,050 0 0

**NUNHEAD.**—For the erection of two iron buildings on the site in Ryedale-road, Nunhead (East Lambeth AG), for the School Board for London, Mr. T. J. Bailey, architect:—  
 Walker Bros. ..... £895 0 0  
 Clark, Bennett, & Co. ..... 850 0 0  
 Croggon & Co. ..... 848 0 0  
 Yorke & Son ..... 813 0 0  
 J. W. Key ..... 805 0 0  
 W. Harbrow ..... 765 0 0  
 A. W. Pocock ..... 670 0 0  
 Bruce & Still ..... 621 0 0  
 \* Recommended by the Works Committee for acceptance.

**PORTSMOUTH.**—For building St. Michael's Vicarage, Mr. Withers, architect. Quantities by Mr. Hale:—  
 Mullings, Devizes ..... £2,484 0 0  
 Dove Brothers, London ..... 2,415 0 0  
 Burrell, Littlehampton ..... 2,329 0 0  
 Stephenson, London ..... 2,295 0 0  
 Gregory & Co., London ..... 2,237 0 0  
 W. & E. Light, Portsmouth ..... 2,227 0 0  
 J. & C. Bowyer, Norwood ..... 2,167 0 0  
 Spear & King, Crowthorne ..... 2,107 0 0  
 Buckle & Wheeler, Abingdon ..... 2,185 0 0  
 Bottrill, Reading ..... 2,140 0 0  
 Smith, Worthing ..... 2,123 0 0  
 Stevens & Bantow, Bristol ..... 2,103 0 0  
 H. & D. Evans, Portsmouth ..... 1,993 0 0  
 Bull, Sons, & Co., Southampton ..... 1,971 0 0

**SOUTH NORWOOD.**—For alterations to the Albion Hotel, for Mr. Geo. E. Fago, Mr. W. Hilton Nash, architect:—  
 Drew & Cadman ..... £433 0 0  
 Bryant ..... 298 0 0  
 Smith ..... 297 0 0  
 Orenden (accepted) ..... 247 0 0

**WEYBRIDGE.**—For new shop and dwelling-house, Baker-street, Weybridge, Mr. W. I. Chambers, architect:—  
 Martin, Addlestone ..... £977 0 0  
 S. Wood, Weybridge ..... 880 0 0  
 W. & A. Browne, Ostlands Park ..... 877 0 0  
 Peters, Ostlands Park ..... 865 0 0  
 King, Ostlands Park ..... 800 0 0  
 S. Brown, Weybridge ..... 780 0 0  
 A. A. Gale, Woking ..... 650 0 0  
 Matthews & Mann, Weybridge ..... 650 0 0  
 \* Accepted.

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### Irish River Conservancy.



**L**N Ireland, outlets for the water issuing from drained land began to be made in 1843, but not much was done until 1846 and 1847, the time of the potato disease.

Between that time and the year 1863 more than two and a quarter millions of money were spent in the construction of public works in that country, of which nearly two millions were spent on these outlets for land drainage, or arterial drainage as it has been called. Practically, it is a lowering of the water-level of the outlets of land drainage, to enable the land drains to be laid with a sufficient fall for a sufficient distance from the arterial drains. The area so provided for during those years,—and mostly during the ten or twelve years from 1846 to 1857,—was 266,391 acres, statute measure. The average cost per acre was 6*l.* 17*s.*, and there was, of course, the cost of the land drains besides. This land drainage is called, in Ireland, "thorough" drainage, and is distinct from the subject of arterial drainage, of which we now desire to say something, the basis of which is the Appendix to the First Report of the Royal Commission on Irish Public Works, which contains the evidence given before the Commissioners who sat on forty-three days between October, 1886, and April, 1887. The Appendix is accompanied by a map on the scale of ten miles to the inch. There have been three systems or orders of procedure under which the arterial drainage of Ireland has hitherto been undertaken. Under the first, constituted by an Act of Parliament in 1831, landed proprietors were enabled to form themselves into joint-stock companies, and to proceed with the execution of drainage works without the intervention of other Acts of Parliament, and by private agency and with private funds to execute the works. Little practical result, however, followed this measure, and Parliament endeavoured to find some more effectual means for the attainment of the object by an Act passed in 1842, which provided that the works might be carried out by the Government on the application of owners of land in any district of the country. It was not necessary that all the owners, in a district desired to be drained, should make the application, or should agree to the work being done, but Government took action on the application of the owners of two-thirds in value of the lands proposed to be provided with proper outlets for the drainage, whereupon the works were carried out by the Commissioners

of Public Works in Ireland, or the Irish Board of Works, as they are more commonly called, under the superintendence of engineers appointed by that Board. It was intended by this Act that private funds should still bear the chief part of the expense of the works, but it did not exclude the Government from being one of the subscribers, on the security of the improved value of the land. On the undertaking being completed in any district so drained the expense was apportioned on the lands benefited, according to the benefit conferred; but during the next three years drainage works progressed slowly, and it was not until the famine years, to which we have made reference, that serious attention was given to the subject. There then ensued a demand that means should be found for the employment of labour to alleviate the wide distress. If such means were to be supplied by the Government, it was thought desirable that it should be by way of employment on reproductive works, and the choice fell on arterial drainage. With a view of meeting the urgency of the case the Government obtained fresh Parliamentary powers in 1846, which enabled the Irish Board of Works to proceed with works of this kind on its own responsibility, with the consent of the proprietors of but one-half in value in any district proposed to be drained. These works were then largely proceeded with, the Government lending the money; but, when the famine was over, the Government became alarmed at the outlay, and directed every exertion to be made to close the works, and return to the ordinary procedure under the Act of 1842. Complaints were made by the landed proprietors that, in order to find work for labourers, schemes had been forced upon them. By an Act passed in 1853, special Commissioners were appointed to inquire into these complaints, who recommended extensive remissions to be made, and in 1859 the amount so remitted, out of the total outlay of 1,827,068*l.*, was 906,786*l.*, or nearly one half. Whether that was satisfactory to the Irish landowners we do not know, but it seems to have had the effect of stopping further supplies from the Imperial Exchequer on that system of carrying out the work; for, after 1857, nothing seems to have been done until 1863, when an Act of Parliament was passed which relieved the Government of the responsibility of executing any works through the instrumentality of the Irish Board of Works, and by the engineers appointed by that Board. The aim of this Act was to leave the initiation of arterial drainage entirely to proprietors, and to enable them to carry out works with less interference, but offering them the advice and experience of the Board of Works and its

engineers, and the assistance of loans of money. Before we say anything of this new arrangement, however, we may say that the amount (1,827,068*l.*) was expended on 119 districts, the average area of which is 2,239 acres, the average cost per acre,—the acre being in all cases herein referred to the statute measure,—was 6*l.* 17*s.*, but in three of these districts, comprising 41,000 acres of drained land, the drains were made navigable, and in these cases the average cost per acre was 7*l.* 15*s.*, or less than 1*l.* above the average cost of drains not navigable. It must be said, however, that these were not new cuts; they were, for the most part, navigable waterways already, and what was done in them was of the nature of improvement only. In the case of a new cut, the difference between the cost of what would be necessary for drainage only, and that which would be necessary if navigation were provided also, would probably be greater than it appears from these figures, in the first instance; but in the long run it would, nevertheless, be found probably the more economical of the two. The average expenditure on each of these districts was 15,354*l.*, but on each of four of them it exceeded 100,000*l.*, and the average cost per acre of these four was 8*l.* 8*s.* The total area of the four districts is 57,166 acres, and the total expenditure upon them 481,911*l.*

Going from this largest class of drainage districts to those upon which more than 20,000*l.*, but less than 70,000*l.* was expended upon each, there were, of these, twenty-one, comprising an area of 108,211 acres, and upon which 808,385*l.* were expended, the cost per acre being 7*l.* 9*s.* Then there are thirty-one districts upon which less than 20,000*l.*, but more than 5,000*l.*, were expended on each, the total area of which is 65,653 acres, and the expenditure 331,431*l.*, the average being 5*l.* 1*s.* per acre. The smallest class of districts, those upon which less than 5,000*l.* were expended on any one district, are sixty-three in number, comprising 31,377 acres of drained land, at a cost of 122,504*l.*, or an average of 3*l.* 18*s.* per acre.

These were the works and this was the cost of draining the 119 districts under the conditions of the Acts of 1842 and 1846, and of which the landowners complained, although the annual improved value of the 266,391 acres of drained land was 74,502*l.*, and the average return per annum of the 1,827,068*l.* expended was over 4 per cent., and, if the remission which was made by the Government of 906,786*l.* be allowed for, the average return per annum must have been over 8 per cent. However, works were practically suspended after the famine time, but the importance of providing further means for arterial drainage forced itself on the attention of Government,



and in 1863 another Act was passed, which was amended from time to time at the instance of the Commissioners of Public Works in Ireland, with the view of extending the advantages of the Act of 1863. Under these several statutes the first step which proprietors of lands had to take was to send to the Irish Board of Works a statement of their requirements, accompanied by plans and estimates, duplicate documents being exhibited in the district and notices sent to the local newspapers and to all persons concerned, in order that objections, if any, might be lodged with the promoters. The Board of Works then instructed an Inspector to hold an inquiry in the district, hear objections, and revise the estimate if necessary. The Inspector was not an officer of the Board, or for whom the Board were responsible except as to his competency. He was appointed by them as occasion required. Mr. Roberts, who now is one of the Commissioners of the Board, was largely employed. Mr. Kelly, who had successfully carried out many of the former drainage works, was another who was often employed as an Inspector, and subsequently Mr. Kane was employed.

The report of the Inspector was sent to the Board of Works, and copies were furnished to the proprietors, who were again given an opportunity of objecting to the scheme. If objections were made and were satisfactorily disposed of, and if the Commissioners of the Board of Works saw no glaring defects in the scheme, they proceeded, on receiving the requisite assent of the proprietors of two-thirds in value of the land, to make a Provisional Order, constituting the area into a drainage district, and in due course obtained an Act of Parliament confirming the order. The Local Board, which had already been formed in the locality, called the Drainage Board, were then in a position to commence the works, and to borrow the necessary money from the Board of Works. In 1878 an alteration was made in respect of the number of proprietors from whom assent was required before works could be proceeded with. In this year it was enacted that a drainage district might be formed upon the assents of owners of only one-half of the land in a district, unless the owners of one-third of the land actually dissented. In 1880, power was given for the Drainage Board to borrow money from the Board of Works for works outside their district. In 1886 an important innovation was introduced by the House of Commons into a private Act, by a clause which provided that the Drainage Board should include a certain number of representatives of the occupiers of land in the district.

Thus, the Act of 1863 introduced a different system or order of procedure, which, in the main, has been followed to the present time. Under it a sum of 504,998*l.* has been expended in forty-two districts, comprising an area of 78,528 acres of drained land, or at any rate drained or otherwise improved by arterial drainage, the average cost of the drainage works being 6*l.* 8*s.* per acre of land drained or otherwise improved by the arterial drainage. The average return per cent. per annum upon this outlay has been 4*l.* 16*s.*, the total improved annual value being 24,225*l.* Under the Act of 1863 and subsequent Acts there have been only two districts on which more than 70,000*l.* has been spent on each, viz., 162,976*l.* on the two, comprising an area of 20,540 acres of drained land, the mean cost per acre being 7*l.* 19*s.* nearly. Then there are three districts where in each the expenditure was over 20,000*l.*, but under 70,000*l.* These contain 8,300 acres, and the outlay has been 87,613*l.*, or an average of 10*l.* 11*s.* per acre. The return per cent. per annum is 3*l.* 11*s.* The next scale of expenditure, viz., over 5,000*l.* but under 20,000*l.*, is one under which the cost per acre is less and the return on the outlay greater than in either of the other cases. On this scale twenty-one districts have been drained, comprising an area of 37,223 acres, the expenditure upon which has been 206,527*l.*, being an average of 5*l.* 11*s.* per acre. The return is 5*l.* 18*s.* per cent. nearly. On the smallest scale of expenditure, viz., under 5,000*l.* in each district, 12,765 acres have been drained

at a cost of 47,481*l.*, or at the small average of 3*l.* 15*s.* per acre, the return per cent. being 6*l.* 11*s.*

The cost of districts at present under construction, or, rather, which were so at the date of the report,—April, 1887,—is estimated at 233,000*l.*, the area of these districts to be improved is 52,850 acres, and the increased value is estimated at 15,850*l.* per annum. The average annual return on the whole expenditure since 1863 is 4*l.* 16*s.* on every 100*l.*

The country is divided, in a memorandum by Sir John Ball Greene, into areas, as follow:—

	Statute acres.
Arable and pasture land .....	15,357,866
Woods and plantations .....	339,849
Rivers and lakes .....	627,761
Bog, moor, and mountain .....	4,497,024
	20,822,490

Or the areas may be taken under different elevations, as follow:—

	Statute acres.
Not exceeding 250 ft. above the sea level	8,500,000
From 250 ft. to 500 ft. " "	7,500,000
" 500 " 1,000 ft. " "	3,750,000
" 1,000 " 2,000 ft. " "	1,020,000
Over 2,000 ft. " "	62,490
	20,822,490

In calling witnesses on the question of arterial drainage, the Commissioners,—who, by the bye, are now sitting on other questions connected with Irish Public Works,—addressed to them, before they appeared, the following heads of evidence, as suggestive of the information desired:—

As to the importance of arterial drainage to Ireland.

The amount of work remaining to be carried out. How far has advantage been taken of the facilities for promoting arterial drainage afforded by the Act of 1842 and the Act of 1863?

What causes have prevented a more complete adoption of these Acts?

What changes in the law are needed in order that districts still requiring drainage may be relieved?

Whether the charges should be direct on occupiers, and whether all the land in a river basin should be occupied as well as owners?

Whether part of the charges should be borne by towns, if any, in any district proposed to be drained, and whether all the land in a river basin should be made to contribute?

The advisability, as has been suggested, of the Government taking the initiative, or giving special help in the formation of drainage districts.

What precautions should be taken to prevent drainage districts being formed in such a way as to injuriously affect other districts, either by omissions of areas which ought, for physical reasons, to be included with them, or by direct injury in the way of increased floods?

Maintenance of arterial drainage works when complete.

Navigability: its advantages to adjacent land, to neighbouring towns, and to the surrounding district.

To most of these suggested questions the Commissioners received answers in full from one or other of the fifty-three witnesses they examined, together with evidence on questions not touched upon in the suggestions. It may be seen that the cost per acre is greater in the large districts than in the small ones. The large districts include a greater proportion of the main outfall works than those of smaller area do. The efficiency and completeness of a large area are much superior to those of small areas; but, as the cost per acre of the land benefited is greater in the larger district, there is no encouragement to attain the best efficiency the case admits of, and the solution of the difficulty lies in the formation of each district, under a Conservancy Board, with power to charge upon all lands within its area, not an equal rate, but one varying with the area, so that those most benefited would be charged at the highest rate, and those most remote, and receiving the least benefit, at the smallest rate. In these remote parts of a conservancy district the direct benefit is not perceptible, but there is no doubt they are able to contribute on other grounds, and so that the gradation be properly made there would be no injustice in including them as parts of the contributory area in every river basin. The Commissioners of the River Conservancy which comprehends this area would

undertake the main outfall works, and the charge per acre for arterial drainage in large districts would then be no greater,—perhaps less,—than it has been in small ones.

### A PUGIN STUDENT'S DRAWINGS.



GREAT many good and interesting sketches have been produced under the incitement of the Pugin Studentship of the Institute of Architects, but we do not remember that any other Pugin Student has brought out his drawings and sketches in so sumptuous a form as the folio volume\* in which Mr. Washington Browne has collected a number of the drawings for which the Studentship was awarded him in 1878, and of those which were made while travelling in fulfilment of the conditions of the studentship. The book is a volume *de luxe*, of which only two hundred copies have been printed; and though it is not necessary to the architectural value of the drawings that they should be published in so costly a form, and it may not be convenient to everyone to do so, the fact of collection and publication is in itself an example worth following by others, for a set of carefully-measured drawings or carefully-studied sketches of buildings of interest may have a permanent value, and it is a pity they should be shown for a few days on the Institute walls only to disappear again. Of course, it is desirable in such a case to make a judicious selection, and not to publish drawings, however good, of works which have been very often drawn and published, or from the same district which others may have previously selected for illustration. In this respect, however, no exception can be taken to Mr. Browne's selection. It deals a great deal with Scotch Medieval remains, which have been by no means over-illustrated, and the English works illustrated are, with a few exceptions, not in a very beaten track.

The illustrations in the book are of two classes, ordinary photolithographs from pen drawings, and "Licht-druck" reproductions from pencil drawings. Most of the perspective sketches are by this latter process, which is very successful in the reproduction of pencil drawing. One of the first plates, however, is a geometrical drawing in pencil of a very interesting bit of work at St. Andrew's, an arcade in the approach from the cloister to the chapter-house; a very bold piece of what Mr. Browne calls Transitional work, but which has the characteristics of Early English (in this case we should say early Scotch) pretty well developed, except a certain squareness about the archivolt sections. The arcade is backed by a modern brick wall, against which the sturdy Gothic work shows up very effectively; but we should almost have preferred a perspective sketch of this bit to an elevation and plan. A perspective sketch of the College Church, with its tall plain saddle-back pinnacles, is another of the St. Andrew's illustrations. A geometrical drawing of part of the remains of the Abbey of Aberbrothock, on plate 6, shows an instance of a circular-headed doorway in close contiguity with pointed arches of the same date, a peculiarity also shown in the bit from St. Andrew's just before mentioned. This mingling of round and pointed arches in the same story of a building seems rather characteristic of Scotch Gothic, and one is led to the conclusion that there was a preference for the round-arched form for a door, perhaps for purely practical reasons, as giving wider headway, for in both these two examples it is the doorway only that is round-arched. That remarkable bit of Scotch castellated work, Rowallan Castle, in Ayrshire, is the subject of a neat pencil sketch on plate 7; we have never visited it, but a photograph of it which is before us gives a very different idea of the expression of the building from that conveyed by this daintily-touched pencil sketch;

\* Pugin Studentship Drawings: being a selection from sketches, measured drawings, and details of domestic and ecclesiastical buildings in England and Scotland, drawn while Pugin Travelling Student of the Royal Institute of British Architects in 1878, together with a number of the drawings for which the Studentship of that year was awarded. By G. Washington Browne, Architect. David Douglas, Edinburgh. 1887.



the outlines are the same, but the stern expression is lost in the outline sketch. The castle, or the portion shown, is dated 1562, a date which accords with the details of interior doors given on the same plate, but not (to the "Southron" mind) with the exterior of the building itself, which stands as an outward or visible sign of the longer duration in Scotland of the fiercer type of feudalism which had at this time pretty nearly died out in England. There is, perhaps, not in all Great Britain a more characteristic bit of building than Rowallan. Compare that with the (in its way) equally characteristic manor house of Ockwells, Berks, very fully illustrated in a series of measured drawings (plates 10 to 12); this is a century earlier than Rowallan; but what a contrast between the stern northern castle and the quiet-looking domestic southern English dwelling-house. The two are eloquent of the respective social states of the two countries at the time.

One of the most interesting portions of the collection is the series of very careful measured drawings (plates 48 to 57), devoted to the illustration of New Abbey or Sweetheart, a few miles from Dumfries, the latter *alias* arising from a legend as to an embalm'd heart preserved there. This ruined abbey was well worth such careful illustration, both on account of its powerful and grand style of work and its many interesting peculiarities of detail. Newark Castle is carefully illustrated, with plans and geometrical drawings. Various pencil sketches of Scotch work,—old houses in Paisley and elsewhere; the west end of Paisley Abbey, with a fine and rather unusual arrangement of traceried windows; views of Glamis Castle, Midmar Castle, and others; details from Jedburgh Abbey; these and many others are of great interest, and charming to look at.

In the larger pen-drawn geometrical drawings, Mr. Browne gives us clear, strong-lined, and what may be called business-like, drawing, but the strongly-ruled joints across the masonry, and the thick lines generally, give a somewhat mechanical appearance to this portion of the drawings; and the throwing back of the portions on a more distant plane, as in the elevation from Dryburgh Abbey (plate 15), by vertically-ruled shading lines, is still more mechanical, and a device in architectural draughtsmanship that is, to say the least, not worth the trouble it gives; besides, it crowds up the surface of the paper and interferes with the clearness of the actual construction lines (especially curvilinear arch lines) which have to cut through all this ruling. For pencil-drawing the author's touch and style is charming. Occasionally we find a certain now fashionable trick of effect with draughtsmen carried a little too far,—that of stopping or interrupting lines and leaving the eye to carry them on in imagination. This is to a certain extent a legitimate source of effect, and it is in accordance with the actual effect of moulding lines, on old buildings especially, under varying gradations of light; but when we see the cornice of the circular tower at Falkland Palace (plate 24) completely omitted in the middle portion, as if it had dropped out (which we do not imagine is what is intended to be conveyed), one is tempted to ask whether it is not rather a too easy mode of sketching to draw only the beginning and end of a set of curves, and leave the rest to imagination. There seems also to be a disposition among the modern school of draughtsmen to be less particular about perpendicularity than formerly. In the sketch of Ponds Priory Gate (plate 5) the arcade above the gateway is falling backwards; in that of Dunblane (plate 19) the clearest windows are tumbling in. The comparison of the two leads to the conclusion that this is a licence of sketching, not a representation of fact. We used to think it was a special characteristic of ladies' architectural sketching that their buildings are not upright. Architects should be more careful.

#### The Suggested Board of Forestry.

The report of the Select Committee on Forestry has been issued. The Committee recommends the establishment of a Board of Forestry, presided over by a responsible Government official.

#### NOTES.

**T**HE Midland Railway strike does not seem to be turning out so serious a matter for the company and for the public as it was at first feared that it would. We must confess that we regarded with considerable apprehension the statement that fresh hands were being taken on from other railways to act as drivers, seeing that to learn the signal system of a great line is no easy matter, and that it is generally understood that all drivers go through a probation of learning the road, in the capacity of stokers or otherwise, before they are allowed to drive on it; and we "attended ourselves," as the French put it, to a serious accident from some mistake of a driver unfamiliar with the road. It says much for the pains and care exercised by the officials in charge and their new helpers that nothing of the sort has occurred. With regard to the matter in dispute between the Company and the men, it appears to us that the Company are in the right. We are told by those who ought to know that the men, even under the new system proposed, would be paid better than those of any other railway in the world. The kind of complaint which the men make is represented in what was said to us by a passenger driver on the Midland (not a striker), that if he went from Liverpool to London and back with a "special" he would be so situated that he would not be able to take his turn next day, according to the rules, but must make only five days that week. This, however, is surely a matter that could be easily arranged by a scale of pay for distance run. Knowing what is the average proportion of willing workers and unwilling workers among mankind, and remembering that even engine-drivers are but human, we should expect that a system ensuring a week's pay, whether the usual amount of running was done or not, would infallibly be taken advantage of by the less worthy and diligent men whenever a chance occurred, and that to the detriment of the hard-working and willing men; and it must be remembered that the work of a great line cannot be carried on well without a strict disciplinary system, and what is now proposed by the Company is only the system in existence on most of the other great lines in England. We fear the men are in the wrong in the general demand, and there is no question that those who thought proper to pull up their trains at a given time and desert them are flagrantly to blame, and that the Company are quite right in their positive refusal to re-engage any man who had neglected his obvious duty, not only to his employers but to the public, in such a manner. It is the case of a sentinel deserting his post.

**O**N Monday last was issued a supplementary estimate for 363,799l. in connexion with the Civil Service and Revenue Department. Amongst the payments is one of 256,000l. to the Local Government Board for certain disturnpiked and main roads in England and Wales; and one of 8,000l. to Messrs. Leeming & Leeming, architects, "in full satisfaction of their claims upon her Majesty's Government in connexion with the preparation of plans for the erection of new offices for the Admiralty and War Departments." The taxpayer is hereby reminded that the scheme for fresh buildings over the Spring-gardens and Whitehall sites is for a while in abeyance. A grant in aid of 2,000l. to the Victoria University is also included in this estimate. There are also grants of 4,000l. in aid of cost of site of the new hall for Edinburgh University; and of 2,230l. for buildings at the Royal University, Ireland. A fair pecuniary justice seems to have been done to Messrs. Leeming & Leeming, provided they had not made working drawings for the new building; and we presume matters had not gone so far as that. Most of those who are interested in architecture will be glad to hear that their commonplace design is shelved; and it is to be hoped that public opinion may still be stirred up to protest against the miserable

economy which recommends a piece of cheap patchwork for the War and Admiralty Offices, instead of a building worthy of the nation.

**T**HE fire at Whiteley's has once more frightened people about the safety of London in the admittedly improbable event of two great fires taking place on the same night. Practically, the whole available fire engine force was concentrated on one conflagration, and though London is not now the combustible town which it was when the Great Fire occurred, there might be an unpleasantly near chance of something like a great fire establishing itself some night if two "Whiteley's" took to burning simultaneously. The question is partly one of rates, of course, and those who grumble just after a great fire because there are not enough fire-engines, would probably grumble equally at being double-rated for a fire service of double efficiency. There is, perhaps, another practical difficulty apart from this, in the fact that, however great may be the demands occasionally made on the fire-brigade, they are few and far between; and there is a not unnatural feeling as to the waste of *matériel* and *personnel* which would be incurred in keeping up a much larger force of men, engines, and horses, which would be for far the great majority of their time standing idle. If any system could be developed by which extra men could be trained and engaged, to be called out only when urgently needed, and to be at liberty to work at their own occupations in the meantime, on the understanding that they should be within a certain radius of the station, and so as to be easily summoned (which, if we mistake not, is the actual system now pursued in the lifeboat service), there would seem to be the best chance by such a system of squaring efficiency with economy, and not keeping men about as idlers: this latter necessity being in itself objectionable on other grounds than those of economy.

**A**S usual, a large fire brings out the stereotyped queries, "Why is not everything fireproof?" and Earl Wemyss writes to the *Times* to ask why Whiteley's and all other buildings are not built with Brannon's fireproof covering to the timbers, which by this system are encased in a fibrous, non-combustible concrete. These things are not so easy and obvious as Earl Wemyss supposes. The question of increased cost would be very considerable, which Earl Wemyss would probably recognise if he had to erect a large building at his own cost; but there is the further question, which does not occur to amateur correspondents on these matters, What is the wood doing all the while under this concrete shroud? Wood is a material the behaviour of which requires looking after, and the man who puts his faith in coating the structural timbers of a roof with concrete might be disagreeably surprised some day to find that a rotten tie-beam or strut let the roof down over his head.

**I**N a letter to the *Times* of Tuesday, Mr. W. H. Gregory makes a protest in regard to the condition of the National Portrait Gallery and the South Kensington Museum. The erection of an adequate and worthy building for the National Portrait Gallery is the main object of his letter, but the completion of the South Kensington Museum building, which Mr. Gregory only treats as an accessory matter, seems to us by far the most important matter of the two, and the one of most public and artistic interest. The fact is the National Portrait Gallery has never been an object of high interest to the cultivated portion of the public, on account of the very fact which Mr. Gregory emphasises, that it is not an art collection, and the pictures composing it are not bought from artistic considerations; and the dull and uninteresting aspect of a collection of mostly second-rate and third-rate paintings cannot be much atoned for by the consideration that the subjects of all the paintings are of more or less historical interest. Few visitors were ever found in the National Portrait Gallery when it was in the dangerous but more accessible "sheds" in the Exhibition-  
6



road; we understand there are fewer still at Bethnal Green; and we cannot wonder at it. The collection is not likely to prove attractive to "the masses." Bethnal Green is the wrong place for it, and it was only sent there temporarily, and there ought to be a gallery built or found for it in a more central situation. But the state in which the principal front of the South Kensington Museum has for many years been left is, to our thinking, a much greater artistic scandal, and one which has existed so long that, as Mr. Gregory observes, the London world has become quite accustomed to it and makes no complaint; and we are apt to forget that these bare and unsightly brick walls, behind which our art treasures are placed, do not represent the kind of architectural covering which was ever intended for them as a permanency. It is really contemptible that, while spending money freely on the acquisition of artistic objects not always of equal worth, we should leave the building containing them in the forlorn state which seems now to be tacitly regarded as permanent. Even if Londoners are accustomed and reconciled to it, how does it look to foreigners? The South Kensington Museum has a world-wide reputation; how does it strike artistic students from the Continent, who come to see the exhibition as one of the art-shrines of Europe, to find its outward aspect that of a barn? The fact can scarcely raise the credit of England in their eyes.

FROM a reply of Mr. Egerton's to Mr. Kimber, on Monday evening in the House, it appears that, a portion of the cornice of St. Mary-le-Strand having fallen, the church has been declared by the Board to be a "dangerous structure." This may be all very well so far, but we become somewhat alarmed when the representative of the Board goes on to say that "The Board had before them suggestions for widening the Strand at that point, either by the removal of the south side of Holywell-street or by the removal of the church, but they were not in a position to act upon either suggestion." From the tone of the Board's representative, it seems pretty evident that the Board would be perfectly ready to pull the church down if they were "in a position" to act upon the suggestion. When suggestions like this are mentioned in the House, and get into people's mouths, there are always some idiots desirous to act on them sooner or later. We published some time ago an illustration showing how the Strand could be widened by forming a roadway on either side of the two churches, in the shape of a fine design made by Mr. Brewer for a certain "Strand Improvement Association" (see *Builder* for Dec. 26, 1885). This scheme would not only not sacrifice the churches, but would realise a new and very fine effect, while giving ample roadway. But it would be easier, and cost less, to pull down a fine building, and that is the only thing that a body like the Metropolitan Board of Works thinks of.

IN June last we published the names of the authors of the fifteen selected designs for the completion for the new front of Milan Cathedral. The name "Teodoro Ciaghin," of St. Petersburg, was No. 9 in the list. We have lately received from a correspondent the news of the sudden death of Theodore Tchagine, at the early age of twenty-seven. He was a member of the Imperial Academy of Russia, and Professor of Architecture at the University, and is said to have been a man of exceptional ability.

LONG'S Hotel, New Bond-street, is about to be demolished and rebuilt. In connexion with its earlier annals the following note by Sir Walter Scott (*vide Moore's Life of Byron*) is worthy of remembrance:—"I saw Byron for the last time in 1815. He dined or lunched with me at Long's in Bond-street. I never saw him so full of gaiety and good humour, to which the presence of Mr. Mathews, the comedian, added not a little. Poor Terry was also present." This part of Bond-street stands on what had been the grounds of Clarendon, vulgarly styled Holland, or Dunkirk, House,

as bought in 1675 by Christopher Monk, second Duke of Albemarle, of the Earl of Clarendon, son to the Lord Chancellor Hyde of that title. Evelyn tells us that the price paid was 25,000*l.* Monk sold most of his purchase (*circa* 1685) to Thomas Bond, of Peckham, comptroller of Queen Henrietta Maria's household, whom Charles II. had made a baronet. Bond pulled down the house and erected Bond, Albemarle, and Stafford Streets over the property. Clarendon House stood north of Piccadilly, over against the end of St. James's-street.

WE have received from Mr. B. G. Jenkins, F.R.A.S., his London weather chart for the rest of this year, based on his paper on "Forecasting the Weather," published in the Transactions of the Royal Academy of Belgium. The first experience is hardly happy. We received the chart last Monday, and find barometer and thermometer alike marked at a low level for those two sweltering and almost tropical days, Sunday and Monday last, with the general remark:—"Barometer rather low first half of the month, bringing rain and decrease of temperature." We can only wish, at the moment we are writing, that Mr. Jenkins had been a true prophet. He adds: "Violent gale probably about the 4th (!)" However, we will keep an eye on Mr. Jenkins's prognostics for the rest of the year, and see if the results come any nearer to the predictions.

#### THE SALISBURY MEETING OF THE ROYAL ARCHEOLOGICAL INSTITUTE.

THIS year's meeting of the Royal Archaeological Institute was brought to a conclusion on Tuesday last, though some twenty-five members have arranged for a supplementary tour in Brittany. We this week continue our report\* of the meeting, and hope to conclude it next week. The congress has been a very interesting and successful one, its success being, of course, greatly helped by the uninterrupted fine weather which prevailed during the whole eight days of the meeting.

On the second day of the meeting, Wednesday, August 3rd, carriages conveyed a party of about a hundred members and visitors to Old Sarum, where General Pitt-Rivers took the party under his direction, and read a paper on the site of the city. From this paper we quote the following passages:—

The fact of the place having originally been a British earthwork is proved by the six Roman roads leading up to it, traces of which may still be seen, and, as the work from its shape is certainly not Roman, it must necessarily be pre-Roman and British. The three roads which led to the eastern entrance were from Winchester, Silchester, and Badbury. A fourth is believed to have run north to the Roman station of Cimetio, near Marlborough, a fifth went to Bath, and a sixth to Ilchester. It was probably originally the stronghold and place of refuge of an independent tribe of Britons, to which the inhabitants of the surrounding district retired when attacked by a neighbouring tribe. It occupies a knoll of the chalk hill, and, like most British earthworks, its outline conforms to the line of the hill. The reason it is nearly round is because the hill was round. It has two principal lines of defence,—an outer line with a deep ditch and rampart on the inside, and a smaller rampart on the outside of it, and which has two entrances, one on the east and one on the west. The inner line, consisting of a ditch with one rampart on the inside, has only one entrance on the east. It is believed that the outer line of defence only was British, and that the inner line or keep was added in the eighth or ninth century to make a fortified residence for the lord of the place. This, however, has not been proved, as it might be, by excavations in the ramparts. Besides this, there are radiating lines of entrenchment between the central keep and the outer defence made for the purpose of protecting part of the outer ward should the enemy break in through the outer line. This appears to me to be a Norman method of defence, as a similar arrangement is seen in the so-called Caesar's

camp at Folkestone, which I excavated and proved to be of Norman construction. The Normans found the mounds of earth here and built on them a line of wall on the inner rampart, the remains of which are seen at the entrance, and another on the rampart of the outer line of defence, a fragment of which, 25 ft. long, 12 ft. high, and 10 ft. thick, may be seen on the north-west side, but Mr. Roach Smith is of opinion that this fragment is Roman. The Normans also added earthen barbacans to cover the eastern and western entrances to the outer line, each having a separate ditch of its own detached from the main ditch of the place. The marks of a large wall can be seen in the keep, and Leland says there are other wells, which I think would be worth finding and examining. There was an suburb outside the fortification on the south side. Few relics of any period have been found in Old Sarum, and the place has been very much neglected by archaeologists. In studying ancient fortifications, it is always desirable to keep in view the distinctly different purposes which an earthen rampart served in ancient and modern times. In modern times the rampart is intended to give cover to the defender from the cannon of the enemy, and to be able to do that it must be of a certain thickness, that the shot may not pass through it, and, in consequence of this thickness of the rampart, the defenders standing behind it are unable to see down into the ditch in front of them. The line of the rampart has, therefore, to be arranged so that the ditch in front of each part may be seen into by some other part, and it is this flanking defence, as it is called, that has given rise to the different system of modern fortification. But in ancient fortifications the wall, or stockade of wood, not being required to be of very great thickness, the defenders, standing behind it and looking over it, or through loop-holes in it, were able to see down into the ditch in front of them. Flanking defence was, therefore, not necessary to the same extent: parts which, in a modern fortification, are called dead ground, or ground in which an enemy could lie concealed, would not be dead ground in an ancient fortification, and a simple straight line of ditch and rampart was all that was required. The use of an earthen rampart in ancient fortification was to give command to the defenders, to increase the force of their missiles by gravitation, and to place the stockade, or wall that was built on the top of it, beyond the reach of the enemy's battering-rams. The object of a modern rampart is to give cover, not command; the object of an ancient rampart was to give command, not cover. If this is kept constantly in view, the lines of ancient British entrenchments will be better understood. It will be found that almost invariably the height of the rampart in each part of a work was greater where the ground outside was flatter, and where command had to be obtained by artificial mounds. Where the ground sloped down from the rampart, it was not so high; and in places where the natural slope of the ground afforded sufficient command without an earthen rampart, it was dispensed with altogether, especially in the less important works. But at Old Sarum these principles of fortification, which are so usually observed in all British works, as at Whichbury, for example, on the other side of Salisbury, do not apply. Although the ground is much weaker on the east than on the west side, the ditch and rampart are of the same size all round, and this leads me to think that the fortification may have been modernised in more recent times. Alfred, in 871, ordered Leofric of Wiltonshire to make another ditch at Old Sarum, to be defended by palisades, and this alteration may have consisted in deepening the old ditch. It is even possible that the present ditch may have been altered at the time when the barbacans were added, to cover the openings in Norman times. The father of Cnut is said to have burned the place in 1003; Cnut himself died here in 1036; the bishopric of Sarum was established here in 1075; William the Conqueror was here in 1086, and held a review of 60,000 men who swore allegiance to him. The Cathedral of Old Sarum was consecrated in 1092. William Rufus was here in 1096. There was a mint in Old Sarum, as proved by the coins struck in the place. On the coins of Ethelred II. the name of the place was written Searbe; on those of Cnut Sæber,

\* See last week's *Builder*, p. 200.



Ser, or Sere; on those of William I. and II., Sere, Seber, or Serri, which were evidently corruptions of the Saxon name Seabyrig, which latter was the Saxon version of the Roman Sorbiodunum, and this, in its turn, a corruption of the Celtic name ending in *dun* or *dunum*, "a fortified hill." On a coin of Stephen, however, it first appears in the modern form of Salis, and on the coins of Henry II. Sal or Saler. In the course of time, the soldiers and the clergy, living together in so small a place, fell out. The clergy annoyed the soldiers by constantly singing psalms, and the soldiers, no doubt, annoyed the clergy by their bad language, so that in 1256 the clergy departed, and established the new cathedral in modern Salisbury. During the long drought of 1834, the outline of the old cathedral, which had been destroyed, was discovered beneath the grass which had turned brown over the spot in the north-west quarter, and it was excavated by Mr. Hatcher and Mr. Fisher. It was found to be a plain cross, 270 ft. long by 150 ft. broad. There were double aisles to the nave, choir, and transept. The cloisters were also discovered to the north of the choir.

On leaving Old Sarum, the party proceeded to Great Durnford, where the church was visited, under the guidance of Mr. George H. Gordon, A.R.I.B.A., who read a short paper on it. Subsequently Amesbury Church, Stonehenge, and Lake House were visited. Of these we will say something in our next. In the evening the Historical Section was opened by an address by the President, the Dean of Salisbury.

A paper by Dr. Wake Smart, entitled "A Brief Account of some Celtic and Roman Antiquities within the North-eastern part of the County of Dorset, between Bockley Dyke and the River Stour from Blandford to Wimborne," was read before the Antiquarian Section. The author said that Bockley or Bockerley Dyke, the northern boundary of the area included within the scope of the paper, was also a boundary between the counties of Wilts and Dorset. It was an earthwork of high antiquity. The best general view of it was to be had from the top of Blagden Hill, over which it passed. Its whole length was from four to five miles. The western turnpike road traversed the Dyke about three-quarters of a mile from Woodyates, and at the same place the Via Iceniana, Aekling Dyke, or Roman road from Old Sarum to Dorchester, crosses it. These two roads, ancient and modern, make some confusion in their united passage through it; but the Roman road may be soon traced from its emergence into arable land, and runs nearly parallel with and near the turnpike road to Woodyates Inn, which stands on its line. As to the origin of the earthwork the author said he was utterly opposed to the Belgic theory of its construction, which he believed was generally accepted, though it was not the opinion of Mr. Warne. That theory seemed to be founded on a misconception of historical statement, for which the learned Dr. Stukeley was primarily responsible. There was no basis of proof that the Belgæ ever peopled Dorset. For the first three-quarters of a mile after it leaves Woodyates Inn the Roman road has to be taken on trust, for it is hidden from sight by the turnpike road, which has been carried along the *dorsum*; but at the eleventh milestone, where the open Down succeeds the enclosures, the Roman road parts company with its companion, and, at a sharp angle, runs in an independent direction and straight course to Badbury Rings, at the distance of about ten miles south. The widening space formed by the ancient road and the turnpike encloses a large tract of the Down, which is studded with Celtic tumuli in great variety; and overlooking all from Handley Hill is a very fine specimen of the oblong (perhaps chambered) barrow, of unknown antiquity. With the exception of this one, all the rest, which are of the Bronze Age, were opened by that indefatigable explorer, Sir R. C. Hoare, or his companion and friend, Mr. Cunningham, and most of their discoveries are now deposited in the Devizes Museum. These barrows were remarkable in producing more artistic relics, as ornaments of amber and glass, and trinkets with jet and gold, also bronze daggers, in a larger proportionate number than fall to the lot of barrow diggers in the southern parts of Dorset. In this respect these tumuli assimilate more to the Wiltshire barrows about Stonehenge. The Via Iceniana, or Aekling Dyke, in its course across the Down, presents, for the most part, a fine example of Roman

road-making. It is a raised causeway, with rounded back and sloping sides, to throw off the rain and melted snow. The substratum is chalk, with a thick covering of broken flints; and in a certain section he had noticed a superficial layer of yellow gravel, such as may be dug on Pentridge Hill. The road must have been a work of much time and labour,—enforced labour, no doubt, with very little regard paid to "the groans of the Britons." It is much to be regretted that modern road-making has done a good deal of mischief in places by pillaging the store of flints; but there are still remaining portions that have not suffered yet from the human despoiler or from the wear and tear of time. Proceeding with his paper, Dr. Wake Smart pointed out the mistakes which had been made by some previous writers as to the continuation of this road, and enumerated several Roman remains which had been found in proximity to it or its branches.

On Thursday morning the Architectural Section was opened by an address from its President, the Rev. Precentor Venables. Of this we print the greater part on another page, under the title "Architecture and Architectural Topics in Wiltshire." Subsequently there was an inspection of some interesting old buildings in the town, including St. Thomas's Church, which was described by Mr. A. Wood, in a paper from which we extract the following passages:—

"The Church of St. Thomas is the most important of the three remaining parish churches of Salisbury. It was erected as a sort of chapel-of-ease to the cathedral by Bishop Bingham, who occupied the see of Salisbury from 1228 to 1245. Bishop Bingham is a figure of considerable importance in the history of Salisbury. Two years previous to his death, availing himself of the Royal Charter granted to Bishop Poore, he brought the Icknield-street, or "Wilt Way," to New Sarum, and built the bridge over the Avon between Harnham and the city. This proved no little injury to Wilton, and was altogether fatal to Old Sarum. Bishop Bingham built the small chapel of St. John the Baptist, now converted into a dwelling-house, upon an islet between the main stream of the Avon and an artificial channel connected with it. Here two chaplains were to say mass, and to receive the alms of passengers to defray the expenses of the bridge. We shall find that there was a chapel of St. John the Baptist in the church of St. Thomas, and it may be inferred, with some probability, that Bishop Bingham, who built the bridge-chapel of St. John on the islet was also the founder of the original chapel of St. John in the church of St. Thomas. As to this, however, there is no certainty, as the latter was the chapel of the Merchant Tailors, whose patron was St. John the Baptist. It may have been that they found an existing chapel of St. John the Baptist, and proceeded to rebuild and enlarge it. The date assigned to this church is the year 1240. No part, however, of the present structure can be assigned to the thirteenth century. It is of the same general date as the other three remaining parish churches of the city as they at present stand. It is a large and fairly handsome building of the Third Pointed style, measuring 130 ft. in interior length, and 70 ft. in width. Its component parts are a nave with two aisles, or, as the Italians, with better reason, term this arrangement, three naves (*tre navate*), a chancel with aisles or subsidiary chapels, and a double vestry or sacristy. To the south, flanking the third bay of the aisle, is a square tower of moderate elevation, not with the pyramidal capping which I am wont to hear termed a Sussex head, but an octagon in plan, although of no higher elevation than one is accustomed to see in Sussex. The detached position of this tower, and the fact that the buttresses die into it below the belfry stage, give it more of the character of a campanile than is common in England. But the practical genius of our countrymen is shown by the employment of the lowest of the four stages as the south porch of the church. Its worst feature is the awkward compromise between a staircase turret and a buttress at the north-east angle. The best is the panelled parapet that surmounts it, and next to that the elegant belfry windows, divided into two lights each, filled with the trifoliate tracery so common in Somersetshire. This tower contains a peal of eight bells, brought hither from the detached belfry of the cathedral at its demolition by Wyatt, the icono-

clast. On the east side of the tower are two figures to strike the bells of the clock. In the second stage, on the south side of the tower, are two large niches with figures, now very much mutilated, one representing St. Thomas à Becket, the patron of the church, and the other the Virgin and Child, the arms of the see of Salisbury. It may be observed that the three parish churches of Salisbury exhibit great variety of treatment in the position of their towers. The tower of St. Thomas is attached to the third bay of the south aisle; that of St. Edmund's is what is termed disengaged at the western end of the nave; that of St. Martin's projects from the south aisle, and is flanked by a porch and chapel, now used as a vestry-room, extending across the nave and north aisle. The only other projection, with the exception of the unusually large vestry, from the general plan of the church of St. Thomas, is that of a turret staircase on the north side which formerly conducted to a room above the north porch, which, with the porch itself, has been removed. The third window from the west occupies the site of this porch. The upper part of the turret is partly supported by a corbel carved with the head of St. Thomas à Becket. The date assigned to the nave and its aisles is 1404. The chancel is some forty years later. The history is evidently this, that when the nave was built, Bishop Bingham's old chancel was left standing, but this arrangement proving unsatisfactory to the munificent church-builders of those days, the rebuilding of the chancel was shortly afterwards undertaken, and the whole church brought to its present uniform appearance. The site was not made a mere *tabula rasa*, and then built upon with the temerity of our modern builders; the rebuilding was a thing of time and circumstance, and travelled from west-eastwards, instead of from east-westwards, as would have been the case with a wholly new fabric. The great west window occupies nearly the whole of the upper portion of the west front. It is of seven lights. It is subarcuated by an elliptical arch running through all the compartments. It is also transomed. The spandrels are hollowed out, but not pierced. To the south of the west door was formerly the monument, carved in oak, of Humphrey Beekham, now removed for protection to the porch beneath the tower. Humphrey Beekham, other specimens of whose carving are still extant in Salisbury, died in 1671, at the age of eighty-eight. He informs us upon his monument that it was his own work. His claim to these rudely-fashioned *alto-relievi* would hardly be contested by any considerable artist. The subjects are the Sacrifice of Isaac by Abraham, the Dream of Jacob, the bargain of that Patriarch concerning the striped and ringed cattle. Such subjects,—treated on about the same artistic level,—are common on the old iron fire-backs in Sussex farm-houses. The lower windows of the nave of the church are large, divided into four lights each by mullions, with shaftlet lights in the heads, save in the outer compartments, where a *vesica piscis*, placed obliquely, gives something of a Flamboyant character, and relieves so far the ribbed rectilinear regularity of the Third Pointed style. The clearstory windows have elliptical arches, a form not very frequently met with, but here evidently a favourite with the architect, as he has introduced it, as we have seen, into the west window. There is a good example in Middle Pointed at Over, in Cambridgeshire; there are examples in the Church Transitional to Third Pointed at Etchingham, in Sussex; and there are examples also at St. Andrew's, Halstead, Essex, which, like St. Thomas's, Salisbury, is well within the Third Pointed period. The clearstory is surmounted by a battlement without pinnacles. The interior of the Church of St. Thomas is large and dignified. The arches of the nave are each 16 ft. in width. These arches rest on square piers fluted at the angles, set with four shafts on the cardinal faces, surmounted by octagonal capitals. These are enriched with vine leaves, and in some with clusters of grapes. The mullions of the clearstory windows are carried down below the sills as so to form blank panelling, and rest upon the outer surface of the arches. The "Doom" over the chancel arch is worthy of particular observation. It was first discovered in 1819. It is supposed to have been concealed during two centuries. It was re-touched, or, as would appear, really repainted; then again covered over, and only



fully shown of late years. The Heavenly Jerusalem, at the top of the picture, appears above or is partially concealed by the figures. Above it, on the left, is seen the sun in its splendour, and on the right the star in the East. In the centre is Our Lord seated on a rainbow, with His feet resting on another of less size. At His feet are the Twelve Apostles seated in judgment. Our Lord shows the five sacred wounds. To His right is an Angel bearing the cross, which is of the tau-shaped form, whilst on his left is another angel holding in one hand the spear and sponge, and in the other the column of the flagellation. From the cross hangs the Crown of Thorns. At the right extremity of the rainbow upon which our Lord is seated appears the Blessed Virgin in a kneeling posture. At the left extremity of the rainbow is a male figure, also kneeling, with a nimbus round his head and having a long mantle. It seems not unlikely that he is one of the patriarchs of the Old Covenant, or St. John the Baptist, the last and greatest prophet of that dispensation come to judge to condemnation the unbelieving and underserving of the new dispensation. On either side angels summon with trumpets the dead to judgment. The female figures are represented as rising in shrouds from their graves, whilst on the right angels are receiving the Blessed into the Heavenly City. An angel on the left is turning from the reprobate, and apparently casting a glance of pity behind. On the left is a representation of Hell, beneath which is the inscription: "Nulla est redemptio." Here are depicted several demons and a group of figures chained together and being drawn towards Hell's mouth, represented by a dragon. With the freedom of that age,—of which there are many other examples,—one of this group is distinguished by a mitre. There is also a representation of a bishop among the Blessed. The bishop on the left hand is accompanied by two kings. This painting is apparently of the close of the fifteenth century. The figures below are described as King Henry II. with cockle-shell and pilgrim's staff and St. Thomas of Canterbury. As Henry II. made his pilgrimage, not to Compostella but to Canterbury, I fail to discover the appropriateness of the cockle-shell. The chancel of St. Thomas was restored by Mr. G. E. Street. There are three frescoes on the wall of the Annunciation, the Visitation, and the offering of the Magi; the last is much mutilated. On the beams of the roof are these inscriptions alternately,—*'Orate pro anima Wilhelmi Swayne, et Christiani Uxor[is] ejus,'* and *'Orate pro anima Jacobi, patris Wilhelmi Swayne.'* On the shields in the ceiling are first, the Swayne arms: azure, a chevron between three fleams; (2) the well-known emblem of the Holy Trinity; (3) a representation of the five sacred wounds; (4) a merchant's mark of the type which is supposed to represent the flag which accompanies the lamb of St. John the Baptist. This chapel was the chantry of William Swayne. There is a crucifix in stone on the fifth buttress from the east of the south chancel aisle. The altar tomb of William Ludlow, of Hill Deverel, who seated and painted the north aisle, butler to Henry IV., Henry V., and Henry VI., was formerly on the north side of the chancel; but it was taken down and broken to pieces at the same time that the rood-screen was destroyed. In the north chancel aisle are to be seen the remains of the staircase to the rood-loft. In the windows of this aisle are fragments of glass, one of which is called the Head of Moses. The large organ in this aisle is that which was given by George III. to the cathedral, in the character of a 'Berkshire gentleman,' Windsor being situated in that county. It is that which must have been in the mind of the novelist as being played upon by Tom Pinch on his visit to Salisbury. It was built by Green, of Isleworth. On the ancient monument, inscribed in the last century with the name of Chatty Markes, &c., merchant marks may again be seen. In the same aisle is the parish chest bound with iron bands. There is a similar one in Bridport Church near the city. In the vestry is a Mediaeval frontal, or it may be the upper part of a cope, in a frame. The subject inwoven is the Salutation, with numerous spread eagles, or two-headed eagles displayed, and fleur-de-lis. There is also a portion of a vestment in a frame. There is also a small modern figure of St. Thomas à Becket. In the inner vestry there are stained-glass

representations of St. Thomas à Becket, St. Christopher, and a third figure, greatly obliterated, but which is described as our Lord in the act of benediction. In conclusion, I may remark that, now that St. Nicholas' Church exists as a mere fragment, the cathedral of Salisbury and the parish churches stand not in a competition that would be fruitlessly maintained on the part of the latter, but in sharp contrast. The destructive hand of Wyatt has contributed to this result by sweeping away some minor portions of the cathedral. We have now the Early Pointed in its perfection, and the Late Pointed is sufficiently adequate representation side by side in the cathedral and parish churches of this interesting city, and the eye is educated by the contrast between them, and if it learns to prize yet more highly the beauty of the former, yet neither does it despise those later sacred houses, of which St. Thomas's is the chief."

In the afternoon there was a carriage excursion to Britford and Downton, taking Longford Castle en route, and returning via Trafalgar. At Britford and Downton the churches were visited, and at Downton the "Moot" was inspected, under the guidance of Mr. E. P. Squarey. We will say more of this and of the subsequent days' proceedings in our next.

On Friday there was an excursion to Bradford-on-Avon, where the Tithe Barn and the Old Bridge were visited, the party afterwards proceeding to Kingston House and the Saxon Church. In the afternoon South Wraxall Manor House, and the Manor House and Church of Great Chalfield were visited. In the evening there were Sectional meetings. In the Architectural Section, papers were read by Mr. C. E. Ponting on Edington Church, and by Mr. E. Green (on behalf of its author, Mr. J. A. Gotch) on "Longford Castle and Longleat." This paper we are enabled to print on another page.

Saturday was devoted to a visit to Wadour Castle, Tisbury Church, Wilton Church, and Wilton House.

In the evening, before the Historical Section, Mr. J. S. Udall read an interesting paper "On Dorset Seventeenth Century Tokens." Incidentally referring to the national collection of coins and tokens at the British Museum, he said,—While I am upon the subject of our national collection of tokens, I hope I may be pardoned when I say that I think it is a great pity that wider powers should not be given to those having the care and superintendence of our coin departments in dealing with private collectors and others wishing to exchange or purchase duplicates from them. I understand that it is the practice for them to be allowed to accumulate, and then to be sold wholesale to the dealers. The authorities are not allowed to exchange or sell privately as occasion offers. I could more than once have offered a very liberal exchange of duplicates to the public authorities, but have been met by the above-named rule. It needs very little discrimination to infer that considerable advantage would result to our public collections were this rule a little relaxed and a little more latitude in this respect allowed to the heads of those departments. I understand that as far as the Bodleian collection is concerned, an attempt has been recently made to pass a new statute to that effect, though as yet without success. It is to be hoped that those having authority over the disposition of our public collections will be led to deal more liberally with the coin-collecting section of the public; it will assuredly be as much to the ultimate advantage of the national depositories themselves as it will be a decided boon to private collectors.

On Monday, Boyton Church and Manor House, Scratchbury Camp, Heytesbury Church, Knook Church, and Heytesbury House were visited; and on Tuesday carriages left with a party of about sixty for a long ride across the Wiltshire Downs to Farnham Museum, passing en route Bockley Dyke and Ackling Ditch. They then proceeded to Rushmore, where they were entertained by the President of the meeting, General Pitt-Rivers. After inspecting some recent excavations, near Rotherley Wood, of a Romano-British village, they visited Ferne, and subsequently returned to Salisbury from Tisbury Station.

We will next week conclude our report by giving amplified notes on some of the buildings and antiquities which we have only had space to name in the foregoing lines.

## ARCHITECTURE AND ARCHITECTURAL TOPICS IN WILTSHIRE.\*

PREHISTORIC architecture, illustrated so magnificently in the county of Wiltshire in the mysterious circles of Avebury and Stonehenge, and the standing stones, cromlechs, and distavaens which stand its downs, as well as in the British camps and villages which so abundantly crown the hill crests, belongs to the section of Antiquities and does not enter into our present purpose. Architecture, properly so-called, begins for us with the so-called Anglo-Saxon era,—a convenient and intelligible if not strictly correct term. Of this era in ecclesiastical architecture, the county of Wiltshire has several examples to show, one of which is certainly unsurpassed in value by any building of its age in England. I mean, of course, the old church at Bradford-on-Avon, rescued from desecration and restored to its sacred purpose by one whose premature death has inflicted an irreparable loss upon the archaeology of Wiltshire generally, and of Salisbury in particular, never more acutely felt than at our present gathering, the late Canon Rich-Jones. In this little building,—which, in the words of one who, though happily he is still alive and likely to live for many years, and is not so very far from us, is, unfortunately, not with us, Professor Freeman, is "probably the most ancient unaltered church in England,"—we may safely recognise the church erected by St. Aldhelm at the beginning of the eighth century, and mentioned by William of Malmesbury as standing in his day, as it still stands in our day, at the Broad Ford over the Avon,—*"est ad hunc diem eo loco ecclesiola quam ad nomen beatissimi Laurentii (Aldhelmi) fecisse predictum."* All qualified judges who see it will agree that there is only one period at which a building so remarkable both in its outline and in its detail could have been erected in England, and that the period named by Malmesbury. There are other examples of the same rude pre-Norman style in the remarkable Church of Britford and at North Burcombe, and though less certainly at Manningford Brosses, where the east end is semicircular instead of square, as is usual in English churches anterior to the Norman Conquest, and at Avebury, where Mr. Ponting has discovered and replaced a remarkable series of small circular clearstory windows, unique in character. As far as I know, no instance of the characteristic Anglo-Saxon tower, such as those at Earls Barton, Barton-on-Humber, Barnack, and in the city of Lincoln, occurs in Wiltshire.

We hardly need to be reminded how intimate is the connexion between the character of our Mediaeval churches and the geological formation of the district to which they belong. The nature of the local building-material rules the architecture. There is an exception to the law where, as in parts of Lincolnshire and the adjacent low-lying district, water carriage was easy and inexpensive. Here we find an abundance of noble churches, excellent in their stonework and unstinting in the richness of their design, in a country which does not produce building stone of any description, the whole being brought on rafts or in barges from the quarries of Barnack and Ketton. But where there was no such facility of transport the builders were entirely dependent on local material, and the character of the churches, both in form and detail, varies accordingly. The reason why we find round towers so common in Suffolk and parts of Norfolk is that they could be constructed of flint alone, which was abundant, and had no angles to be strengthened with quoins of stone, which was rare. The same causes led to the invention of the elaborate patterns of black flint set in tracery of white stone, which are so beautiful a feature in the East Anglian churches. The variety of light and shade produced elsewhere by deeply-out mouldings and recessed panels, here, where stone was scarce and thin and had to be used economically, was ingeniously given by the contrast of colour on the same plane. The thatched roofs speak of a swampy district, where slates were not and tiles were dear, while sedge and reeds might be had for the cutting. Want of stone and abundance of pebbles has also given us the boulder-built churches of the Sussex seaboard, while the wooden bell-turrets and shingled spires of the same county may be

\* From the Address given by the Rev. Proctor Venables, F.S.A., as President of the Architectural Section of the Salisbury meeting of the Royal Archaeological Institute, elsewhere referred to.



traced to the wide-spreading forests which, until the iron works which once had their seat there had consumed them all, and thus, fuel ceasing, put themselves out, covered its surface. The unmanageable texture of the Cornish granite is answerable for the coarseness of the ecclesiastical architecture of that county, while the fatal softness of the red sandstone of Cheshire and Staffordshire has led to an indulgence in an excess of ornamentation which has proved only too transient.

If now we turn to Wiltshire, we find the same law dictating the character of the churches. Wherever good stone is abundant, and as the masonry of Salisbury Cathedral testifies, no county in England supplies better, as in the northern part and in some districts of the south west, the churches are usually large, lofty, and carefully designed, much pains being taken,—as is noticeable in the noble chancel of Amesbury,—in the ashlar of the walls, and in the exterior generally, on which a good deal of ornament is often bestowed. Where, on the contrary, as in the southern and eastern districts, the only building material is chalk, clunch, and flints, with a small amount of green sandstone that will serve for windows and doors and dressings, the churches are diminutive and homely, with wooden belfries or low square steeples. These materials are often arranged in chequers of stone and flint, producing a very pleasing effect. This mode of walling is very common in Wiltshire. Many of these smaller churches possess features of considerable interest, more especially those which have escaped the hand of the restorer,—which has, alas! been very busy in Wiltshire,—or those on which that hand has been laid lightly, and has been guided by the first principle of all restorations, to preserve and maintain and never to destroy. Norman doorways and chancel arches are by no means infrequent, and are sometimes richly ornamented, while a considerable amount of good Early English work is to be found, often plain and simple, but always pleasing. These smaller and humbler churches often get passed over by the tourist, but they will almost always reward a visit. Even when their architectural features are of the plainest, there is an undefinable something in their shape, and colouring, and position, and the way in which they group with the cottages which are scattered about them, and the trees out of which their little belfries peer, on which the memory dwells with more satisfaction than on many a more stately edifice.

It is observable that, while in some large parts of England the cruciform plan is hardly found at all, churches of this form are of somewhat frequent occurrence in Wiltshire. Some of these are on rather a large scale and of considerable dignity, such as Edington, Westbury, Amesbury, Tisbury, Heytesbury, Downton, Bishopston, All Cannings, Bishop's Canning, Great Bedwyn, and several more, while others are small and unpretending. The nave at least is commonly provided with aisles, but the noble Early English church of Potterne, one of the finest in the county, has none, and the churches of Winterbourne-Stoke, and the early church of Britford, are also aisleless. A singular line of cruciform churches is found in the Vale of Chalk, where Bishopston, Broad Chalk, Bower Chalk, Alvediston, and Berwick St. John in succession exhibit the same plan. A central tower is essential to the completeness of the outline of a cruciform church. This is seldom wanting in the Wiltshire cross churches; and in some, as at Chilmark and Bishop's Cannings, where it is crowned with a stone spire, at Potterne, Westbury, St. Sampson's Cricklade, and others, it is of considerable dignity. Corsham Church had till recently a central tower, but when it was restored by the late Mr. Street he pulled it down and built a new tower and spire in a different position. No doubt he felt that there were good reasons for his action, though we cannot but regret it. While speaking of towers it should be mentioned that two churches near the N.E. border, Purton and Wanborough, present the unusual feature of two steeples, one at the west end of the nave and the other in the centre. This arrangement, it will be remembered, is also found at Wimborne Minster. There is a reason for this arrangement there, the western tower being the belfry of the parochial nave, that at the intersection belonging to the Collegiate Church. I am not aware that any satisfactory explanation can be given of its occurrence at Purton and Wanborough.

Stone spires, though not numerous, are not very uncommon. Passing over that of Salisbury Cathedral, confessedly without a rival in England, and for the union of simple majesty and exquisite grace almost without a rival in the world, these spires do not, generally, take the first rank for height or beauty. There are, however, good examples at Chilmark, Bishop's Cannings, Trowbridge, and Lacock. Pack-saddle roofs—an unusual form in England—are found at North and South Wrexall and at Winsley. A bell-turret, crowned with a spirelet of much elegance, is rather frequent in the north-west corner of the county, as at Acton Turvill, Sutton Benger, Corsley, Corston, Biddeford, and Great Chalfield. The small wooden bell-turrets of the south-east have been already referred to. They are often very picturesque.

Stone groined roofs, though far from being common, are less uncommon in Wiltshire than in some other parts of England. The Norman chancels of St. John's and St. Mary's, at the Devizes, have good vaults of that date. Early English and Decorated vaulting is found at the beautiful churches of Bishop's Cannings, Urchfont, Steeple Ashton, Bishopston, and Marlborough, St. Peter's. The nave of Steeple Ashton is groined in wood, the ribs springing from stone shafts. At Edington there are curious plaster ceilings, of late date, which deserve notice.

Taking a general survey of the county, we find Norman work very abundant, though not usually of a very high order. The humble village churches frequently contain a door or a window, or a chancel arch of that period. Great Durnford is a typical example, and the fabrics of a large number, though with but slight architectural traces of their date, evidently belong to this epoch. We have examples within a short distance of Salisbury. Berwick St. James preserves its Norman doorway, while we have doorways and other remains of Norman work in the churches of Winterbourne Stoke, Stapleford, South Newton, and Little Langford, all very near together.

The most conspicuous Norman building in Wiltshire is the fragment of the Abbey Church of Malmesbury. Much of it, however, is late in the style, and belongs rather to the Transition period. The doorways are well known. The outer south door, with its interlaced bands and series of Scriptural medallions, is unsurpassed for richness of decoration by any door in England. We have fine examples of Late Norman in the groined chancels of the two churches at Devizes, the work of the warlike Bishop Roger, the greatest builder of his day. The churches at Corsham, FRESHUTE, and several others, preserve their Norman arcades; and at Melksham, amid many undesirable alterations, we have enough left to make out the original cruciform Norman church.

Passing to Early English, in the unrivalled cathedral under the shadow of which we are meeting we have the most perfect example of the style on its grandest scale to be found in England. As is natural, its influence spread, and we find village churches displaying the same purity of design, harmony of proportions, and dignified simplicity of outline, of which the mother church set the example. Potterne, which may very probably be ascribed to Bishop Poore, the founder of the Cathedral, may not improperly be called Salisbury Cathedral in miniature. Bishop's Cannings, though with later alterations which mar its unity, is also a beautiful example of the style, which we find also in great excellence in the chancel of Great Bedwyn, at Collingbourne, Kingston, Boyton, Purton, Downton, Amesbury, and many other places.

The fourteenth century seems to have been less prolific in church building in Wiltshire than elsewhere. There is, it is true, no want of Decorated architecture in windows, doors, and in portions of churches, but there are fewer entire churches in this style than in the midland counties. The chancel of Downton is a good example of Early Decorated. We have rich Flamboyant work in the transepts of Great Bedwyn, and in those of Lacock; we must mention also the chancel and transepts of the very interesting church of Bishopston, especially the south transept, with its curious external cloister. At Boyton the Decorated work is earlier in date, and very good.

The transition from Decorated to Perpendicular is exemplified in the very remarkable church of Edington, now under careful restoration by Mr. Ponting, one of the most important

buildings we possess for the history of English architecture, in which we trace the beginnings of the new style,—the special growth of English soil,—and watch the flowing curves of the tracery stiffening into rectilinear uniformity. Perpendicular not improbably had its rise in the Abbey of Gloucester. We find the earliest-dated instance of its employment in the south transept of the cathedral, soon after which it appears in the remodelling of Winchester Cathedral, commenced by Bishop Edington, 1345–1366, by whom it was adopted in the noble collegiate church founded by him in his native village as a thank-offering, which is deservedly one of the chief glories of Wiltshire. The first stone of this church was laid in 1352, and it was dedicated in 1361,—dates of some importance in the origin of the Perpendicular style.

It would occupy too much of your time to dwell on the Perpendicular work in this county, as everywhere there is hardly a church which does not exhibit some trace of the great wave of rebuilding and alteration which passed over the country as the Gothic style was losing its life and freedom and gradually giving way to the newly-introduced Classical revival. The stately church of Mere, with its noble west tower, may be mentioned as one of the best in South Wilts. Westbury deserves notice as an example of a church originally Norman recast in Perpendicular, much in the way Wykeham treated Winchester Cathedral. The nave is very stately, and the aisles show a not very usual feature in the transverse stone arches, with interpenetrating mouldings, which cross them from north to south. The masonry throughout is of great excellence. While at Westbury we have an adapted building, and at Mere a mixed building, at Trowbridge we have an example of a Perpendicular church raised from the ground as one design without any admixture of earlier styles, by the munificence of the inhabitants, in 1475. It is a typical church of its date, with a western tower groined within and lofty stone spire and north and south porches, and a very beautiful open-timber roof, the whole deserving Leland's description as "lightsome and fair." The font is lofty, carved with the emblems of the Crucifixion. Steeple Ashton, built between 1480 and 1500 by the clothiers, is also a very noble Perpendicular church, exhibiting well-finished masonry of the highest order of excellence. The clearstory is lofty, the arcades lofty and imposing, the windows large and good. Both the chancel and the nave are groined, the former in stone, the latter in wood. St. Thomas's, Salisbury, though late and rather coarse, is a very good example of a rich Perpendicular town church. With its light arcades, very wide aisles, and low timber ceilings, it supplies a model the designers of our town churches might do well to follow. I would except the clearstoried chancel, which is of somewhat excessive length for modern requirements. Perpendicular work of peculiar richness is to be found in the north-east angle of the county, sometimes in the fabrics of the churches, sometimes in appended chapels and chantries. The nave of Lacock is a sumptuous building, and the Lady-chapel deserves notice for its fan-traceried roof and general richness of character. The Baynton Chapel, at Bromham, is also a very gorgeous example of Late Gothic with a richly-pannelled ceiling. In the same district a rich canopied niche crowning the apex of a gable is by no means infrequent; we have good examples at Lacock and St. John's, Devizes. The chancel and tower of Calne, rebuilt after the fall of the older tower in 1645, is a very interesting specimen of the survival of the Gothic style, of which we have such interesting examples at Oxford and Cambridge.

The monastic remains of Wiltshire are scanty. The great religious foundations of Wilton, Amesbury, and others have entirely passed away, leaving but small fragments of their once extensive buildings. At Malmesbury, a large portion of the nave is still standing, and a vaulted crypt, under what may have been the abbot's house, and some other relics, are built up in an Elizabethan house. At Bradenstoke, in an Elizabethan house. At Bradenstoke, the refectory, a beautiful example of Early Decorated work, is preserved, with its vaulted undercroft, prior's house, and domestic offices. The remains of Monkton Farleigh are of Early English date, but are very insignificant. The most important and best preserved monastic building in the county is the nunnery at Lacock, founded by Ela of Salisbury, in memory of her



husband William Longsword. It is too little known, for it exhibits one of the best existing examples of conventional arrangement, substantially unchanged. The cloister, with its three beautifully vaulted alleys of good Perpendicular design, is surrounded with the usual monastic buildings, on a small scale but of excellent character. The church on the south side has entirely passed away. Opening out of the east walk we have in succession the sacristy, the chapter-house, the alms, and the calefactory or day-room, all of Early English work, with the Perpendicular dormitory above. The refectory occupies the north side, standing on a vaulted undercroft, with the kitchen at the west end. The whole building is of the greatest interest, and it is to be regretted that it lies too far away for us to visit it on this occasion.

If the remains of monastic architecture in Wilts are but scanty, the remains of military architecture are scantier still. The great castles of the county which played so important a part in English history, have completely vanished, leaving only their huge mounds and earthworks, with some fragments of walls and vaults to testify to their former existence. I may mention Old Sarum, Devizes, Marlborough, Castle Combe, and Ludgershall. The only castle of which the walls still stand is Wardour, hexagonal in plan, a good example of Early Perpendicular, when the military castle was passing into the nobleman's residence.

In domestic architecture few counties are so rich as Wiltshire. In the northern part of the county nearly every parish can show specimens of the smaller manor-houses of the fifteenth and sixteenth century, with long gabled front, two-storied porch, hall and solar, lighted by stone mullioned windows. There are also several examples of the larger and more stately mansions, especially those of South Wraxall, with some later adaptation; Great Chalfield, and the Duke's House at Bradford, all of which we are to inspect, Norrington, Charlton, Corsham, Littlecot, and many more. The still larger and more magnificent houses of Wilton, Longleat, Longford, and others, have few rivals in any part of England. The town houses of Salisbury, the Audley Mansion, and the Church House, the Hall of John Halle, and others more or less mutilated, afford an excellent illustration of the domestic life of our civic forefathers.

Naturally the examples of later architecture are more abundant, but earlier examples are not wanting. The fourteenth-century houses at Stanton, St. Quentin; Place House, Tisbury; Woodlands, Mere; and the Barton Farm, at Bradford, with its noble fourteenth-century barn, deserve the most careful examination.

I pass now to notice the chief architectural events connected with archaeology during the past year. These have been comparatively few. Commercial and agricultural depression, by drying up the springs, have retarded the work of restoration, and there are few extensive works of that nature to record. The most important work is that still in progress, and likely to be in progress for many years to come, at the Abbey,—now the Cathedral Church,—of St. Albans. While desiring to do the fullest justice to the constructional skill, wide knowledge, and, above all, to the munificent liberality of Lord Grimthorpe, it is necessary in the cause of true archaeology and of architectural history to record a firm protest against the mode in which his lordship is dealing with that venerable fabric (applause). It is true that he has, at great cost, ungrudgingly rendered, secured the stability of a decayed and tottering fabric, and that by his generosity one of our grandest architectural monuments will be preserved from ruin and a cathedral given to the new diocese equal in structural excellence to that of any other diocese in England. For this Lord Grimthorpe cannot be too highly commended. But every one to whom the historical character and structural continuity of our churches are dear must deplore the rashness with which his lordship is wiping out the original features of the edifice and replacing them with architecture of his own design, which, whatever its merits,—a topic on which I do not wish now to enter,—has no real affinity with the fabric, it being entirely unlike anything which ever did or ever could have stood there. The west front has been finished for a year or two, and does not come within our limits, but during the past year the south transept gable has been entirely

demolished and a new one erected. The old gable end,—a portion of the veritable old St. Alban's,—was Norman, with a round turret of interesting character at the west corner, and a large Perpendicular window, inserted by Abbot Whet-hampstead. At the base were the very curious, elaborately-ornamented arches of the Norman style. All these are now of the past. What the English eye has been familiar with for centuries is gone, and we have in its place an entirely modern building, designed, it is true, after the best models of ancient art, but falsifying the history of the building. The gable now presents a series of five gigantic lancets, as big or bigger than the celebrated "Five Sisters of York," flanked by turrets, square instead of round, finished with conical caps, the arches of the slype being nailed up as it were, like hawks or wassels on a barn door, on the wall below, appendages to not integral parts of it. A correspondent writes:—"The whole south front of this transept will probably be new, the effect good, the introduction of the slype arches clever, the effect of the high roof satisfactory, but . . . I fear the north transept will soon be similarly transmogrified." Once again, in the name of the Institute, I may be permitted to raise a serious protest against such a treatment of an ancient building (applause). It is endeavoured to be justified by reference to the similar mode in which the earlier builders treated the work of their predecessors, which they pulled down and altered unscrupulously to replace it by work of the reigning fashion. But at that time architecture was a living, growing art. The new work belonged to its own age and was its natural growth, now all we can do is to copy and adapt; with what success I leave it to those who visit St. Albans to say.\* We have a new well-built, carefully-designed, and attractive design,—a new lamp, bright and burnished, in place of an old lamp, battered, broken, and dingy. Some may prefer the new lamp; I prefer the old one.

Another work is proceeding in the same Cathedral in a far different and more reverential spirit,—the restoration of the statuary of the long-impooverished reredos, by the munificence of Mr. Henry Hucks Gibbs. Everything has been done here, with due respect to ancient lines and historical precedent by a true architect, Mr. Arthur Blomfield.

There is not much other cathedral work to record. At Peterborough the central tower has been carefully rebuilt in its old form, by Mr. Pearson,—happily preserving the east and west pointed lantern arches. The want at present of corner turrets,—those taken down, it will be remembered, were late additions by Dean Kipling,—gives the tower a bald, stunted look. We wait with anxiety to see how it will be completed. It is well known that Mr. Pearson desires to add another story to the very low tower. Until the point is finally decided, the turrets are necessarily suspended. No steps have yet been taken for the restoration of the choir.

At Winchester, the investigations of the energetic Dean have been rewarded by the discovery of the foundations of what is probably the earlier church, beyond the present north walls. The Norman crypt has also been opened out, and several ancient interments brought to light. The statues are being replaced in the reredos. We are beginning to perceive that tenantless niches are as unmeaning a decoration as vacant picture-frames.

At Lincoln, excavations in the retro-choir have revealed the foundations of the semi-hexagonal apse, with radiating chapels, which was the original termination of St. Hugh's Minster, removed for the erection of the Angel Choir,—the saints' building being destroyed to recover the saint's shrine. The external effect of this east end, though rather crowded, must have been of great singularity and beauty.†

The cathedral of Manchester,—a mere stately parish church of the latest style of architecture, without any pretensions to the minster type,—has undergone much rebuilding of its walls, which were considerably decayed, and other much-needed improvements. But a real cathedral at Manchester is still wanted.

\* We must entirely differ from the line taken by Precentor Venables here, and regret that he should have taken up a position so open to attack. The real objection to what is being done by Lord Grimthorpe at St. Alban's, as we have said over and over again, is not that it is new design, but that it is bad and clumsy design, carried out by incompetent hands.—Ed.

† For an article, with plans, fully describing these discoveries, see the *Builder* for May 21 last, pp. 755-58.

Decided steps have been taken to supply this want at the sister city of Liverpool during the past year by the cathedral competition. Out of the large number of designs submitted, three were selected by the committee, those of Mr. Brooks, Messrs. Bodley & Garner, and Mr. Emerson, and submitted to Mr. Christian for adjudication. Of these, Mr. Christian, while highly commending the other two, selected that of Mr. Emerson as better fitted, in its plan and arrangements, for the requirements of a modern cathedral than the others, in which the old cathedral ideas were more strictly followed. I do not think that Mr. Christian's verdict has met with general acceptance (hear, hear). Mr. Emerson's plan is certainly one of great merit. The value of a spacious domical area for the reception of large congregations is proved by the cathedral of St. Paul, nor can any one question the beauty of a cupola, uniting dignity and grace, as the central figure of a great church. But the idea is far superior to its carrying out. The style chosen,—I may rather say invented,—by Mr. Emerson is far from attractive, and the ornamentation is in some cases almost grotesque. I could only consider it a national misfortune if the design were carried out in its present form (hear, hear.) To render it at all worthy as a monument of the nineteenth century the whole must be redesigned; the skeleton reclothed in more comely attire. As architectural studies, the severe Early English of Mr. Brooks, and the rich, luxuriant Decorated of Messrs. Bodley & Garner, produce far more satisfactory results. Mr. Brooks's design is specially admirable (hear, hear.)

While Liverpool Cathedral still remains, as one may say, in the clouds, that of Truro, due to the exquisite genius of Mr. Pearson, is all but completed,—at least the eastern half of it,—and will be consecrated before the close of the year. Our generation may be congratulated on possessing an architect capable of producing so beautiful a work, instinct in every part with artistic life, not unworthy to take rank,—especially when completed,—with the best of the smaller cathedrals of our country. *O si sic omnes!*

The same great architect has been intrusted with the re-erection of the destroyed cloister at Exeter, with a library over the southern wall. Sufficient indications of the original work remain to guide Mr. Pearson in his design.

Mr. Pearson has also restored the Abbey gateway at Bristol Cathedral. He has created a very beautiful structure, and we cannot doubt that so conscientious an architect has found satisfactory evidence for all that he has done. But the result has been that the old building has put on a new face, which looks strange to those who knew it in former years. It is earnestly to be hoped that Mr. Pearson will absolutely forbid the rechielling of the elaborate Norman mouldings of the well-known archways, which those who have the conduct of the work are contemplating. Such an operation would entirely destroy the historic value of these very remarkable archways, and transform them, for all practical purposes, into nineteenth-century work.

One of the most important works of restoration carried out during the past year has been that in the Priory Church of St. Bartholomew's, Smithfield, under the able and conservative hands of Mr. Aston Webb. Through the energy of the late (alas! that I should have to say the late!) incumbent, the Rev. W. Panckridge, who scarcely lived to see the completion of the great work on which he expended his vital strength, and the munificence of the patron and others, the Lady Chapel has been purchased and rescued from desecration, the Norman apse restored, and the whole church re-roofed and refitted. Happily, the interior walls of the church have not been touched, save with a broom, and still retain the rich colouring which time has imparted to them. The church still looks old; a sadly rare case in a restored church. This is, however, only the commencement of a work of restoration the successive steps of which we shall hope to be able to record in future years.

Time forbids me to speak of other minor works. I can barely refer to the new buildings rising on the west side of Westminster Hall. One must not call them "restorations," as there was nothing to indicate more than the general plan and arrangement of what preceded them. On these much difference of opinion has been expressed. Let us hope the result will



justify the soundness of Mr. Pearson's judgment. Waltham Cross is, for the second time in my own memory, under the restorer's hand. We cannot hope that, after such repeated demolitions and re-constructions, much more of the old structure will be left than was left of the traditional Irishman's knife.

I may conclude with an expression of thankfulness that after a somewhat hard fight the Stone Bow at Lincoln, crossing the High-street, much as Temple Bar used to cross Fleet-street, with the Guildhall over it, has been rescued from impending destruction, and has been admirably restored by Mr. Pearson. The changed policy of the municipality and citizens of Lincoln with regard to the architectural remains of their town, which we rejoice to trace also in every part of England, is one among many satisfactory evidences of the excellent work done by the Institute, and other kindred societies, in spreading archaeological knowledge, and awakening a feeling of reverence for and interest in the monuments of the past, which in our own memories was so lamentably deficient. We may congratulate ourselves that we have not lived in vain.

#### LONGFORD CASTLE AND LONGLEAT.\*

LONGFORD CASTLE is interesting in many ways. Its curious plan,—that of a triangle, with a tower at each angle,—the various circumstances connected with its origin, and its fine collection of pictures, make it interesting to those wholly unacquainted with architecture; while to those who practise that art, and to all who (like the company present to-day) are given to the study of archaeology, the fact that we have the original drawings of the castle preserved in the Soane Museum is of the highest interest.

Let us first recount the building of the place according to popular tradition. The Manor of Longford belonged in the middle of the sixteenth century,—that is, in the time of Philip and Mary,—to a family named Cervington, the last of whom was a man of extravagant and dissipated habits, so much so that in course of time he was obliged to mortgage his estate to one John Webb, of Salisbury. John Webb, being unable to get the interest of his money foreclosed in the year 1573, and the last of the Cervingtons found himself ejected from the home of his ancestors, and wandered about the estate in a condition of great misery. John Webb, who had turned him out, shortly afterwards sold the estate to Sir Thomas Gorges, a son of Sir Edward Gorges, of Wroxall, co. Somerset, and it is said that the unfortunate Cervington, who still lurked about the place, used to make his way into the house, to the annoyance and terror of the servants. On one occasion the wild and miserable man was taken before Sir Thomas himself, and, on being questioned as to who he was, told his name, and added that a Cervington was at least as good as a Gorges. Sir Thomas, moved by his sad plight, gave orders that thenceforth he was to be treated with attention and respect; but the unfortunate man shortly afterwards died miserably under an elm tree in the Coney-garth, a victim to his own improvidence.

The house thus invaded by the wreck of its former master could not have been that which we now see, for Cervington was ejected in 1573 and the foundations of the present building were not begun till thirteen years later, in 1586, and it is incredible that the poor man's misery could have been prolonged through all those years. Sir Thomas Gorges had married Helena, the widow of William Parr, Marquis of Northampton and brother of Katherine Parr, who was so fortunate as to survive Henry VIII. Lady Gorges was a Swede by birth, being the daughter of George Wolfgang Snachenburg, and she had come over to England in the train of Princess Cecilia, daughter of Eric, King of Sweden, all of which history may be deciphered by the curious on her tomb in Salisbury Cathedral. When her second husband, Sir Thomas, thought of building himself a new house, she persuaded him, it is said, to build it after the model of a castle near her own country,—the Danish castle of Uranienburg in the Sound, which had been designed by Tycho Brahe. Sir Thomas complied with her wishes, but the site chosen for the building swallowed up the greater part of his fortune in

foundations, and the work threatened to be abandoned, when by a fortunate chance one of the galleons in the Spanish Armada was wrecked near Hurst Castle, of which Sir Thomas was Governor. His lady successfully begged the hull of the queen, and this was found to contain enough treasure to complete the whole structure in the year 1591, the total cost being about 18,000*l*.

Such is the popular version of the building of Longford. How far it is authenticated, and how far it is mere tradition, I am unable to say. Let us now turn to the information we have in black and white, namely, the drawings preserved in the Soane Museum.

The drawings are by an architect named John Thorpe, who was concerned in a very great number of houses at this period, among them being Burleigh House, by Stamford Town, Kirby, Holdenby, all in Northamptonshire. Burley-on-the-Hill, in Rutland; Audley-End, in Essex; Amptill, in Bedfordshire; Holland House; Slougham-place and Buckhurst House, in Sussex; Losely House, in Surrey; Somerhill, in Kent; besides many others. All his drawings, bound into a book and numbering over 250, are preserved at the Soane Museum, in London. The drawings relating to Longford are on folios 155, 156, 158, and consist of a ground-plan, front elevation, and an elevation of the garden side. The ground-plan shows a triangular building with a triangular court in the centre, a round tower at each external angle, and a circular staircase at each angle of the courtyard. These features may be found to-day, but the courtyard has been roofed over and made into a fine saloon. The interior generally has been modernised, and there has been a good deal added to the house, so that it is a very different place from what it was when first built. It is certain, however, that Thorpe's ground-plan was not carried out as drawn, and we may fairly regard it as a preliminary sketch. It is otherwise with the elevation. This does not agree with his plan, but it agrees in all but a very few particulars with a view of Longford, drawn by Robert Thacker, showing the castle "repaired and beautified by Henry Hare, Baron of Coleraine, in the year 1650." It agrees so minutely that there is no doubt that this elevation of Thorpe's represents the house as it was originally to have been built, although a few modifications were introduced as the work went on.

The front that is to be seen at the present day has evidently been rebuilt, for it differs in essential particulars of arrangement from Thorpe's elevation and Thacker's view; but apparently nearly all the old features have been used again, including the balustrades, arches, pilasters, cornices, and strings. This opinion, arrived at by comparing these old views with the present structure, is borne out by information derived from the clerk of the works, who says that the stone and mortar of the arcaded part differ from that of the tower, and that the floor of the arcaded part does not rest on the tower wall, but is supported by posts and iron bands.

The conclusions, therefore, that we may come to are these:—The tower to the right of the entrance is the original work, so is also the other tower on the garden side. The entrance-front itself has been rebuilt, with the original features, arranged in a somewhat different manner. The garden side between the two towers has been almost entirely rebuilt. The interior has been re-arranged and modernised, while a large part on the north-eastern side is altogether new.

Assuming, as we may fairly do, that John Thorpe was the architect of Longford, where did he get his idea of the curious triangular plan? Did he copy the castle of Uranienburg, as stated, or did he design it himself? His drawing certainly looks like a preliminary sketch plan; it is partly in ink and partly with pencil notes. On the front side it says "Court here," on the garden side it says "Garden here," and on the third side "Orchard here," all of which imply that the site was already fixed. The fact that it is a quaint and fanciful plan is in favour of its being Thorpe's own design, for his MS. book abounds in fanciful plans, and on fol. 161, that is, in close proximity to this plan of Longford, occurs another plan on the triangular system, but more matured, and a further development of the Longford idea. There is, however, no name to it, and no evidence of its ever having been

carried out. If, on the one hand, an examination of Thorpe's designs leads us to the conclusion that he might very well be the author of Longford, on the other, there must be some foundation for the statement that the design was brought from Denmark; and if evidence could be given of this, it would throw a very interesting light on the source of some of Thorpe's ideas. But, whatever conclusion we adopt, we must not imagine that this is a solitary specimen of fanciful design imported from abroad. The air of the latter part of the sixteenth century was full of quaint conceits, some of which got embodied in stone, and among them was Longford. Its date is 1591. In 1593-5 Sir Thomas Tresham was building at Rushton, in Northamptonshire, his Triangular Lodge, a very much smaller building, but one containing many more quaint conceits. It is an embodiment in stone of the idea of the Trinity,—three in one. Curiously enough, on Thorpe's plan of Longford, within the triangular courtyard, is a device emblematic of the Trinity. But the Triangular Lodge was not the only emblematic building erected by Sir Thomas Tresham. About five years later, that is, in 1600, he was building Lyveden New Building, which is a cross on plan, and in all its parts symbolises the Passion. Plans of Lyveden are also among Thorpe's drawings, so that a very close relationship is established between all these quaint and curious buildings.

Longford Castle, therefore, may be taken as an example of one type of planning prevalent in Elizabeth's reign, when the object of those concerned seemed to be not so much to promote the comfort or convenience of the house as to embody some sentiment, or to work out some quaint idea to which all notions of convenience had to bend. The appearance of the plan on paper was all that was cared for. At Longleat we shall find another type of building, much less quaint but more reasonable, in which symmetrical magnificence was aimed at, but almost equally at the cost of convenience. You will, no doubt, have noticed that in the middle gable over the front entrance is carved a ship in full sail. Has this any reference to the legend of the Spanish galleon? And, if so, was it placed there in commemoration of that circumstance, or was the circumstance invented in consequence of the ship being there? On Thorpe's elevation the arched recess is shown, but not the ship; it appears, however, on Thacker's view in 1650. With regard to the rest of the detail, it is of the period; but a close examination will show that the sections of the strings and cornices are by no means orthodox, though they are very similar to those on other buildings attributable to Thorpe.

Longford Castle, therefore, in spite of the alterations it has undergone, throws no little light upon a phase of architecture of great interest, and one which was the result of the most active period of house building which the country had ever seen previous to the Victorian era.

#### Longleat.

Longleat is an excellent text upon which to found a discourse on the Domestic Architecture of the Renaissance, but before doing this let us see what we know with regard to its history. Canon Jackson has already busied himself with this subject, and is in a far better position to speak on it than any one else, and it is therefore with great diffidence that I approach it.

The house was begun by Sir John Thynne,—who was the founder of the family and the purchaser of the estate,—in 1567, as shown by a book of building accounts which begins on the 21st of January, 1567, and continues till the 29th of March, 1578, during which time 8,016*l*. 13*s*. 8*d*. was spent. Losely House, near Guildford, was building about the same time, viz., from 1561 to Michaelmas, 1569, during which time only a little over 1,600*l*. was spent; but Losely House is not so large as Longleat. The 8,000*l*. sufficed to cover the cost of the outside of the house, except the west front and part of the inside court, but the exact extent it is difficult now to determine. Sir John Thynne died in 1580, leaving his son, the second Sir John, to carry on the work. Under his directions the balustrade that crowns the walls, many of the chimneys, and some of the towers, were built, and the screen in the hall and much of the panelling were also finished. The work was taken up by Sir John's successors, one of whom employed Sir Christopher Wren, and was continued for a great

\* A paper by Mr. J. Alfred Gutch, F.R.I.B.A., read at the Salisbury meeting of the Royal Archaeological Institute, as elsewhere mentioned.



number of years. Finally, Jeffrey Wyatt came upon the scene early in the present century and blotted out all history from the inside, and from the outside too, except from the south and east fronts. It is, therefore, from them that we must learn all that Longleat has to teach us. But, before proceeding to this lesson, let us see what we know about the actual designing of the building.

Longleat has been attributed to John of Padua; to John Thorpe, who is erroneously supposed by some to be the same man under an English name; and to Robert Smythson, who has been said to have designed Wollaton House, near Nottingham. Here are several suppositions which open up rather a wide field of controversy. Without lingering in that field for any length of time, it may perhaps be as well to give one or two facts which will dispose of some of the points in doubt. First of all, John Thorpe cannot be John of Padua, since John of Padua is recorded to have received his first grant, "Pro servitio in architectura et musica," in 1544. One of Thorpe's plans is dated 1620, i.e., seventy-six years later, and it is hard to believe that an architect can have been in active practice for seventy-six years. Secondly, I am not aware that any evidence exists that John of Padua had anything to do with Longleat. Thirdly, it is certain that no evidence exists that John Thorpe was ever concerned there. Canon Jackson is my authority for this statement, which I can supplement by saying that there is no drawing in Thorpe's collection which can be meant for Longleat. We are, therefore, left to deal with Robert Smythson's connexion with the house, and with Wollaton. It is stated that the previously-mentioned building accounts show that on the 11th of March, 1568-9, Robert Smythson succeeded John More as head freemason. I have not been able to examine these accounts in detail, but, from a short inspection made with Canon Jackson some time ago, it appeared that they mention a Richard Smythson as freemason at 16d. a day, but do not mention Robert Smythson at all. It would seem, however, that a Robert Smythson was sent about 1567 to succeed More, the mason, but how to reconcile the difference in the names I do not know. If Richard really were the name of the Smythson employed here, he could not be the same man who is connected with Wollaton, for his name was Robert, as his epitaph in Wollaton Church states. The epitaph is as follows:—

"Here lyeth ye body of Mr.  
Robert Smythson Gent.  
Architector and Surveyor  
or unto the most worthy  
House of Wollaton with  
Diverse others of great  
account, he lived in ye fayth  
of Christ 78 years, and then  
departed this life ye XVth of  
October Anno Dni 1614.

Into the rival claims of Robert Smythson and John Thorpe to have designed Wollaton, I will not enter; but this much may be said:—that a plan and elevation of Wollaton are found in Thorpe's collection, just as a plan and elevation of Longford are found, and I myself regard Thorpe as responsible for "the most worthy house of Wollaton." It is interesting to note that Wollaton was begun in 1580, the year of Sir John Thynne's death, so that it would have been quite possible for the same man to have been engaged on both buildings consecutively. But the evidence relied on by some writers,—an exact similarity of detail between the two places pointing, indeed, to a use of the same templates or moulds,—this evidence cannot be established. I have compared the sections of the mouldings side by side, and find that, though in general disposition they resemble each other, yet in particular features they are quite different; those at Wollaton could not even have been worked from an ill-proportioned sketch of those at Longleat, except in one or two cases. The mouldings at Wollaton are hardly as well proportioned, as those at Longleat. But, in spite of particular differences, there is a certain general similarity in idea between the two places, which would be accounted for by supposing the same foreman to have been engaged at both.\*

With regard, therefore, to the immediate source of inspiration at Longleat we can form no certain opinion; but the ultimate source was,

\* We have recently stated (p. 155 ante) that the researches of the present owner of Wollaton may be considered to have put an end to the claims of Smythson in connexion with it, and established those of John of Padua.  
—Ez.

of course, Italy. Italian ideas permeated every every branch of art and literature at this period, but Longleat is rather a curious example of their influence, inasmuch as no other building of so early a date is so thoroughly Classic. Kirby, for instance, which was begun three years later, in 1570, is very much more English in feeling, less formal, and consequently more interesting. But Longleat, in its very formality, in its exact balance, in the rigidity of its horizontal lines, in its somewhat tame sky line, from which none of those beautiful gables spring which are characteristic of Anglicised Classic,—in all these points Longleat very aptly illustrates the effect upon English architecture of travelling in Italy. The same influence is observable in the projecting windows, which are not bay windows in the strict sense of the term, not at all like the large semicircular bays at Kirby, or Burton Agnes, or (to name earlier examples) those at the dais end of many halls in Oxford and Cambridge. Then, again, observe the circular recesses filled with busts. The busts all represent some classic personages, gods and goddesses, the Nine Worthies (as at Montacute), or Virgil, Aristotle, and Plato, as at Wollaton. Here none are named, but they are of the same family with those that are, and very sorely they must have puzzled the British workman who put them in their places.

The present plan of Longleat can tell us only one fact of historical interest, and that is that the original arrangement of the rooms became unsuitable to modern ideas, and that, consequently, it has been swept away wholesale. It is often said that the era of house-building that began in Elizabeth's reign introduced all the apartments required for modern use. To a large extent this is so. We might even go further, and add that it introduced a great many for which no modern use can be found. But we must not forget that, though there was a great multiplication of apartments, they were very unsuitably arranged. Nothing is more obvious, in visiting Elizabethan houses which are still inhabited, than the straits to which the occupants have been put to obtain a reasonably comfortable home without destroying the venerable appearance of the house. At Burleigh a corridor has been contrived round the courtyard; at Apethorpe you have to make the circuit of the building to get from your bed to your breakfast; at Loseley the family sleep at one end and the guests at the other, with the great hall between them; at Wollaton the window-sills are so high that to sit down is almost like being in a well. Indeed, there is so concealing the fact that John Thorpe and the other designers of that time went to work on wrong lines. They produced houses into which the inhabitants had to fit themselves. They did not first ascertain the requirements of the inhabitants and then build the house to suit their comfort and convenience. Their way was the easiest. They said: "Here is my architecture, suit yourself to it." Our way is the best; we say: "Such are your habits, our architecture shall be founded on them." In the result what we lose in stateliness we gain in comfort, and those who do not have to live in such houses can freely afford to admire them, and to be thankful to those who, in spite of inconveniences, jealously preserve these magnificent memorials of the past.

## Illustrations.

### CATHEDRAL, TOLEDO.

WE give four views, reproduced from photographs by Laurent, of Madrid, of portions of this Cathedral, of which a long description is given in Street's "Gothic Architecture in Spain," and which is, in many ways, a very remarkable Medieval monument. The Cathedral is believed to stand on the site of an older one, which had been converted into a mosque during the Moorish occupation of the city, but of which nothing remains. The first stone of the present Cathedral was laid in 1227, by King Don Fernando III., and Street was of opinion that French architects were concerned in the design of it. The French character of the older part of the work is evident enough from the interior view, in the eastern ambulatory of the choir.

The church, of which Street gives a plan, is five-aisled, and on a great scale, 178 ft. wide and 395 ft. long, and 50 ft. 6 in. from centre to centre of the nave columns. The plan is

remarkably grand and simple, the transepts hardly projecting on the ground line, and the outer aisles being carried in a splendid semicircular sweep round the apsidal eastern termination. The columns are all circular, surrounded by engaged shafts; a portion of one of them is seen above the view of the side of the high altar-screen. The words "Side of the high altar," on the plate, are the literal translation of the Madrid photographer's title, which should, however, rather be "choir-screen adjoining the high altar." This gorgeous piece of fourteenth-century work only exists in this state on one side of the choir, the remainder having been continued in "Berruguesque." Street expresses great admiration for the elaboration and delicacy of the work here.

The so-called "Gate of Lions," only named so, as will be seen, from the Renaissance addition of the lion-crowned columns supporting the grille, is the doorway of the south transept. The principal western doorway, shown in another illustration, is work of the early part of the fifteenth century, when the west front was commenced; but all the upper portion of this front (as will be gathered from the story immediately over the gable in the illustration) was altered and modernised in later times.

### COMPETITION DESIGN FOR EDINBURGH MUNICIPAL BUILDINGS.

WE give this week another of the designs submitted in this large competition, that by Messrs. Foster & La Trobe, of Bristol. The authors have duly appreciated the importance of the aspect of the building towards Cockburn-street, as shown in their sketch perspective of it from this point of view.

### HOUSE IN SUNDRIDGE PARK, BROMLEY, KENT.

This house, which is in the course of erection, is situated on rising ground, there being an extensive view from the south windows.

Mr. G. H. Lay, of Bromley, is the builder, the estimated cost being rather more than 2,000.

The external walls are faced with red bricks from Duntun Green, Kent, and the roof is to be covered with Yorkshire tiles.

Mr. Evelyn Hellicar, of Bromley, Kent, is the architect.

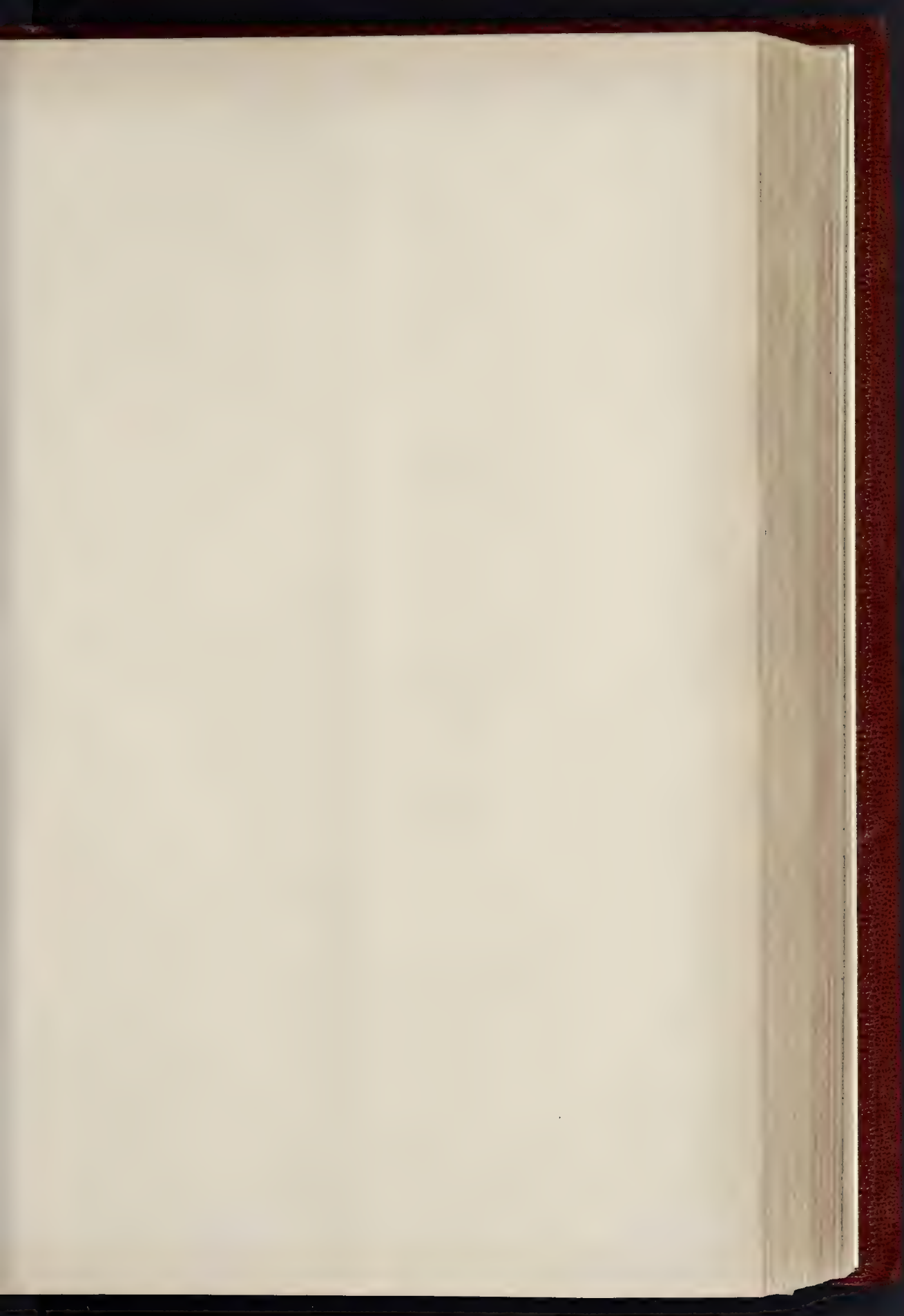
### WIMBLEDON BRANCH OF THE LONDON AND SOUTH-WESTERN BANK, AND BUILDINGS ADJOINING.

THESE buildings have been erected from the designs of Mr. J. S. Edmondson, Mr. H. Johnson being the builder. The amount of the contract was 11,150*l.* The walls externally are of Farnham brick, with all mouldings and enrichments of red terra-cotta supplied by Mr. J. C. Edwards, of Raabon. The other buildings consist of shops, with a private residence at the corner.

The bank contains, on the ground-floor, banking hall, with waiting and manager's rooms, and in basement, fireproof strong-rooms, lavatories, &c. The upper part of house arranged as manager's residence.

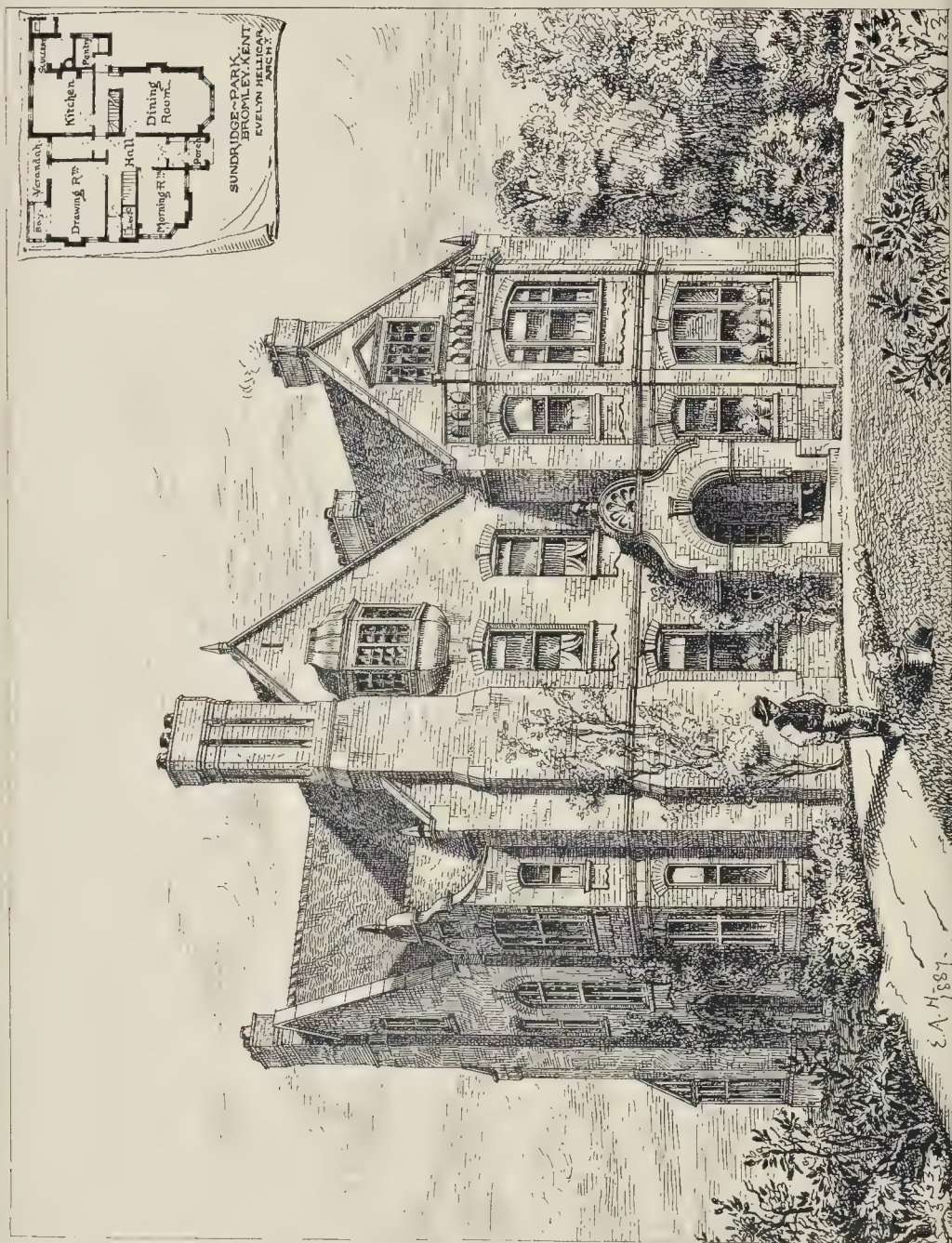
The mosaic pavements are by Messrs. Rust & Co. The bank fittings, partitions, and joinery, all in polished teak, are by Messrs. Bright & Co. Mr. Wm. Tooke is clerk of works.

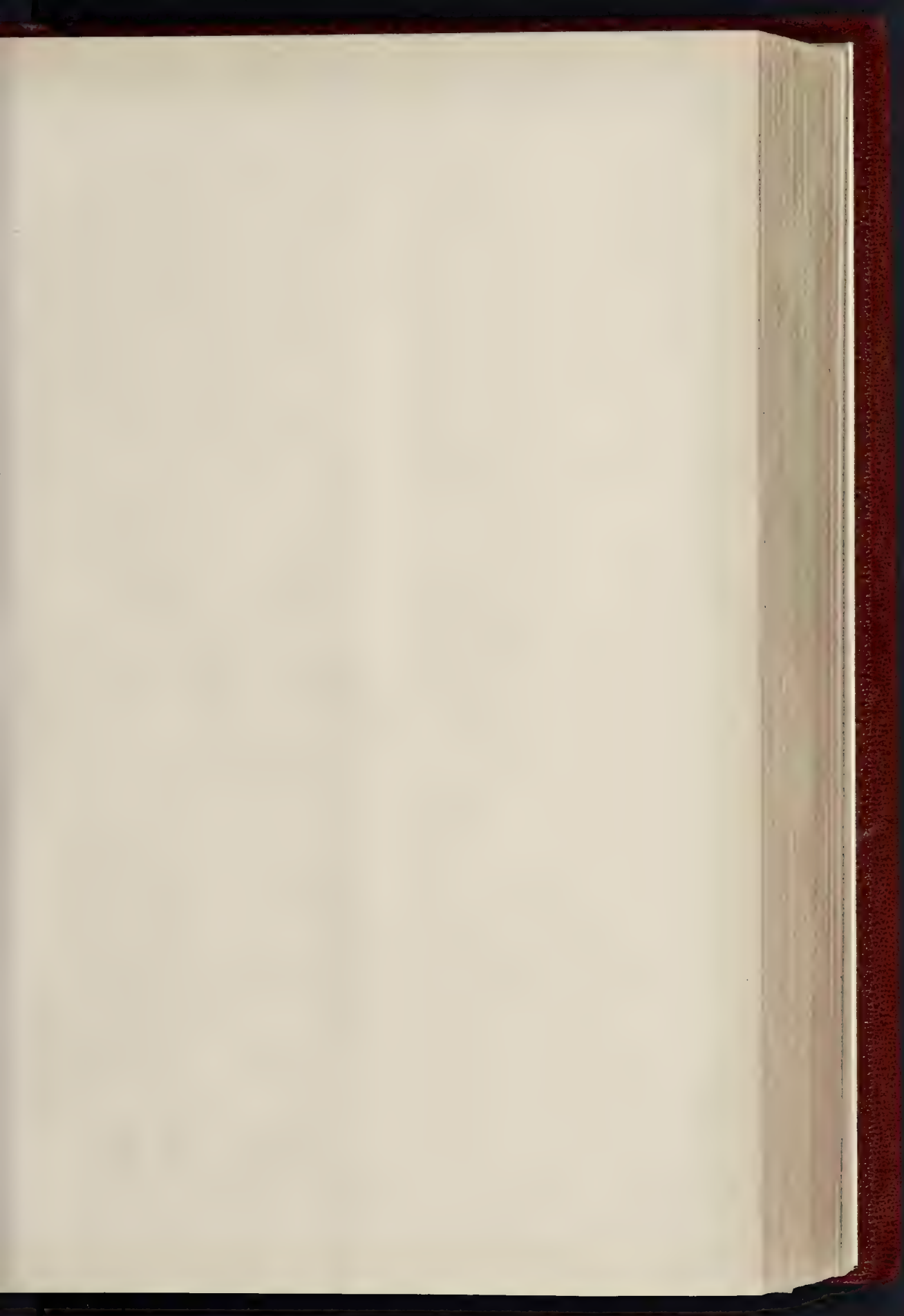
**Association of Municipal and Sanitary Engineers and Surveyors.**—A Northern Counties District meeting of this Association is to be held at Newcastle, this Saturday, Aug. 13. The members will assemble in the Council Chamber at the Town-hall at 11.30 a.m., by kind permission of the Mayor. The first business will be the election of a District Secretary. The following paper will be read and discussed, "The Floating Hospital of the Tyne Port Sanitary Authority," by Mr. W. G. Laws, City Engineer, Newcastle. The members will afterwards adjourn to the Exhibition, where, in the North Court, a model will be seen of the Floating Hospital. As there are many objects of interest to municipal engineers in the Exhibition, it is proposed to spend the rest of the day there.





THE BUILDER, AUGUST 13, 1887.

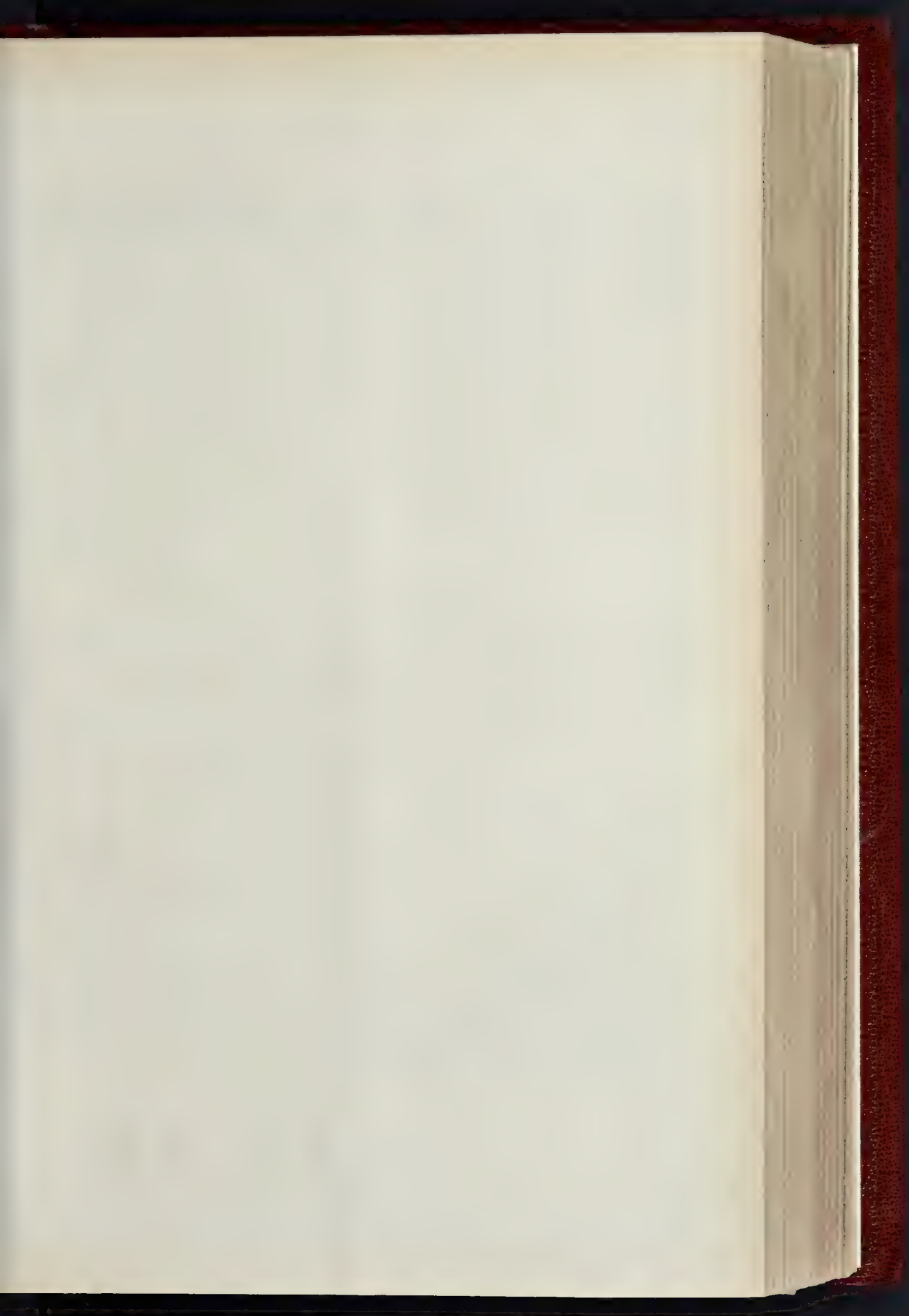




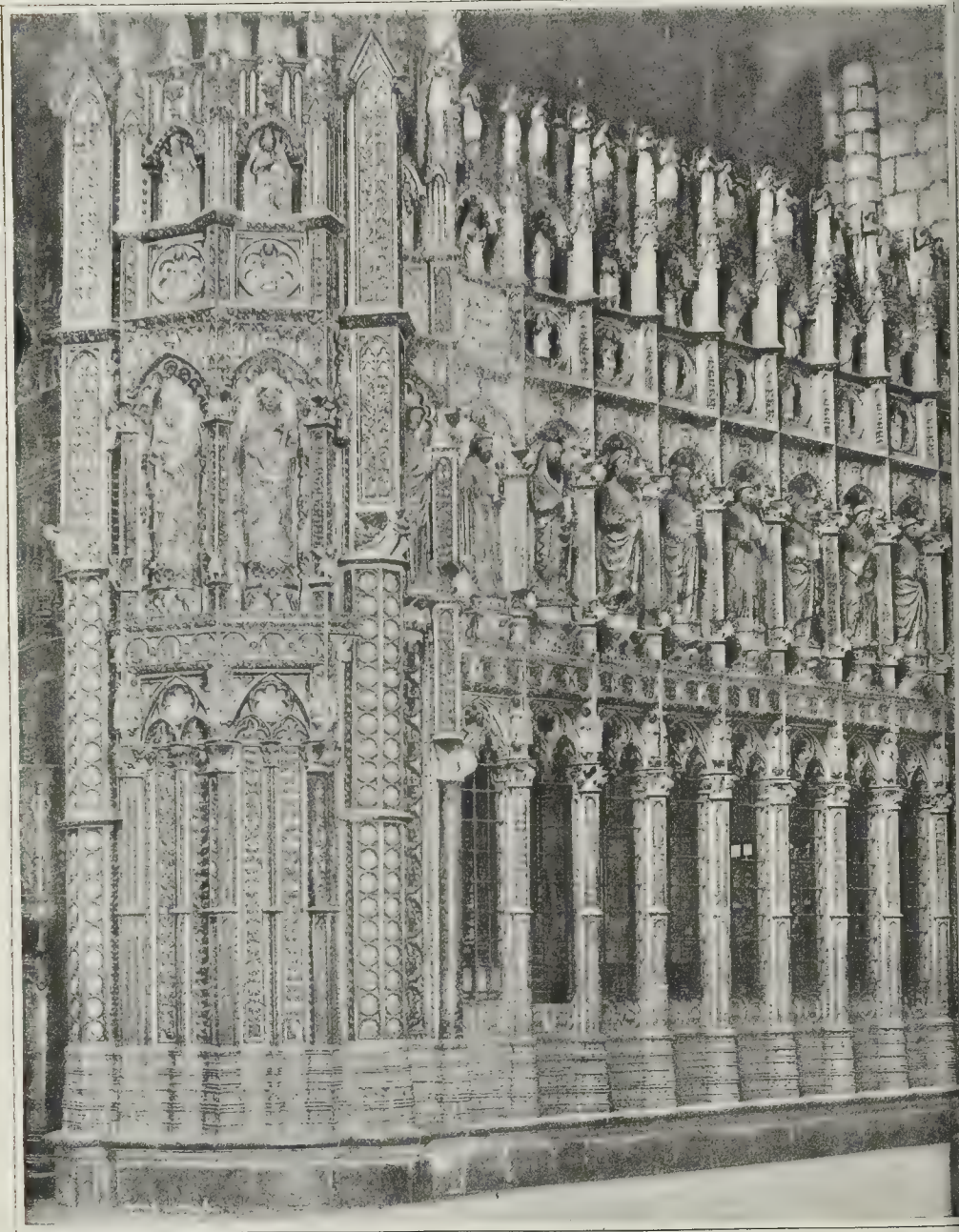


EDINBURGH MUNICIPAL BUILDINGS COMPETITION.—DESIGN SUBMITTED BY MESSRS FOSTER AND LA TROBE.

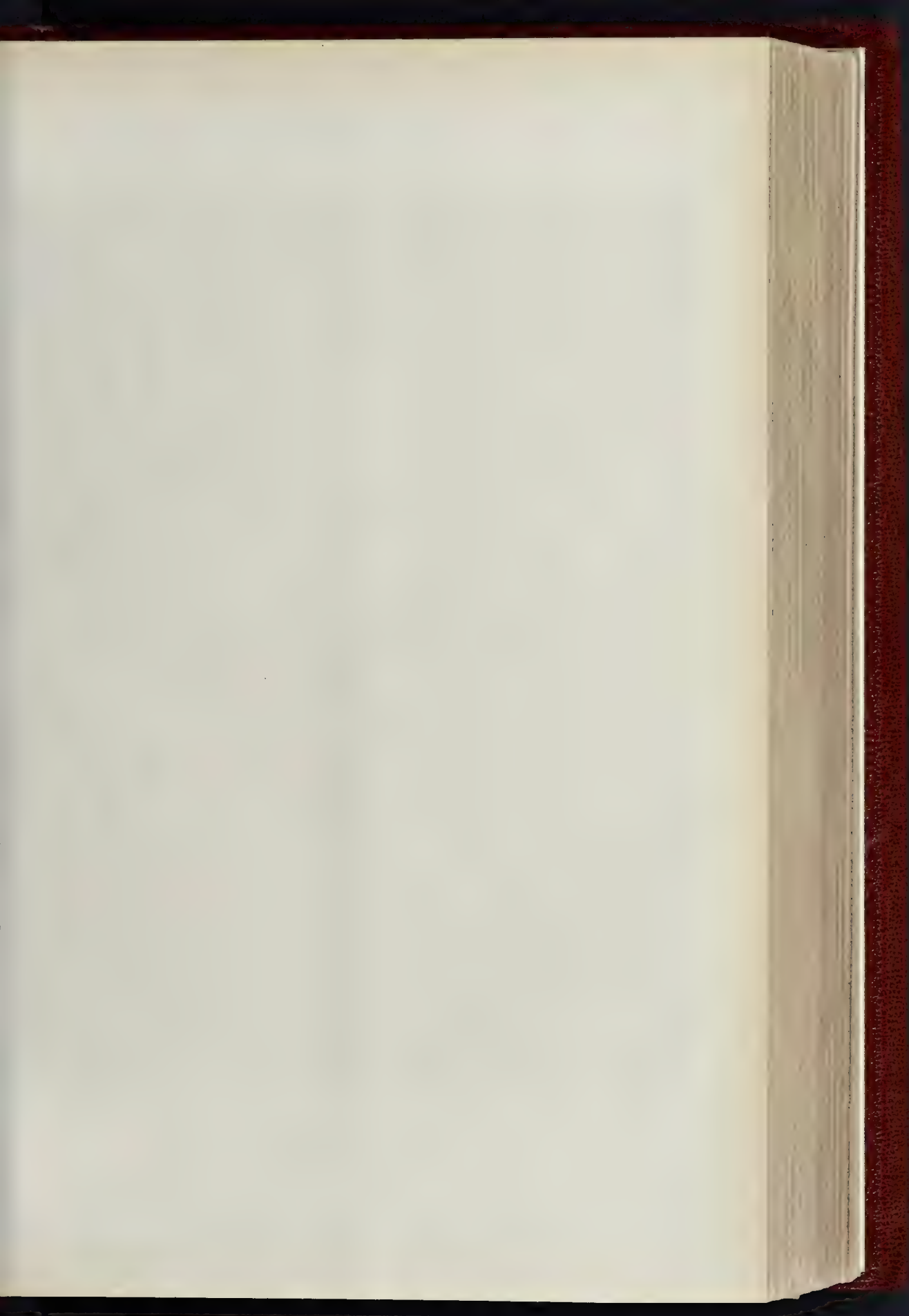
ELEVATION TO HIGH STREET



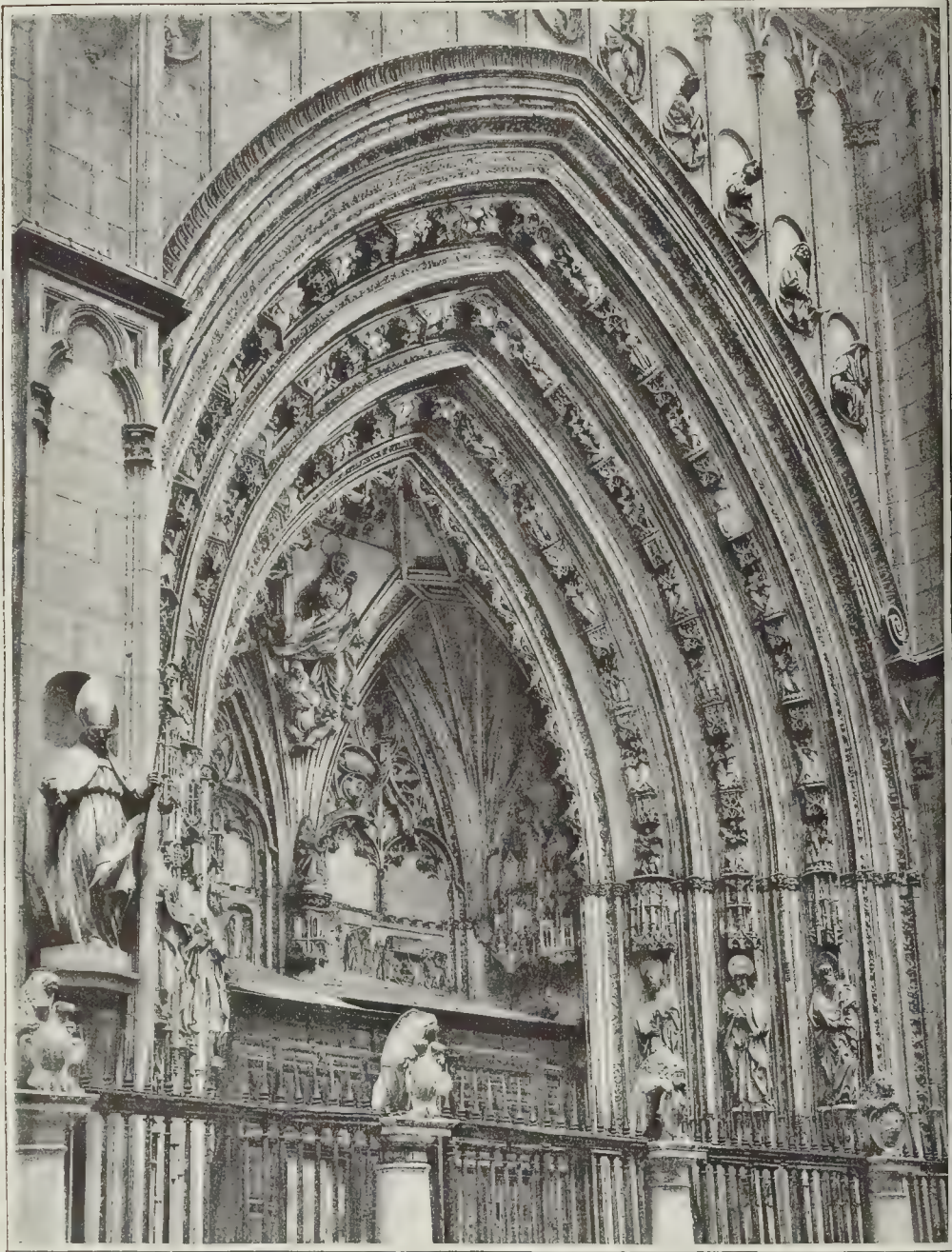




TOLEDO CATHEDRAL: SIDE OF THE HIGH ALTAR.







TOLEDO CATHEDRAL. THE GATE OF THE LIONS.

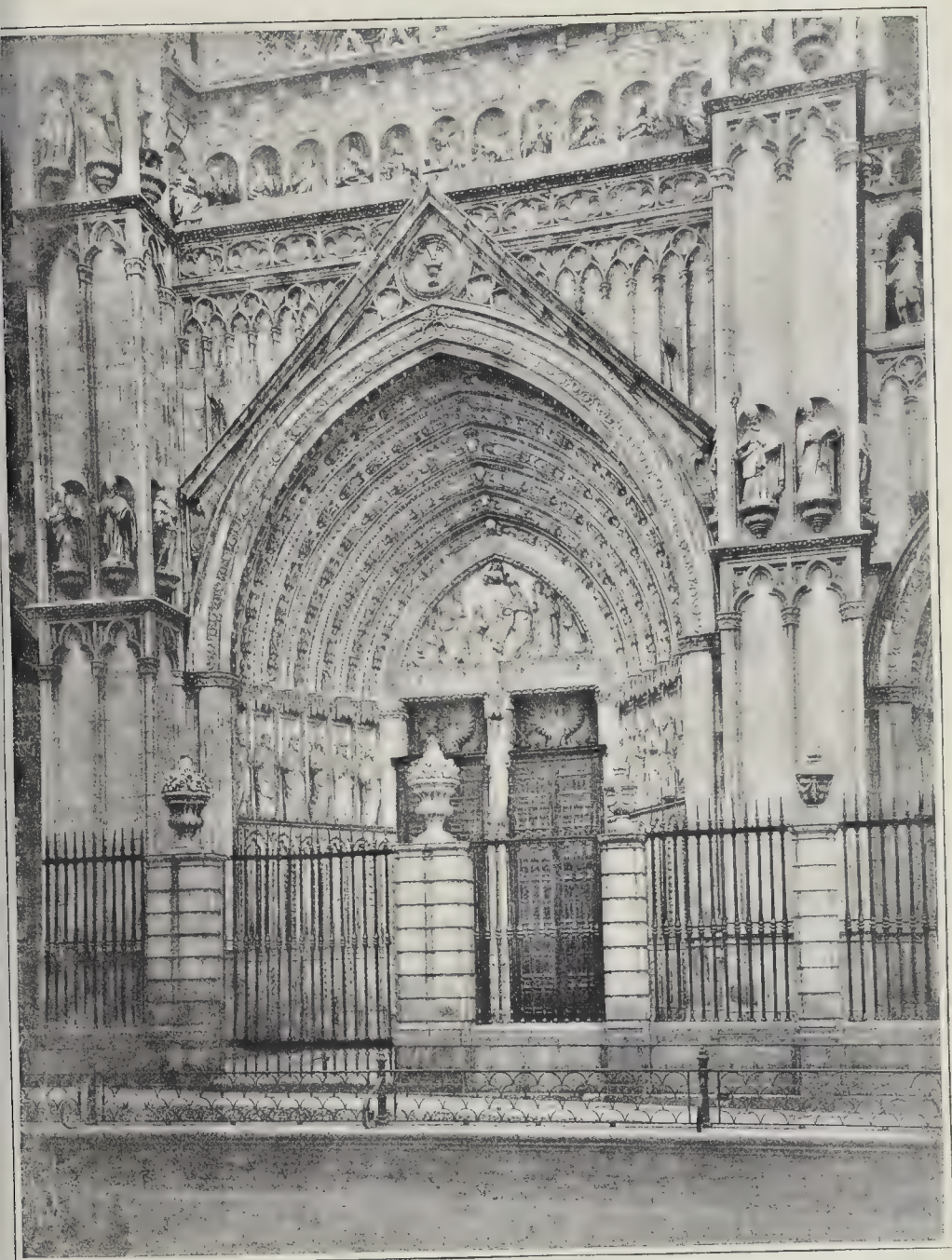




TOLEDO CATHEDRAL: INTERIOR VIEW.







TOLEDO CATHEDRAL: PRINCIPAL ENTRANCE.







EDINBURGH MUNICIPAL BUILDINGS COMPETITION.—DESIGN SUBMITTED BY MESSRS. FOSTER AND LA TROBE.  
PERSPECTIVE VIEW TOWARDS COCKBURN STREET.











CREMATION.\*

The disposal of the human body after death has always occupied the earnest attention of the ing in all countries, and it may be that the method of simple exposure as against burial was the outcome of much cogitation and dispute long the ancient peoples who practised it. It is hard to prove that the Phrygians and others who hung their dead upon the limbs of trees; the North American Indians, who to this day expose their rudely banded dead relatives on tall platforms in the prairie; the Syracians, who left their dead in the near forests to the wild dogs to devour; the Parsees, who from no immemorial have laid their dead upon platforms on the summit of high "towers of silence" for the vultures, did not adopt these various systems of disposal of the dead after the most profound consideration, apart from any religious or superstitious bias? It was very easy for these ancient peoples to inter their dead, but the "far-off descended ray" apparently taught the very earliest born races to object themselves from the dead and to confer the earth to be the very property of the living. The practice of the exposure of bodies to the attack of carnivorous birds, beasts of prey, wild dogs, crocodiles, and the like must have been instituted, not from the want of land for interment or labour to dig graves, but from the innate consciousness that the earth was required for far nobler purposes than as a storehouse for the putrefying dead. . . .

It may almost be said that when mere exposure of the dead ceased to satisfy, and when the burial became obsolete, inhumation or earth burial by contact was introduced, with all its inherent drawbacks. Burial in the earth has, I think, existed from the very dawn of our race's life; certainly no one can absolutely prove this. But it is a very ancient practice, and was the easiest means of hiding the dead out of sight. It matters not how controversialists may decide this point, and it is sufficient to admit that burial in the earth is of remote antiquity. I do not think that it was resorted to for reasons of health, but for reasons of expediency, and economy.

Terrible outbreaks of death-dealing disease have followed indiscriminate and injudicious burial. It would nauseate you to quote a thousand part of the number of cases which have been recorded where the depurating power of the earth has been almost nil. Earthworms continually, from their very nature, upheave the germ-laden soil from below, with the usual consequences. I need only note some instances where misguided burial has been followed by dire consequences. I will not mention the reappearance of the plague at Modena, where 600 years before the victims of a plague were interred, and how similar disturbances of the same sites caused immediate outbreaks of disease, or enhanced the virulence of epidemics such as cholera and the like. This happened in London in 1854, although the pits had been dug and filled up for almost 200 years. In 1843, when a parish church near Stroud, in Gloucestershire, was in process of rebuilding, the superfluous soil of the burial-ground was disposed of for manure to the villagers, and the result was nearly a decimation of the place. An outbreak of the plague in Egypt in 1823 was traced to the opening up of a disused burial-ground about fourteen miles from Cairo, and thousands perished in consequence.

M. Pasteur states that he has obtained, from dig-up earth, germs of splenic fever as virulent when the animals died twelve years previously.

A recent investigation was made in the cemetery of Rio de Janeiro, scarcely four years ago, upon earth taken about spades deep from graves where victims of yellow fever had been buried some twelve months previously, and this soil was found to contain "myriads of microbes," self-same with those present in persons stricken with the same at the time of the excavation. A healthyinea-pig was incarcerated in a space over which earth taken from a grave was sprinkled, and in five days the animal was dead, its blood being found to be "literally crammed" with the germs of the disease in various stages of solution. It will, therefore, be conceded that argument requires to be sprung in favour of cremation for the relics of humanity when the

same thing occurs in respect of the remains of the lower animals.

It is a fortunate thing for us that the majority of the animals which now perish from disease in our crowded towns are no longer buried in the earth, but are scientifically destroyed, and even some valuable products recovered. But this was not so in the olden times, when the corpses were merely thrown into a hole in the neighbourhood of the cattle-markets. It is almost impossible to excavate any distance in Shepherds' Market, now May-fair, London, without coming across numberless relics of animals slaughtered from motives of health for their own race, but interred to the detriment of their owners.

I do not think cremation will ever become universal, and I am equally satisfied that burial in the earth never was a universal practice. Since the abandonment by gradually civilised and growing nations of disposal of the dead by exposure, desiccation, embalming, and the like, burial in the earth followed, and as the ancient world was opened up to the new, the practice of cremation in the former was brought to the knowledge of newer races, and eventually enthusiastically taken up by the Greeks and Romans. And both burial and cremation were practised at the option of the relatives, and this accommodation of parties must always, I think, continue to rule. Socrates was made to say that he had no care whether he was buried or burnt, but this apathy was rarely exhibited, and soon the rite of cremation was exalted to such an extent that certain of the citizens were forbidden it. All suicides, all persons killed by lightning, and all the still-born, were excluded from the pyre.

When the star of Christianity climbed the horizon, it became necessary for its teachers to adopt some distinction between Christians and Pagans, and very evidently the Christian leaders decided upon discarding cremation, and insisting upon the practice of inhumation. A wide-spread schism followed, and the rupture became perfect when the system of burial in and around the churches began to obtain with the community. This practice of crowding the churches and churchyards with the dead was carried to such an extent, that about 1843 the burials in London around the churches averaged in some cases 1,204 per acre; in others, 1,278 per acre; in several, 1,560 per acre; in one case, 2,323 per acre. This was surely burial around the churches with a vengeance!

In ten years following 1852, when Orders in Council were issued to stay this monstrous evil, some 4,000 old burial-grounds were closed, and the good work of regulating interments is still carried on. Within the same space of time some 400 local Burial Boards were constituted, and this number has been far enhanced. Then necessarily followed the institution of cemeteries, and the metropolis alone has now one acre of burial ground for every 1,000 inhabitants, although, of course, this is partly taken up by roads and shrubberies. At present London has twenty-two cemeteries, with an aggregate of 2,210 acres.

A cemetery should have a close and yet dry, porous soil, such as would allow the rain, and the air which accompanies it, to pass down to the level of the lowest interment. With a soil like this, the depth for burial might be extended to a dozen feet, and everything save the larger bones would disappear in a dozen years. When a cemetery soil is very dense and clayey, it is impervious to moisture, and therefore objectionable. Its drawbacks can be partially redeemed by deep cross drains being laid between the bottom of each grave-space. The spaces nearest the deep drains should be first used, gravelled at the bottom, and each subsequent grave, after being gravelled at the foot, should be connected with the other graves, and all drain into the cross drains, the outfall of which should be carefully chosen. Graves in clay formations are sometimes improved by the admixture of gravel and sand when refilling the graves. The cost of these proceedings is, however, very great, and it cannot be said that any commensurate success ever attended it. I have been informed that the cemetery instituted by the Corporation of this city [Leicester] is formed of a stiff and almost impervious clay, and that a tenth of a million of dead have been laid in it. I hope that matters are not so unencouraging as this, however.

Just as wheat may be said to be the ulti-

mum of all grasses, I think that cremation will be final and the chiefly chosen improvement upon burial. Where the earth is suitable for due resolution of the body, nothing can perhaps be preferable, but most unfortunately this consummation cannot be always achieved, and even where a suitable soil can be obtained there are dangers of air pollution and fouling of water, which have always to be strenuously guarded against, as many a community knows.

Since the reascension of the practice of cremation, brought about in our country by the telling works of Sir Henry Thompson, several ideas have been introduced to public notice with a view of minimising the dangers known to be attendant upon any promiscuous system of interment. I will only notice one, and that is what has been called "earth-to-earth" interment, and the use of wicker baskets in lieu of coffins. I can see no improvement here upon what was prevalent with our forefathers, when no coffin was used at all. Winding-sheets alone were in use until the sixteenth century, and in the Vestry Minutes of St. Helen's, Bishopsgate, London, there occurs, under the date of March 5th, 1564, an order that no one shall be buried within the church unless the corpse be confined in wood. Up to the present time, many old families in Ireland inter their dead with shrouds only. At the conclusion of a paper which I read at York in September last,\* the Dean of York mentioned incidentally that at Easingwold, close by, there was a parish coffin, which had been in existence for several hundred years, whereby bodies were conveyed to the grave, and there consigned without enclosure to the earth.

It is sickening to read, as I have done in the Records of the Patent Office, the various improvements which have been laid before the public from 1751 to even last year,—I mean sickening to any one who has formed a high estimate of his fellow-man. Fancy plans for all kinds of coffins in stone, marble, granite, slate, cement, porcelain, earthenware, bitumen, asphalt, papier-mâché, peat, indiarubber, iron, and glass being foisted upon us! An enclosure in lead was the parent of all these strivings after a long preservation of the dead, and this is now becoming altogether condemned, seeing that it robs the earth of its very own. The wicker-basket enclosure is no innovation, and should have a fair field, but its application must be very limited; and it is impossible to see how a body which has perished from, for instance, bad confluent small-pox could be laid in the earth without detriment. I opine that all who have perished from contagious disease, and all the unclaimed dead, should be compulsorily reduced to ashes at the nearest crematory. And, in order that such conveniences should exist, I would feel inclined to recommend that for the future, at all events, every new or enlarged cemetery should be compelled to erect a crematory of some economical kind on its grounds, to carry out such cremations, as also to afford optional cremation to those desiring it,—those who desire when dead to leave their mother earth not worse than they found her.

Cremation is variously practised now, but in former times the funeral pyre was most resorted to. The burning ghasts of India give an example of this at the present day. At the present moment the reform wave of cremation has reached even the Mauritius, and, failing a proper crematory, the people preferring cremation are having recourse to the common pyre. In some parts of Japan the body is seated, and after the body has been surrounded by the wood the orifice is closed, and the body is reduced to ashes. In January of this year an exactly similar cremation took place in Russia, when the remains of the Lama, or Grand Priest of the Calmucks, was consumed.

To describe even a fiftieth of the various methods of cremation which I have in my possession would weary you.

The systems of cremation now in use may be said to consist of the Gorini, the Venini, and the Siemens methods. There are others, but it would serve no purpose for me to explain them to you. I have seen the various systems in use at various places abroad, and chose for use by the Cremation Society of England, which is a learned and not a trading society, the Gorini system, and I was instructed to erect one at their grounds, St. John's, Woking, Surrey, which I did. As yet no temple or chapel

\* "The Economy of Cremation," See *Builder*, Oct. 2, 1886.

From a paper by Mr. W. Easie, C.E., F.E.S., F.G.S., read at the Leicester meeting of the Association of Municipal and Sanitary Engineers and Surveyors.



surrounds the crematory, but that can only be a question of time.

The procedure in the Gorini system may be shortly stated to be as follows:—A fire is first lighted in the chimney close to its base, and through this all smoke and evolved gases are destroyed, thus precluding the escape of any deleterious products which may have escaped from the first combustion in the crematory chamber. A fire is then lighted in the furnace portion of the crematory, and this is chiefly composed of wood fagots, with a sprinkling of anthracite coals, and the heat from this passes through flues under and above the crematory chamber, where the body is placed. When the reception chamber has been sufficiently heated, the body is introduced, and is consumed in little over an hour, the residuum being pure white ashes. The tray is withdrawn after the chamber has somewhat cooled down, and the ashes reverently deposited in a suitable receptacle. On the Siemens system, which is also represented, the requisite amount of destructive heat is first of all generated by combusted fuel, the flame from which imparts most of its heat to the fire-brick or regenerator chamber, and, when the apparatus has been in operation sufficiently long, this fire-brick and crematory chamber become of the usual white heat. The tray containing the body is then slid along the rollers, shown on the right of the plan, into the crematory chamber, atmospheric air is laid on, and when the ashes have fallen into the receptacle below they are inurned.

The progress of cremation within the last few years has been very rapid, and there now exist scientifically-constructed crematories at Woking, England; at Gotha, Germany; at Milan, Lodi, Cremona, Varese, Udine, Padua, Brescia, and Rome in Italy; at Geneva, Switzerland; and at New York, Buffalo, and other places in America. France is also completing an extensive establishment in Paris; and other countries, such as Holland, Belgium, and Sweden, only await a recognition of the right to perform cremation when it is sought for.

The licence will come in good time to those who work and wait, as we did in England, until it was manifest that there was no legal bar to the reformed practice. About twenty-five cremations have taken place in England, the last of them being that of a retainer of Maharaj Sir Pertab Singh, of Jadhpoor, India, who himself, with a suite, attended to witness the ceremony, and who removed the ashes afterwards for immersion in water, as he explained to me, according to Hindoo custom.

The cost of cremation varies, according to the number cremated with one heating of the crematory. But it varies from 6l. to 2l., the former sum ruling in England, where succeeding cremations have not as yet occurred. As to the custody of the ashes, they have chiefly hitherto in England been removed by the relatives, and interred in churchyards or vaults. But the desirable practice would be to collect them for a given time in a columbarium attached to the crematory, and after twenty years, if not claimed then, disposed of upon the ground. There seems to be a consensus of opinion in favour of this, because no good could accrue from the preservation of ashes when none of the family care to pay a fee for further conservation. Many persons simply specify that the ashes shall be strewn upon the earth.

Very much nonsense has been spoken and written upon the possible effects resulting from the destruction of bodies by fire, and the asserted loss of ammonia resulting therefrom was but one of the many bogus objections. With an audience such as this I would not venture upon the religious objections made, because they do not merit a moment's attention, and are puerile to a degree. There is also a series of sentimental exceptions taken to cremation, but they none of them rise even to the level of merest platitudes.

The Cremation Society of England, of which I have been both Hon. Secretary and Hon. Engineer from its commencement, was formed to promote the objects set forth in the following declaration:—

"We disapprove the present custom of burying the dead, and desire to substitute some mode which shall rapidly resolve the body into its component elements by a process which cannot offend the living, and shall render the remains absolutely innocuous. Until some better method is devised, we desire to adopt that usually known as cremation."

The conditions of membership are:—

"I. Adhesion by signature to the above declaration.  
II. The payment of an annual subscription of one guinea, or a single payment of ten guineas."

III. The payment of ten guineas, with an obligation from the Society insuring cremation after death."

Much has been said concerning the possibility of cremation becoming an inducement to commit crime by means of poison; but, with the safeguards now taken by the committees where cremation is carried out, no concealment is possible. People seem to forget that for one body presented for cremation in possibly 5,000 there could be no possible mistake as to the cause of death.

The securities demanded by the English Society are as follows:—

"(a) An application in writing must be made by the friends or executors of the deceased,—unless it has been made by the deceased person himself during life,—stating that it was the wish of the deceased to be cremated after death.

"(b) Two certificates from duly-qualified medical men are required relative to the cause of death, one, at least, of whom must have attended the deceased."

These must satisfy the Council of the Society or their representative, and in some rare or doubtful case an autopsy might be desirable. Several autopsies have already been made by orders of the friends of the deceased themselves previous to cremation.

A branch of the Cremation Society of England has been formed in Leicester by some very influential citizens, and will be certain to prosper.

In the discussion which followed, there was a unanimous consensus of opinion that cremation was the most sanitary means of disposing of the dead, especially in large towns and thickly-peopled countries.

#### THE NEW TEDDINGTON FOOT BRIDGE.

MR. GEORGE POOLEY, C.E., has been appointed engineer for the foot bridge which is about to be constructed across the Thames at Teddington. The structure will consist of two distinct bridges, one over the Thames, adjoining the Angler's Rest Hotel, and the other over the lock cut. The bridge over the river will be a suspension bridge of one whole span of 160 ft. adjoining the Teddington side and one half span of 80 ft. next the island. The bridge will have a clear minimum headway above the mean water level of 12 ft. The suspension part of the structure will be carried upon four steel wire cables, each 7½ in. in circumference, guaranteed to sustain an ultimate strain of 200 tons each. The footway is 6 ft. wide in the clear, and the bridge is stiffened on either side with wrought-iron lattice girders. The bridge over the lock cut will consist of wrought-iron lattice girders of a clear span of 99 ft., the abutments being of Portland cement concrete, furnished with flights of steps to enable the requirements as to headway laid down by the Thames Conservators, namely, 12 ft. clear headway at the towing-path and 18 ft. clear headway above water level of lock cut, being complied with. The sanction of the Thames Conservancy has been obtained to the erection of the bridge, and the plans have been approved by the Local Government Board. It is much to be wished that some effort may be made to produce a bridge of picturesque appearance and such as will not be a disfigurement to the river; but we fear there is little hope of this except so far as this, that a suspension bridge must always present a graceful curve in its main lines, the forces of Nature themselves providing for this. The iron girder bridge we regret to hear of; all the iron structures put over the Thames have been more or less detestable in appearance. In the old wooden bridges at various points on the upper Thames there is an obvious effort and intention to do something not only durable but picturesque; and the new granite bridge at Putney is really a fine one, though it makes no attempt at being architectural; it is built in a manner and with a material which must look impressive if left to itself. But when an engineer gets hold of an iron girder bridge there is an end of the picturesque, and we fear it will be the same here as in other parts of the river.

**Eton College.**—The governing body have definitely decided on the plans for a new block of buildings which will stand on the site of the old mathematical school, facing the laboratory. The buildings will form a square, and will contain, beside several class-rooms, a lower chapel, a lecture room, and a museum. The work will be begun at once, and can hardly be finished under two years.

#### THE WORK AT THE FORTH BRIDGE WORKSHOPS.

We take the following from Mr. Malcolm Wood's paper on the "Forth Bridge," read at the recent meeting of the Institution of Mechanical Engineers:—

"The procedure in the shops may be described as follows. The flat plates and bars are first straightened. The plates to be curved are heated to a uniform red heat in a gas furnace, and while red hot are moulded in dies under hydraulic pressure to the required form, stacked and coated with ashes, and allowed to cool slowly and equally; any subsequent warping is taken out by placing them again in the press when cold, and giving them a final squeeze into the correct shape. The butts of the bars are cold sawn, and the edges and butts of the flat plates are planed in the usual manner. The ends of the curved plates are planed in a novel form of machine, in which the tool travels in a circular path readily adjusted to the radius of the curved plate. On completion of the planing, the plates are taken to the tube yard, and are built up round the longitudinal ribs and internal stiffening frames, which have previously been fitted together in moulds to the exact diameter required, so that the plating of the framing at once gives the tube its proper form. The plates are in 16 ft. lengths, and break joint alternately over the stiffeners at 8 ft. intervals. Means are adopted to keep the tubes in line while the rivet holes are pierced by a travelling annular drilling frame, which is mounted on wheels and carries a boiler and engine driving ten drills by cotton ropes. A pair of drills are attached to each bed; and as the beds can traverse the circumference of the tubes, while the drills can traverse the length of the beds, the whole outside of the tube is commanded, and the holes are completed with accuracy to ensure their precise coincidence when the parts are rebuilt at the site. As fast as each section of 8 ft. length is finished, the machines are propelled along the rails to take up a new position; they thus travel gradually in successive stages over the whole length laid down. The tee and trough shaped parts are built together in the shops, and the holes are drilled by adjustable vertical and horizontal drills, fitted to a travelling carriage; the power is transmitted to the machines by ropes from the shop shafting. Numerous radial machines are also in use for the secondary parts. For dealing with special parts, many ingenious and somewhat novel workshop appliances have from time to time been brought into use, beyond those here mentioned. All the parts of the junctions are carefully fitted together in the yard in the exact positions they will relatively occupy in the bridge. After each member has been prepared, the pieces are painted, marked, and stored until required for erection."

#### MASONS' MARKS AT WESTMINSTER HALL.

SIR,—These masons' marks were monograms representing the name of the mason who worked the stone. The mark was cut on the stone to distinguish it as having been worked, by a particular man, and was entered in the mason's book, the measurement and price being placed against it. For moulded work the mark would be cut on the bed of the stone, not on the face. It must be noted that the marks for the most part are straight lines, such as could be cut by a plain chisel, and the majority form angles. These forms could be nicked in at once, without extra trouble, such as must be used in cutting curves; I, in fact, doubt such curved forms as being true masons' marks. Some stupid egotist, to be singular, may, however, have used them.

At the Custom House, Liverpool, 1832-3, I worked as a youth, and the ashlar stone buried in the foundation were marked as at Westminster Hall, at Heidelberg, and at our monasteries. At the Custom House the masons claimed the stones for working in due rotation, each man's mark being entered in a book kept for the purpose. When the stone was worked the mark was cut upon it, and it was measured, entered up, and was paid for to the mason by his own name, which the mark represented. A triangle might be John Smith, a double triangle John Jones, the arrow James Stout five points Thomas Williams, and so on.



In Freemasonry some of these marks may have mystic meaning. I, however, am in ignorance as to this. The incised cut with a plain chisel was the easiest form to make, and admitted of a large variety of compound forms, as shown on the page of the *Builder*. But the whole of this explanation is only a repetition of a very old story.

ROBERT RAWLINSON.

Sir.—It will be interesting to Freemasons to note that, of the masons' marks shown on p. 215 of last week's *Builder*, only about one-third have an odd number of points, while the other two-thirds have an even number. Some imagine the latter are not proper masonic marks, or at least indicate an inferior status. I doubt such an idea is a mistake. In Scotland, masons used to pay for getting or choosing their marks, and having the same recorded in the lodge-books. Entered apprentices had their marks, which were "booked," as well as those of the fellows of craft and masters.

W. P. BUCHAN.

## ASPHALTE AND CONCRETE FOOT PAVEMENTS.

Sir.—The author of the paper on "Asphalte and Concrete Foot Pavements," recently read before the Association of Municipal and Sanitary Engineers [see *Builder*, p. 165, ante] describes with more or less minuteness the great care required in manufacturing asphalt. The necessity for guarding against the use of spurious materials, the immense difficulty of preventing unrightly cracks, the marked manner in which kerbs are tilted by it, the effects of the sun upon its surface in raising it in irregular lines, its unfortunate power of conducting heat, to the great detriment of the concrete, and the length of time water remains on its surface; and these particulars constitute a grave indictment against asphalt, while many of the charges apply with equal force to *in situ* pavements. The condemnation of both, however, would have been more complete if the facts had been added, that the cost of relaying trenches is from four to eight times as great in these materials as in slab pavements, and that neither asphalt nor *in situ* pavements can be repaired, but when worn down in the lines of greatest traffic, they must be renewed. Even more interesting data would have been obtained if the author's inquiries had been extended to the pavements where the best asphalt has sometimes lasted only six, eight, and ten years, and that in streets of comparatively light traffic. In a recent report by Mr. Lovegrove, M. Inst. C.E., several such instances are related, and doubtless the experience of other surveyors could have been had for the asking. Important information as to the failure of many *in situ* paths which were laid on the most approved principles could also have been obtained in a similar way.

Practical members of the Association will probably be of opinion that the space in the paper occupied by ancient history and chemical analysis might with advantage have been left blank, and that the elaborate geological quotations could have been spared to the rooms for statistics of traffic actually sustained by the various kinds of pavements in a number of streets, and the effect of traffic upon them, together with a few simple calculations as to the approximate cost of each material per million or hundred millions persons passing over them.

The writer of the paper has been careful to inform us of the doubtful statement that when stone has worn in its useful life is over, but he has omitted unintentionally, no doubt) to say what value is left in asphalt or *in situ* pavement when worn only  $\frac{1}{2}$  in. Again, he has noted with exactness tests of tensile strains which he did not witness, and with a marvellous ear detected discord in, and been annoyed by, the "sound of the footfall" on slabs, while he has been studiously silent as to the sloppiness of asphalt and *in situ* pavements in wet weather, when worn down below the kerb-level.

In making these few remarks, I have avoided obtruding my opinion as to which is the best material for footways, for the reason that it appears to me we have had more than enough opinions, and that in future references to this subject, it will be better to simply give the data necessary for forming opinions, and so avoid giving any of the companies which supply these materials cheap advertisements, and prevent the suspicion being aroused that our papers emanated from an asphalt office or a stone yard.

A. M. HISCOCKS, C.E.

## HOUSES FOR EARTHQUAKE DISTRICTS.

Sir.—Can any of your readers who happen to have the experience in house-building in districts affected by earthquakes, make any suggestions as to the safest method of construction? My own idea would be a very low building, timber-framed, and filled in.

R. KNILL FREEMAN.

Bolton-le-Moors.

## PROVINCIAL NEWS.

**Birkenhead.**—A lecture hall in connexion with and contiguous to the Hamilton Presbyterian Church, Laird-street, Birkenhead, was opened at the end of July last. The size of the hall is 40 ft. by 24 ft., with wagon-headed ceiling, finished in pitch pine, and it has sitting accommodation for nearly 200. Mr. W. H. Forde was the contractor, and the cost about 450l. Mr. James N. Crofts, of Liverpool, who also designed and carried out the church a few years ago, was the architect.

**Oldham.**—New buildings for the use of the Salvation Army in Oldham have just been inaugurated. They are situate in Union-street, and the accommodation comprises a large main hall to seat 3,000 persons, a smaller one, intended for week-night services, capable of accommodating 900 persons, a shop, several retiring-rooms, boiler-house, heating-chamber, and the usual necessary appurtenances. The front is of red brick, with stone dressings, with a tower running up each side of the main hall, finished with battlements. Tudor Gothic has been adopted for the architectural treatment. The contractor was Mr. Councillor Holt, of Cheetham, Manchester. The brick and stone work was carried out by Mr. Thomas Whitehead, of Failsworth, Manchester. Mr. J. Williams Dunford acted as assistant architect. Mr. E. J. Sherwood, of Queen Victoria-street, London, E.C., was the architect. The entire block covers an area of 12,250 square feet, and the cost has been about 5,570l.

## CHURCH-BUILDING NEWS.

**Bradley (Isle of Wight).**—The peal of bells belonging to this church has been re-adjusted. No. 5, bearing date 1694, is cast anew, with the addition of 1 cwt. of metal, and four smaller bells are added. The tenor is dated 1594. The flooring, framework, and beams in the belfry have also been repaired, the whole work being carried out by Messrs. Mears & Stainbank, of London, at a cost of about 350l.

**London.**—The foundation-stone of St. Philip's Church, Buckingham Palace-road, was laid on Wednesday last, by Lady Grosvenor, as proxy for her Grace the Duchess of Westminster, who was absent through illness. The parish is to be formed out of St. Michael's, Chester-square. The Duke of Westminster has given the site and 3,000l., and it is expected that the Ecclesiastical Commissioners will augment the endowment. The church will consist of nave and chancel, north and south aisles, transepts, and morning chapel, and will accommodate 750 persons. Clergy and choir vestries, to be used also together as a parish room, with organ-chamber over, are arranged on the north side of the chancel. The materials used are Gainsborough bricks for outside facing, with Lawrence's brick strings, &c., and Doulton's bricks for sills. The core of the walls is of concrete inside, Corsham stone is used for dressings, and the walls are plastered. The roofs are of pitch pine, with boarded ceilings, and covered with Broseley tiles, and there is a flèche, 100 ft. high, above the nave floor, covered with copper at the crossing. The cost of the fabric, exclusive of fittings, is about 6,000l. Messrs. Demaine & Brierley, of York, are the architects; Messrs. Macey & Sons, Strand, the contractors; and Mr. T. W. Creed is clerk of works.

**Portsmouth.** On Tuesday, the 9th inst., the Crown Princess of Germany and her three daughters visited Portsmouth to lay the foundation or memorial stone of a new parish church for Portsea. An anonymous donation of 15,000l. is given towards the cost of the new structure. This will be on the site of the present parish church of St. Mary, in the titling of Kingston, where the tower of the original fabric is still standing. The register dates from 1653. In the churchyard is the monument to Admiral Kempenfelt and his "twice four hundred men" who were drowned at Spithead by the capsizing of the *Royal George* on the 29th of August, 1782. Charles Dickens, who was born (1812) in Landport, was christened in this church. The estimated cost of the new church is 40,000l., of which three-fourths are already subscribed. It is designed to receive 1,600 persons, and will be built in the Perpendicular style, having a general external facing of flint, with freestone dressings. The architect is Mr. A. W. Blomfield.

## Books.

*Labour, Leisure, and Luxury; or, Contributions to Present Practical Political Economy.* By ALEX. WYLIE. London: Longmans, Green, & Co. 1887.

IT is a good sign of the times that an audience of working people can be got together to listen to dissertations on social politics, as in the case of the Renton Literary Association, near Glasgow, and still more so, when we find that the lecturer is no less than one of the masters of the establishment, which numbers over 2,000 hands. All the same, a series of lectures is not always the better for being raked together into a book, for it is apt to lose its coherence, and read rather disjointedly. Mr. Wylie deals with the alliterative subjects of Labour, Leisure, Luxury (which latter, though very interesting as a chapter, is scarcely suitable for a working-class audience), Progress, and the Acquisition of Property by the Working Classes. One of the best chapters in Mr. Wylie's little book is that on the acquisition of property, in which, after dealing with economy, temperance, thrift, and so on, the keynote is co-operation, and especially as regards building societies. These societies have increased wonderfully of late years. In 1861 there were but 66; while in 1881 there were 1,118 with 6,850,000l. capital, so that co-operation has evidently been a great success, and this is more particularly the case with distributive co-operation, the increase in which is marvellous. Mr. Wylie's little work forms a capital book of reference, as it is well studded with statistics from Giffen, Leone Levi, Mulla, the late Mr. Hoyle, and others, and we can recommend it as one which should be added to every one's library.

*Social Arrows.* By LORD BRABAZON. London: Longmans, Green, & Co. 1887.

LORD BRABAZON (who has, since the publication of this book, succeeded his father as Earl of Meath) is so well known for his philanthropic views, and, if one may say so, his particular line of philanthropy, that his volume of "Social Arrows" needs but little explanation or apology. On the contrary, it is most interesting, suffering only from the fact that the papers of which it is composed have already appeared in various magazines, and are consequently rather repetitive in their nature. Throughout he deals with the ills to which suffering humanity is heir, especially in our large overgrown towns and cities, and tells us in vivid language to what dangers society is gravitating by carelessness and in allowing such dangers to exist. Lord Brabazon's individual efforts (and successful ones) to provide for the use of the poor, gardens, playgrounds, and open spaces where crowded places only were before, shows what can be done, for he has pioneered one of the most valuable philanthropic movements of the metropolis has ever known. State-directed Colonisation is another "Arrow," the importance of which cannot be over-rated, and from first to last the book is advocating useful works. The last chapter is a strong appeal to men of wealth and leisure to bestir themselves for the common good, and well it deserves to be read and acted upon.

*The Blackley National Provident Insurance Scheme: a Protest and an Appeal.* By the REV. J. FROME WILKINSON, M.A. London: Swan Sonnenschein, Lowrey & Co. 1887.

This little volume is a jeremiad from beginning to end, and a dissertation upon the shortcomings of the Rev. Canon Blackley, who, as all the world knows, is the framer and (pertinacious) proposer of the Compulsory Insurance Scheme. He has, however, apparently met his match in the Rev. Mr. Wilkinson, who, with what success remains to be seen, has taken a great deal of trouble to dissect the Canon's plans, and show how very unreliable they are. In any case, the Canon has a Herculean task before him, for the innate difficulties in themselves are quite sufficient to take up all his attention, even were the attack less uncompromising than it is. But, whoever is right or whoever is wrong, it is a good sign when we see such a grave matter a subject of controversy, for it, at all events, recognises that a great evil exists in our social system which requires rectification; but we must be careful that in creating a remedy we do not fall into a worse



condition. We agree with Mr. Wilkinson that it is as impossible to make a people thrifty by Act of Parliament as it is to make them religious; but we ought to be well satisfied with what voluntary effort has already done. One can scarcely imagine it possible to stop 10l. out of any wage-earner after 18, whether he likes it or not, especially where the measure is so strongly objected to by the numbers already belonging to friendly societies, but the difficulty will be enhanced a hundredfold when the measure begins to be really worked, and it must infallibly break down by its own weight. At any rate, Mr. Wilkinson's book may be read with a great deal of interest as giving enlightenment on a scheme which, right or wrong, takes high rank in the schemes of the day.

*The Pilgrim at Home.* By EDWARD WALFORD, M.A., editor of the *Antiquarian Magazine*. London: Society for Promoting Christian Knowledge.

At this season, when pilgrimages of all sorts are being undertaken (ostensibly in pursuit of health, but practically for recreation's sake), Mr. Walford's little book will be found useful. It may serve to shape the course of a holiday tour, as well as to increase its enjoyment; for we hold, with the author, that a visit to any spot which past events have made famous distinctly helps one to realise with more vividness the events themselves. A recent writer has, indeed, contended that the faculty of association interferes with the simple enjoyment of a work of art, but in most cases it enhances it. The contemplation of a Botticelli may be spoilt by the gaudy frame and surroundings which environ it, or by a recollection of the exorbitant price paid for it; but there is scarcely room for any such disturbing elements when we are looking at the ruins of Kenilworth or standing within the walls of "old Iona's holy fane."

Mr. Walford writes to please all tastes, and shows experience in making his start on very level ground. The scenery of Olney, the little town in Buckinghamshire, where John Newton and William Cowper composed the hymns that bear his name, is about as tame as the hares that frisked around the poet. Who shall say that it had no influence on his verse? "The Task," which Cowper wrote at Weston Underwood, hard by, is full of local allusions, and the features of this place have undergone so little change that at every turn some lines are suggested wherewith to describe the scene.

Glastonbury Abbey takes the tourist much further afield, and into comparatively unknown regions, though the valley of Avalon has at length been invaded by the railway, and the pilgrimage thither can be made without difficulty. It is one which will well repay the student of architecture. Professor Freeman, as a native of Somerset, is anxious that the fullest justice should be done to such an historic site. "It is certain," he says, "that Glastonbury was the one church of first rank in England which stood as a memorial of the British days,—the only one which had lived unscathed through the storm of English conquest, and which received equal reverence from the conquerors and the conquered." But, of course, the church of wicker and timber has long since passed away.

It survived the English, Danish, and Norman conquest, but it yielded to the grander conceptions which the Norman architects introduced. For awhile it was permitted to stand beside the stone minster which was erected in the tenth century, but both the one and the other gave place to the noble abbey which dates from the twelfth century. St. Joseph's Chapel—the fairest fragment that now remains—was consecrated in 1186, and, with the connecting "Galilee," gave to the great church a length of no less than 580 ft. Nor are these ruins the only objects of interest at Glastonbury. To say nothing of the miraculous thorn, there are two parish churches of considerable beauty, numerous fragments of antiquity around which an old world air still lingers, and such a prospect from the top of Weary All Hill as delights the eye and brings back to the student of Tennyson a thousand recollections. These, indeed, will be still further stimulated if he accompanies Mr. Walford to a more distant and sequestered spot,—Caerleon-on-Usk (Castrum Legionis),—the "Isca Silurum" of the Romans, and the city where King Arthur was crowned, and which shared his love with Tintagel, his birthplace, and Glastonbury, where he lies buried. The practical tourist may like to know that Caerleon lies about three miles

north of Newport (Monmouthshire), and that, with the exception of the Roman antiquities in the local museum (a most interesting collection), the relics of its past history are unimportant. There are vestiges of the old walls with undoubted Roman masonry; there are indications of an amphitheatre and a few fragments of an early castle, but scarcely anything to remind one that Caerleon was once the capital of Britannia Secunda, and at a later period,—but that as remote as A.D. 182,—the seat of an archbishop. Fairford, Sedgemoor, Lindisfarne, and Abbotsford, are some among the places to which Mr. Walford conducts the reader. All are fraught with memories, while to those of Upton,—the home of Pope's Belinda,—a special interest has been given by the memory of Bishop Fraser, its sometime rector.

## RECENT PATENTS.

### ABSTRACTS OF SPECIFICATIONS.

9,922, Ventilating Window Blinds. Wm. Harte.

This invention is intended to provide for the ventilation of rooms when the window-blinds are drawn down. The blind is hung on the top of the sash, where the roller rests upon brackets. When the sash is lowered, the blind roller goes with it until it reaches the required limit from the top for ventilation. It then unships itself, when it is caught up by and supported upon two other bearings fixed to the window-casing, instead of the sash. The sash may then be lowered to the bottom if required. When the sash is raised again, it lifts the roller in passing off the lower bearings on to the sash brackets, and carries it up with it. The blind is rolled and unrolled in the ordinary way.

10,208, Shoes for Piles and Posts. S. L. Bromhead.

The special feature in this invention is the manufacture in cast metal of hollow pile shoes, with projecting straps for fastening the shoe on to the wood.

10,408, Ventilation of Rooms. J. P. Wilson. According to this patent, lifting sashes are hung so that one balances the other. A regulator is fixed at one end of each cord to rectify any stretching of the cords. The ordinary sash-weights are dispensed with.

10,625, Tiles for Enclosing Girders, &c. J. D. Denny.

The specification describes method of machinery for manufacture of "Girder Tiles," which are made of moist clay, terra cotta, &c.

10,919, Improvements in Chimney-tops, Cows, or Ventilators. T. D. Bayliff.

According to the inventor, the wind is guided across the somewhat contracted orifice of the chimney. The cow is arranged to face the wind, and is detachable for cleaning.

11,266, Hanging Sash Windows. J. H. Jones. According to this patent, the sash-weight is formed in links or sections to avoid so large a pocket-hole as at present in use. The cord is passed through the frame and knotted, being covered by a small brass plate, which, it is claimed, is an easier and more effective method of securing the cord and the sash.

11,360, Sashes, &c. G. J. Soper, jun.

This invention is intended to be applied to the altering of existing sashes and frames, and in the manufacture of new ones, to allow of the sashes being turned back into the room for cleaning or painting. The sashes are fitted with a screw-pin passing through plates screwed to sash stiles, to the sash-ends of cords are fixed metal eyelets, which are placed on the pins between guard-plates, allowing sashes to reverse freely. The sash stiles are grooved throughout part of face of stile next groove, cut away to depth of groove and rounded to allow line to pass out and in and turn on pin suspended on the cords, thus enabling them to be replaced in frames in a reverse position.

11,435, Temporary Buildings. R. Bucknall. Roofs, walls and all parts are hollow, and made in sections for convenience in transport, and for warmth or utilising hollow space as cupboard or storage room.

### NEW APPLICATIONS FOR PATENTS.

July 29.—10,530, J. James and F. Ramsome, Furnaces for Burning Hydraulic Lime, Cement, &c.—10,548, W. Burt and C. Payn, Sliding Window-sashes, Panels, &c.—10,553, W. Kent, Water Meters, &c.—10,556, T. Buck, jun., Brick and Tile Making Machine.

July 30.—10,562, W. Sargent, Flushing and Cleansing Closet Basins, &c.  
Aug. 2.—10,608, F. Hemming, Wood Veneers.—10,610, T. Nesbit and T. Forster, White Lead, &c.—10,642, G. Redfern, Preventing the Leakage of

Water around Chimney or other Pipes passing through the Roofs of Buildings.

Aug. 3.—10,675, J. Rickerby, Mechanic's Combination Compass and Tool.—10,704, C. Alger, Door Fastener and Indicator.

Aug. 4.—10,720, A. Boulé, Privies and Privy Seats.—10,731, A. Boulé, Sharpening Attachment for Tools.

### PROVISIONAL SPECIFICATIONS ACCEPTED.

8,497, C. Hax, Sharpening Saws.—8,917, T. Truss Cowie for Chimneys and Ventilating Shafts.—8,536, H. Johnson and T. Wilson, Exhaust Ventilating Cowls.—9,398, J. Jobson, Domestic Fire Grates.—9,435, J. Fox, Latches.—9,593, H. Hanson, Fireplaces.—10,034, R. Smith, Chimney-pots.

### COMPLETE SPECIFICATIONS ACCEPTED.

#### Open to Opposition for Two Months.

10,293, F. Lyte, Manufacture of White Pigment.—12,397, H. Whiteley, Regulating the Opening and Closing of Fanlights, Casements, &c.—12,401, E. Taylor, Opening, Closing, or Fastening Casements, Fanlights, &c.—2,290, E. Young and G. Moss, Fireplaces.—9,246, W. Thompson, Ventilation and Air Moistening.—12,526, R. Baird, Step Ladders.—16,294, H. Bassett, Window Sash Fasteners.—11,454, R. Hunter and J. Turnbull, Kitchen Ranges.

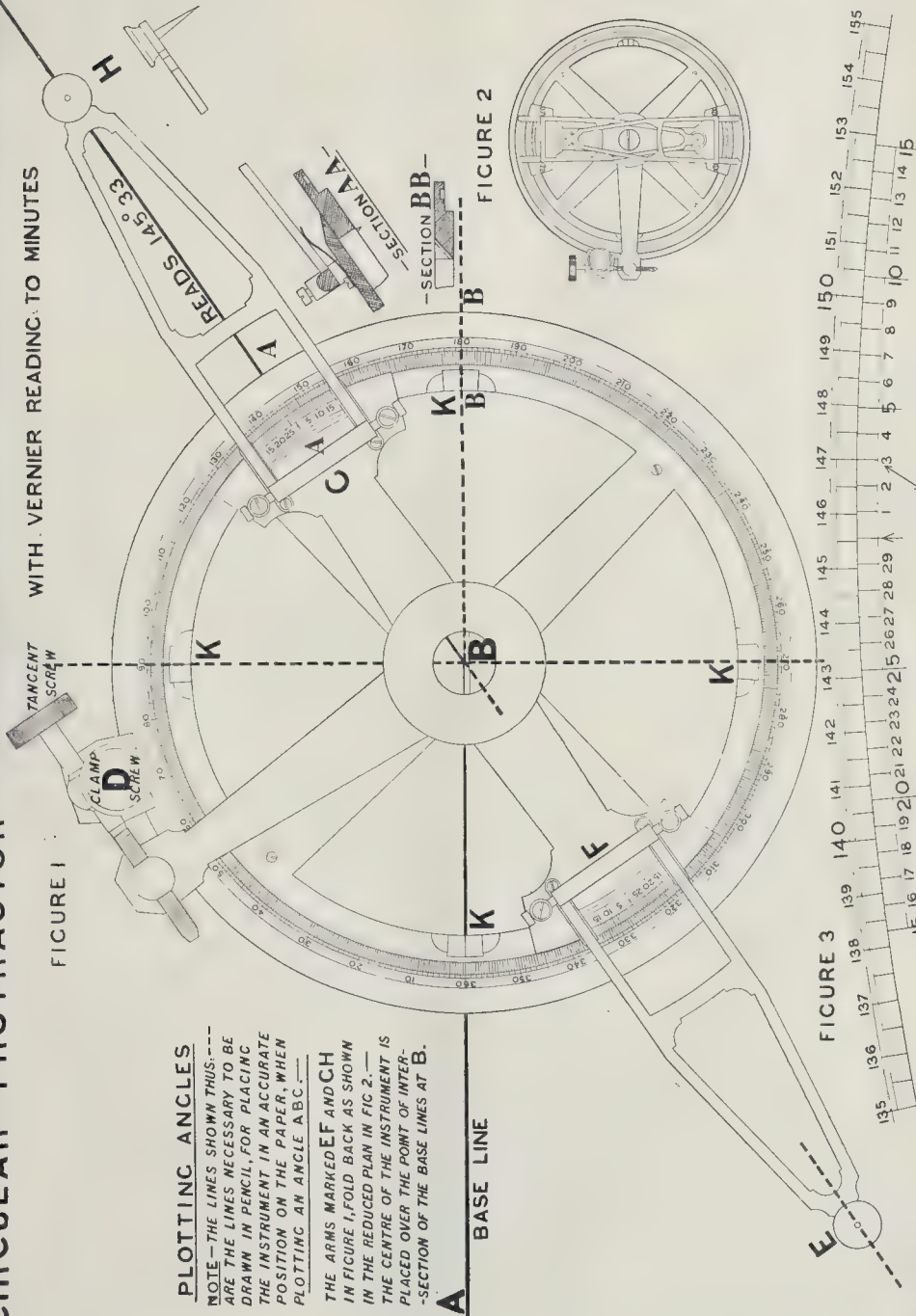
## The Student's Column.

### LAND SURVEYING AND LEVELLING.

#### VII.—CIRCULAR PROTRACTOR.

**P**ROTRACTORS are made into various shapes and sizes; the circular forms are the most accurate. The plain circular protractor has its outer circumference bevelled off to a thin edge, and is marked with radial lines indicating degrees and subdivisions of a degree, which are marked off upon paper with a needle point when required for purposes of plotting. The centre of the circle at which the angle is situated is marked upon the centre of the edge of a fixed bar, which crosses the hollow inner space in the instrument, and which is so constructed that the bevelled edge of this bar gives a true line through the centre of the protractor joining the zero point upon the outside edge with the division indicating 180°. In some instruments a revolving arm is fixed so as to project beyond the circumference. One edge of this arm forms a radial line from the centre of the circle, and, when a vernier scale is attached, the arrow or zero point upon the vernier comes upon this radial line. In the best instruments folding arms are attached as shown in fig. 1, and also to a reduced scale in fig. 2. These folding arms can be fixed in any required position by means of the clamp screw marked D. The complete circle is here graduated into degrees and half-degrees, and the vernier read to minutes. The folding arms and apparatus connected with them, to which the verniers are attached, are fixed upon a frame, the whole of which can be made to move when the clamp D is slackened, round the centre of the instrument. The detail of the attachment of the folded arms is shown in the section A A. It will be observed that, instead of the projecting arm lying flat upon the paper, as in the plain form of instruments, a sharp point, marked H, is fixed to the end of each arm, which, by light pressure with the hand, will leave a small hole upon the paper, and the line joining the points so marked by each arm will pass through the centre of the circle, and will correspond in a line with the reading of the instrument. The spring shown in the section A A at the joint of the folding arm with the vernier frame enables the point H to become automatically removed from the drawing-paper directly the required position has been marked and the pressure of the hand above it is taken off. The short marks K upon the inner circumference of the circle are engraved upon bevelled edges, as shown in fig. 1 and the section B B. These are placed so that lines joining them cross one another at right angles through the centre of the instrument. The centre of the instrument is sometimes made of glass with fine lines across it in the direction of the lines K K, and the centre is sometimes engraved upon the bevelled edge of a semicircular piece as indicated at B. In order that the line drawn through the points H H passing through the centre of the instrument may cross the two opposite marks K K at zero and 180°, and be at right angles to the line joining the marks K K at 90° and 270°, when the verniers read zero and 180° respectively, the zero points upon the vernier scales are placed in the centre of each scale.

CIRCULAR PROTRACTOR



**PLOTTING ANGLES**  
NOTE—THE LINES SHOWN THUS:---  
ARE THE LINES NECESSARY TO BE  
DRAWN IN PENCIL, FOR PLACING  
THE INSTRUMENT IN AN ACCURATE  
POSITION ON THE PAPER, WHEN  
PLOTTING AN ANGLE ABC.  
THE ARMS MARKED EF AND GH  
IN FIGURE 1, FOLD BACK AS SHOWN  
IN THE REDUCED PLAN IN FIG. 2.—  
THE CENTRE OF THE INSTRUMENT IS  
PLACED OVER THE POINT OF INTER-  
SECTION OF THE BASE LINES AT B.

**A** BASE LINE

WITH VERNIER READING TO MINUTES

FIGURE 4

FIGURE 2

FIGURE 3

NOTE—HERE THE VERNIER READS 145° 33'.



To set the verniers to any required angle, say,  $145^{\circ} 33'$ , for the purpose of plotting the angle  $A B C$ : having determined the exact position of the station B by scaling its length from the station A, in the given direction A B, the line A B is temporarily extended in length by ruling a pencil line towards the  $180^{\circ}$  mark, and another pencil line at right angles to it of sufficient length that the marks K may be each set upon these lines when the centre of the instrument is placed over B and the mark K at zero comes on the base-line A B. The projecting arms are then opened and travelled round with the hand, by moving the frame at or near D, until the arrow upon the vernier coincides with the nearest division upon the primary scale to the reading required. In the present case this would be  $145^{\circ} 33'$ , as shown in fig. 4. The clamp D is then fixed, and the vernier is set to  $145^{\circ} 33'$  by means of the tangent screw (see fig. 1). The actual position required is indicated in fig. 3. It should be remembered that the tangent screw is only intended to be applied for adjusting the subdivisions upon the vernier scales to any addition required, which cannot be accurately set by eye upon the primary scale marked upon the continuous circle of divisions.

## RECENT SALES OF PROPERTY.

## ESTATE EXCHANGE REPORT.

JULY 26.

By Messrs. COGS (at Rochester).	
Snodland, Kent—Two plots of freehold land	2,070
The Cottage, and 4a Or. 6p, freehold	850
The freehold blacksmith's shop and forge	650
Rochester—48 and 50, High-street, freehold	1,770
178 and 177, High-street, 7 years, ground-rent 3s.	400
178, High-street, 15 years, ground-rent 2s.	200
An enclosure of freehold land, 7a, Or. 6p.	4,050
14, Bevington-street, freehold	1,650
8 and 9, Railway place	180
Chatham—48 and 50, High-street, freehold	2,000
32, Cape-lane, freehold	145
Brompton—3, Prospect-road, freehold	300
Gillingham—43, Medway-road; and five cottages, freehold	400
Lower Upper—The Rose Meadow, 2a, 3r. 6p, freehold	230
Cooling—Enclosures of freehold land, 10a, 3r. 25p.	800

JULY 27.

By CHINNOCK, GALWATHERY, & Co. (at Leeds).	
Belby, near to—The Carlton Towers Estate—	
Cat Babbleton Farm, 3a, 1r. 37p, freehold	950
Chester Court Farm, 23a, 1r. 23p, freehold	6,360
Manor House Farm, 76a, Or. 20p, freehold	3,000
Myl Hill Farm, 52a, 1r. 36p, freehold	1,650
Drax Hall, and 33a, 2r. 35p, freehold	14,000
Castle Farm, and 98a, 1r. 25p, freehold	2,600
Small freehold farm, 61a, Or. 23p.	2,600
Small freehold farm, 99a, Or. 34p.	3,950
Small freehold farm, 78a, 3r. 34p.	3,950
Freehold marsh land, 128a, Or. 39p.	5,700
Two enclosures of grazing land, 4a, Or. 22p, freehold	285
Numerous cottages and plots of land, 7a, 3r. 11p, freehold	1,695

AUGUST 2.

By A. RICHARDS.	
Tottenham—16, 17, and 23, Lansdown-road, freehold	575
3, Townsend-road, freehold	275
By OSBORNE, TEWSON, & Co.	
Covent Garden—3, Gerrard-street, freehold	3,000
White Chapel—143 and 147, Leman street, freehold	2,000
Bethnal Green—1, 4, and 5, Buckhurst-street, freehold	1,040
Mill End—24, St. Peter's-road, 40 years, ground-rent 3l. 10s.	250
East Ham, Purley Marsh—Freehold land, 10 acres	1,425
Wrotham, Kent—Two freehold enclosures of land, 4a, 3r. 19p.	360
By CHINNOCK & Co. (at Midhurst).	
Midhurst—Enclosures of freehold land, 21a, Or. 28p, in eight lots	4,425

AUGUST 3.

By SLADE & BUTLER.	
Worcester—The residence called Blanquette, and 43a, 2r. 22p, freehold	6,500
By OSBORNE, TEWSON, & Co.	
Belgrave-square—23, Motcombe-street, 41 years, ground-rent 6l., and reversion for 25 years	2,900
By MADDOX & SON.	
Dorset-square—29, Dorchester-place, 57 years, ground-rent 6l. 10s.	680
30 and 31, Dorchester-place, 57 years, ground-rent 11l.	1,275
Canden-road—39, Tottenham-avenue, 67 years, ground-rent 7l.	450
3, Herbrand-street, 69 years, ground-rent 3l. 3s.	350
Gunterbury—26 and 25, Bradenburgh-road, 77 years, ground-rent 14l. 14s.	780
By B. L'ANSON BARRETT.	
Southwark Bridge-road—Nos. 139 to 145 odd; 7, 8, and 9, Lombard-street; and 5, 6, and 7, South Sea-court, freehold	2,700
Ground-rent of 28l. a year reversion in 18 years	1,800
Peckham—18 to 99 even, Lyndhurst-grove, freehold	2,285
Canberchell—4 and 6, Crawford-street, 46 years, ground-rent 7l.	555
Mitcham, Field Gate—Six copyhold cottages	370

AUGUST 4.

By VENTON, BELL, & COOPER.	
Notting Hill—Freehold ground-rent of 52l. a year	1,260
West End—Freehold house, and 1a, Or. 6p.	400
Clay Hill—Aad—An enclosure of land, 3a, 3r. 4p, freehold	600

By W. W. JENKINSON.	
Kentish Town—9, St. Ann's-gardens, 62 years, ground-rent 6l.	2,280
4, St. John's-gardens, 63 years, ground-rent 6l.	280
By E. J. GARDNER.	
Tottenham Court-road—No. 50, freehold	2,210
By HARRIS BROS.	
Plaiestow—114, Broadway, 91 years, ground-rent 6l. 6s.	210
By WAGSTAY & WATTS.	
Highbury New Park—No. 37, term 62 years, ground-rent 15s.	1,300
By WALKER & RUNTZ.	
New Cross-road—No. 360, 42 years, ground-rent 5l.	310
By TUNLEY & Co.	
Catford, Bromley-road—The residences called Bracklynns and Belmoot, 90 years, ground-rent 24s.	750

## Miscellaneous.

**Sales of Building Land at Addlestone and Brighton.**—Last week Messrs. Baker & Sons conducted a sale of building land at Addlestone, Surrey, situated between Weybridge and Chertsey and Virginia Water. The property offered consisted of 154 plots, including two corner hotel sites, several shop plots, and other plots adapted for the erection of medium-sized houses. Most of the plots submitted have frontages of 15 ft. and depths varying from 70 ft. to 90 ft., and nearly the whole of these were sold at prices ranging from 9l. to 11l. each. It should be stated that before the sale commenced the auctioneer announced that twelve of the plots had just been sold by private contract for an aggregate sum of 180l. Three corner plots, having frontages of 17 ft. and depths of 108 ft., were sold for 17l. each. One of the hotel plots, having a frontage of 34 ft. to Liberty Hall-road, and a return frontage of 108 ft. to Conquest-road, was sold for 36l. 10s., and the other hotel plot, having a frontage of 30 ft. to the same road, and a depth of 87 ft. to Pear-tree-road, realised 25l. For upwards of 30 of the plots, the highest offer was 8l. 15s. each, on which they were withdrawn, the auctioneer stating that his reserve was 9l. 10s. per plot. The prices realised for the lots sold averaged from 400l. to 600l. an acre, and the total proceeds of the sale amounted to about 1,500l. On Monday last Messrs. Baker & Sons submitted for sale at Portside, Brighton, 107 plots of building land, forming the Brighton View Estate. The estate is situated at Portside, about three miles west of Brighton. It stands on high ground, commanding extensive views of Brighton and the neighbourhood, also fine views of the sea. The plots offered included a large hotel site, having a frontage of 40 ft. to South Sea View, and a return frontage of about 60 ft. to Brighton View, together with grounds attached, the whole covering an area of between 9,000 and 10,000 ft. Also several house and shop plots having frontages to the high road, Brighton View, Ocean View, Fair Sea View, and South Sea View. The whole of the plots offered were readily disposed of. With a few exceptions, they have all frontages of 15 ft. and depths of 60 ft., the prices realised being from 7l. to 8l. per plot; a few other plots, having frontages of 16 and 17 ft. realising from 10l. to 12l. each. There was a very close and severe competition for the hotel plot. The biddings commenced at 40l., and the plot was ultimately sold for 92l. 10s. The prices at which the several lots were sold represented an average of about 350l. an acre.

**London and County Banking Company (Limited).**—The balance-sheet of this company for the half-year ending June 30th last is published in our advertisement columns. The directors report that, after paying interest to customers and all charges, also 23,660l. 18s. 9d. bonus to officers (under resolution of Meeting of 3rd of February last), making provision for bad and doubtful debts, and for 24,435l. 3s. 3d. rebate on bills not due, the net profits amount to 185,689l. 7s. 7d. This sum, added to 35,581l. 19s. 10d., the balance brought forward from last account, produces a total of 219,288l. 7s. 5d. The directors have declared an interim dividend for the half-year of 10 per cent., which will absorb 200,000l., leaving the sum of 19,288l. 7s. 5d. to be carried forward.

**"A Hygienic Bakery."**—Referring to the notice in our last of Messrs. Hill & Sons' new bakery, Mr. C. H. Mabey writes to ask us to mention that he executed the whole of the full-size models for the enriched parts of the building, with the exception of the four panels above the name-plate.

**Crystal Palace Engineering School.**—The summer term closed on Saturday, when the certificates awarded to the students were presented in the singularly-elevated and not easily accessible lecture theatre of the school, near the top of the south tower of the Palace. Mr. William Shelford, F.G.S., F.S.S., C.E., presided. The examiners of the work of the students during the term were, for the Mechanical Engineering Section and the Colonial Department, Mr. W. N. Colam, C.E., M.E.; and, for the Civil Engineering Section, Mr. Henry Law, C.E. After a short address from the chairman Mr. Shenton read the examiner's report. The lectures for the term were on "Railways, their Construction and Appliances." Thirty-three students attended the lectures, to fourteen of whom, a smaller proportion than usual, certificates were awarded. The highest number of marks attainable is 268. B. G. Lloyd was first, with 224 marks. One of the students refused to accept the order of merit awarded to him by the examiners for lecture questions and for work in the drawing office. The other firsts in the various departments were as follows:—Drawing Office, A. W. Pearson; Pattern Shop, E. A. Glover; Fitting Shop, H. P. Miles. Second year's course Civil Engineering, General Surveying, and Preparation of Plans for Parliament, E. J. Bowman; Calculations, Plans, and Estimates for a Railway and Dock, W. E. Underwood; Design and Construction of Existing and other Engineering Works, W. J. Bowman and E. J. Prew, equal firsts. Mining Engineering, J. H. Chute. Eight certificates were also awarded in the Colonial Section. Mr. J. Bosman, a Hong Kong Queen's Scholar, and *primus* student at the Crystal Palace School for this term, was presented with the Bronze Medal awarded to students who have taken nine certificates, all third, or higher, in order of merit. He was greeted with prolonged and hearty applause by his fellow-students. Mr. Law, examiner, and Mr. Walmisley, a former examiner, also addressed the students. Mr. J. W. Wilson, Principal of the School, referred, in an interesting address, to the kindness they met with at the hands of engineering authorities. Mr. Kirtley, Locomotive Superintendent of the Chatham Railway, had afforded 400 of their students opportunities of learning something of locomotive driving by riding upon the engine. In their annual visit to Dundee Mr. Barlow kindly told off a steam tug for their use in examining the works of the Tay Bridge; a like courtesy had been shown them when they visited the Forth Bridge on the following day; and the Admiralty authorities had done the like to facilitate their inspection of the fort at Spithead. Mr. Wilson gave an interesting account of a former student, Mr. Thomas Birch Freeman, who is now in a responsible office at Cape Coast, on the engineering staff, and receiving 3000 a year and allowances. The usual votes of thanks closed the proceedings.

**Shah Jehan Mosque.**—The first mosque ever erected in this country is about to be built at the Oriental University, Woking, from designs of Mr. W. L. Chambers. The style selected is Saracenic, and the drawing shows a large central dome, surrounded by minarets, and comprises the usual court-yards, sacred tanks, &c., and will be complete in every respect. The site adjoins the Salar Jung Indian Memorial House, which is of a refined type of Northern Indian architecture, and is now in course of construction from the designs of the same architect. We hope to illustrate both buildings in an early number.

**The Court Theatre, Lower George-street, Chelsea.**—Being about to be pulled down to make way for some extensive improvements on Lord Cadogan's estate, a new theatre is about to be built to replace that which is to be pulled down, by Mr. John Clayton, on a site adjoining the Sloane-square station of the Metropolitan District Railway. The theatre will accommodate about 800 persons, and will be almost wholly constructed of fire-resisting materials. Mr. Walter Emden and Mr. W. E. Crewe are the joint architects of the building, which is proposed to be opened at Christmas.

**Carpenters' Hall.**—The Worshipful Company of Carpenters will hold a second exhibition of works in wood at their Hall, London-wall, London, in the early part of next year. Full particulars as to time and conditions will be advertised as early as possible in October.



**Beaumaris Sewerage.**—The dispute between the contractors and the Beaumaris Council has ended in an arbitrator being appointed by the Court of Queen's Bench. The gentleman selected is Mr. Edward Pritchard, C.E., who will shortly proceed with the reference in Beaumaris. The plaintiffs in this case are Messrs. John Hughes and Charles Hooper, of Chester and Liverpool.

**Sanitary Institute of Great Britain.**—The society have received the preliminary programme for the tenth Autumn Congress, of this Institute, which is to be held at Bolton from September 20th to September 24th. The programme includes sanitary apparatus, appliances, in connexion with the Congress, will be held in the Drill Hall and special building, Silverwell-street, from September 20th to October 15th.

**PRICES CURRENT OF MATERIALS.**

TIMBER.		2. s. d.	2. s. d.
Heart, B.G.	ton	5 10 0	7 10 0
Red, E.I.	load	5 10 0	13 0 0
Canada, U.S.	load	0 2 3	0 3 0
Canada, U.S.	load	3 0 0	4 10 0
Canada, U.S.	load	2 0 0	3 10 0
Canada, U.S.	load	3 10 0	4 10 0
Dantzie, &c.	load	1 10 0	4 0 0
Dantzie, &c.	load	2 10 0	4 10 0
Dantzie, &c.	load	3 0 0	6 0 0
Canada, red	load	3 0 0	4 10 0
Canada, red	load	3 0 0	4 0 0
Dantzie, &c.	load	3 0 0	6 0 0
Petersburg	load	4 0 0	6 10 0
Riga	load	0 0 0	0 0 0
Odesa, crown	load	2 10 0	3 0 0
Finland, 2nd and 3rd, std. 100	load	7 10 0	8 0 0
Finland, 4th and 3rd	load	5 10 0	6 10 0
Petersburg, 1st yellow	load	8 0 0	13 0 0
Petersburg, 2nd	load	7 0 0	8 0 0
Petersburg, white	load	6 10 0	8 10 0
Sweden	load	0 0 0	0 0 0
White Sea	load	0 0 0	0 0 0
Canada, Pine, 1st	load	18 0 0	24 0 0
Canada, 3rd	load	10 0 0	15 0 0
Canada, Spruce, 1st	load	8 0 0	9 0 0
Canada, 3rd and 2nd	load	5 0 0	7 0 0
Canada, Brunswick, &c.	load	5 0 0	6 10 0
Canada, all kinds	load	4 0 0	10 10 0
Canada, 1st	load	0 0 0	0 11 0
Canada, 2nd	load	0 0 0	0 7 0
Canada, 3rd	load	0 0 0	0 0 0
Canada, 4th	load	0 0 0	0 3 0
Canada, 5th	load	0 0 0	0 3 0
Canada, 6th	load	0 0 0	0 3 0
Canada, 7th	load	0 0 0	0 3 0
Canada, 8th	load	0 0 0	0 3 0
Canada, 9th	load	0 0 0	0 3 0
Canada, 10th	load	0 0 0	0 3 0
Canada, 11th	load	0 0 0	0 3 0
Canada, 12th	load	0 0 0	0 3 0
Canada, 13th	load	0 0 0	0 3 0
Canada, 14th	load	0 0 0	0 3 0
Canada, 15th	load	0 0 0	0 3 0
Canada, 16th	load	0 0 0	0 3 0
Canada, 17th	load	0 0 0	0 3 0
Canada, 18th	load	0 0 0	0 3 0
Canada, 19th	load	0 0 0	0 3 0
Canada, 20th	load	0 0 0	0 3 0

METALS.							
Iron—Bar, Welsh, in London.....	ton	4	7	6	4	15	0
"      "							

OILS.		20 7 6	20 10 0
Coconut, Ceylon	ton	20 7 6	20 10 0
Ceylon	ton	24 0 0	0 0 0
Alma, Lagos	ton	24 0 0	0 0 0
Pressed, English pale	ton	23 5 0	23 10 0
Pressed, brown	ton	21 15 0	22 0 0
Refined, refined	ton	20 15 0	0 0 0
Alma and Olenia	ton	25 0 0	45 0 0
Refined, U.S.	ton	6 0 0	6 0 0
Refined	ton	5 0 0	12 0 0
AMERICAN	ton	1 5 0	0 0 0
American, in casks	ton	1 5 0	0 0 0
Stockholm	barrel	0 14 0	0 14 6
Archangel	barrel	0 9 8	0 10 0

**COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.**

*Epitome of Advertisements in this Number.*

**COMPETITIONS.**

Nature of Work.	By whom required.	Premium.	Designated to be delivered.	Page.
Swimming, Private, and Turkish Baths	Gloucester Cor.	50l. and 25l.	October 1st	ii.

**CONTRACTS.**

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Renewal of Two Draw-Bridges	War Department	Official	August 20th	ii.
Collection of Refuse	Tottenham Local Board	do.	August 23rd	ii.
Wood Fencing	East Cotes Local Board	J. R. Mann	do.	ii.
Wrought-Iron Railings	do.	do.	do.	ii.
Taking Down and Rebuilding Bridge	Kent Justices of the Peace	P. W. Ruck	do.	ii.
Oak Park Fencing	Gt. Yarmouth Town Cl.	J. W. Cockrill	August 24th	ii.
Four Beam Pumping Engines	Leicester Corporation	Official	August 25th	ii.
New Church, Aston Green	do.	E. Monson, Junr.	do.	ii.
Building Nursing Institute, Taunton	Hospital Committee	J. Houghton Spencer	August 26th	ii.
Various Works to Workhouse Buildings	Cheltenham Union	do.	August 30th	ii.
John Robinson, Ashton-under-Lyne	do.	do.	do.	ii.
Allen Holmes, Ashton-under-Lyne	do.	do.	do.	ii.
School, Caretaker's House, &c.	Burton-on-Trent Sch. B.	R. Churchill	Sept. 1st	ii.
Sewers, Depot Tanks, &c.	Ashford Local Board	Official	Sept. 7th	ii.
Construction of Reservoir	Belper Union	Blackwell	Sept. 8th	ii.
Formation of Footpaths, Penning, &c.	Met. Board of Works	Official	Oct. 4th	ii.
Enlargement of School	Schl. Board for London	do.	Not stated	x.
Bourne-Wall and Making-up Roadway, &c.	Willenden Paper Works	do.	do.	x.

**PUBLIC APPOINTMENTS.**

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Private Drainage Inspector	West Bromwich Cor.	100l. per annum	August 25th	xiv.
Diocesan Surveyor	Bristol	Not stated	August 27th	xiv.

**TENDERS.**

<b>ASHTON-UNDER-LYNE.</b> —For alterations to warehouses, for Mr. W. Brown. Mr. J. H. Burton, architect, Ashton-under-Lyne.		£385 8 10
Marland & Myles, Ashton-under-Lyne		377 12 7
John Robinson, Ashton-under-Lyne		333 15 0
Allen Holmes, Ashton-under-Lyne		313 19 0
Castle Hall Saw Mills Co., Stalybridge		313 15 0
Thomas Suddaby, Ashton-under-Lyne		3 19 6
Aaron Napier, Ashton-under-Lyne		304 10 0
J. W. Williamson, Ashton-under-Lyne		301 14 6
Thomas Deap, Ashton-under-Lyne		294 11 9
<b>AUDENSHAW.</b> —For laying 12-in. earthenware pipe sewer in Audenshaw-road, from Cross Gate to near the London and North-Western Railway bridge, for the Audenshaw Local Board. Mr. J. H. Burton, surveyor, Ashton-under-Lyne.		£270 0 0
W. Mountain, Salford		270 0 0
James Charlesworth, Ashton-under-Lyne		242 10 0
Marland & Myles, Ashton-under-Lyne		223 12 9
Worthington & Powell, Manchester		161 3 0
Charles Wainman, Audenshaw		170 8 0
Robert Irwin, Ashton-under-Lyne		150 0 0
[Surveyor's estimate, 208l. 15s.]		* Accepted.
<b>AUDENSHAW.</b> —For laying a 24-in. by 16-in. brick culvert and a 12-in. earthenware pipe sewer in Audenshaw-road, from near the London and North-Western Railway bridge to Trail Dog Bridge, for the Audenshaw Local Board. Mr. J. H. Burton, surveyor, Ashton-under-Lyne.		£816 12 8
W. Mountain, Salford		816 12 8
Marland & Myles, Ashton-under-Lyne		556 12 6
Worthington & Powell, Manchester		546 15 0
James Charlesworth, Ashton-under-Lyne		490 0 0
Lyne		475 15 4
Robert Irwin, Ashton-under-Lyne		395 10 0
[Surveyor's estimate, 464l. 18s. 4d.]		* Accepted.
<b>BARNES.</b> —For alterations and repairs to the Bouleau Arms public-house, Barnes. Mr. J. G. Needham, architect, Lower Clapton.		£1,414 0 0
J. Chappell, Pinlicko		1,385 0 0
A. Sale, Barnes		1,385 0 0
G. Warner, Hackney		1,381 0 0
F. & C. Collin, Barnes		1,310 0 0
J. Walker, Limehouse (accepted)		1,150 0 0
<b>Peckering.</b>		£298 0 0
Phillips		98 0 0
Skinner		94 0 0
Warner (accepted)		94 0 0
<b>Gagging.</b>		£25 0 0
Lowe & Son, Barnes (accepted)		81 0 0
Stedman		81 0 0
<b>BIRMINGHAM.</b> —For the extension of the Aston Workhouse. Messrs. Dunn & Hipkiss, architects.		£16,201 0 0
J. Mollis, Birmingham		16,180 0 0
S. Surman, Birmingham		16,776 0 0
W. J. Webb, Birmingham		15,743 0 0
J. Mallin, West Bromwich		15,383 0 0
W. Sapote & Son, Birmingham		15,280 0 0
W. Bloore, Aston		14,986 0 0
W. Bissell & Sons, Birmingham		14,875 0 0
J. Harley & Son, Smethwick		14,871 0 0
J. Wilson & Son, Handsworth		14,858 0 0
J. Smith & Son, Birmingham		14,850 0 0
Jeffery & Son, Birmingham		14,763 0 0
W. Robinson, Birmingham		14,763 0 0
S. Taylor, Birmingham		14,763 0 0
J. Rowbotham, Birmingham		14,695 0 0
J. Garlick, London		14,469 0 0
J. Barnsley & Sons, Birmingham		14,314 0 0
Barker & Son, Handsworth		14,250 0 0
J. Hughes, Handsworth		13,955 0 0
H. Willcock, Wolverhampton		13,477 0 0
* Accepted.		
<b>BOURNEMOUTH.</b> —For additions to The Pine, Winton, for Messrs. Eldridge, Pope, & Co. Messrs. Kemp-Welch & Pinder, architects.		£165 0 0
Francis, Winton (accepted)		165 0 0
<b>BOURNEMOUTH.</b> —For additions and repairs to Rectory and stables, Manor-road, for Mr. J. Roberts Thomson, M.D. Messrs. Kemp-Welch & Pinder, architects.		£216 0 0
George & Harding		216 0 0
Jenkins & Sons (accepted)		267 0 0
<b>BOURNEMOUTH.</b> —For the election of a club room at the South-Western Hotel, for Messrs. Eldridge Pope & Co. Messrs. Kemp-Welch & Pinder, architects.		£398 0 0
F. Walden		398 0 0
J. Hards		360 0 0
A. H. Stroud		350 0 0
S. H. Morse		350 0 0
G. H. Rolis (accepted)		358 0 0
<b>CHESTER.</b> —For re-pewing the Methodist New Connexion Chapel, Pepper-street, Chester. Mr. J. H. Burton, architect, Ashton-under-Lyne.		£231 0 0
George Forester, Chester		336 12 0
Henry Pearson, Chester		330 0 0
Robert Jones, Chester		306 0 0
John Mayers, Chester		288 4 0
G. & H. Wright, Kelsall (accepted)		208 13 2
[Architect's estimate, 310l.]		
<b>Painting.</b>		£43 0 0
William Fritchard, Chester		35 3 6
James Priddy, Chester		29 15 0
Issac Watkin, Chester (accepted)		29 15 0
<b>CHRISTCHURCH (Hants).</b> —For erection of the White Hart Hotel, for Messrs. Eldridge, Pope, & Co. Messrs. Kemp-Welch & Pinder, architects, Bournemouth.		£1,823 9 8
J. Groke, Moorndon		1,638 10 9
F. Walden, Christchurch		1,627 0 0
A. H. Stroud, Bournemouth		1,627 0 0
W. Stanley, Bournemouth		1,675 0 0
G. James, Bournemouth		1,668 0 0
Davis & Lambert, Bournemouth		1,629 0 0
G. Walden, Bournemouth		1,600 0 0
Jenkins & Sons, Bournemouth		1,607 8 0
J. B. Hyde, Christchurch		1,490 0 0
G. H. Rolis, Bournemouth		1,490 0 0
* Accepted.		
<b>CLACTON-ON-SEA.</b> —For two houses and shops at Clacton-on-Sea, for Mr. G. Moore. Mr. T. A. Crespy, architect.		£2850 0 0
Demand		825 0 0
Allen		750 0 0
Day		733 0 0
Dupont		611 0 0
Chambers		698 0 0
Hook (accepted)		587 0 0
<b>CLAPHAM.</b> —For sundry works to be done at The Lawn, Clapham Common, for the Girls' Public Day School Company, Limited. Mr. J. Osborne Smith, architect.		£113 0 0
H. & C. Davis & Co.		91 0 0
Exton & Burton		74 0 0
W. H. McLachlan		70 0 0
Barrett & Power		70 0 0
<b>DEPTFORD.</b> —For the enlargement of the Deptford Lower-road School (Greenwich A <sup>2</sup> ) by 400 places, for the School Board for London. Mr. T. J. Bailey, architect.		£4,289 0 0
S. J. Jerrard		4,200 0 0
Stimpson & Co.		4,168 0 0
H. Hart		4,168 0 0
J. Holloway		4,094 0 0
C. Wall		3,983 0 0
H. Holloway		3,823 0 0
Altherton & Latta		3,149 0 0
W. Johnson		3,149 0 0
* Recommended by the Works Committee for acceptance.		
† Withdrawn, owing to error in casting.		



& SONS, La Belle Sauvage-yard, Ludgate  
Hill, London. [ADVT.]



# The Builder.

VOL. LIII. No. 2354

SATURDAY, AUGUST 20, 1897.

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### Dalmatian and Istrian Architecture.



THE large and admirably illustrated work on the architectural remains of the eastern coast of the Adriatic, which has been brought out by Mr. T. G. Jackson,\* is the first attempt at anything like a complete description and illustration of a group of architectural remains about which there has been a kind of spasmodic interest excited from time to time, and at long intervals, but about which, with the exception of Diocletian's palace at Spalato, no one in England has till lately known or heard much in a collected manner. Fergusson devotes a considerable space to Spalato, or Spalatro as it was then called; but the names of Ragusa, and Zara, and Traù, and Sebenico are unknown in his comprehensive survey of the architectural remains of the world. More recently Professor Freeman has broken ground on the subject in his collection of essays on the "Subject and Neighbouring Lands of Venice," in which the architectural remains of some of the principal papal towns of the locality are described with a zeal and enthusiasm which is not always according to knowledge, and the effect of which the author did his best to nullify by the juxtaposition of the inaccurate and ill-executed sketches which adorned such a ludicrous comment on the glowing descriptions of the buildings which they were supposed to represent. The book was not one to recommend itself to architects, but the few who did read it probably came to the conclusion that there might be a new and fruitful field there for the architectural sketcher, at all events, if not for the architectural student. In the mean time a competent observer and an artistic draughtsman was laying the foundation for an illustration of the district more worthy of its real architectural interest, which will be rendered fully obvious for the first time, to those who have not visited the neighbourhood itself, by Mr. Jackson's elaborate descriptions and numerous drawings. For all real purposes of architectural illustration Mr. Jackson is (except, of course, in regard to Spalato) practically first in the field, and he has made the most of it. In the course of three apparently tolerably lengthy visits he has collected as much information and as many illustrations as could well be comprised in one

book, and though it is likely that Dalmatia and Istria will now be more or less popularised and become a new hunting-ground for the company of architectural sketchers, there is no probability that Mr. Jackson's book will be superseded for a long time to come.

Robert Adam's monograph on "Spalatro" is, of course, a classical work in architectural illustration, though we imagine it had dropped very much out of the minds of architectural students until Fergusson drew attention to the importance of this building in the history of the transition from the column to the arch. Adam went to study and measure it (which he did under great difficulties from official and non-official interference), mainly as the only known example of the plan of a great Roman mansion, of which sufficiently intelligible remains were left. He also, however, seemed struck with the suggestiveness of its style, and of the arched openings with the cornice members carried round them; and, speaking of the elevation of the Porta Aurea, with its circular-headed windows, adorned by projecting shafts carried on brackets, he makes the rather odd remark,—"It appears to have been from something of this kind that Palladio and other architects of his time have adapted the modern Venetian window." But, passing over this well-known book on an always celebrated monument, it may be a surprise to him to whom Ragusa, and Traù, and Sebenico are almost new names, to find that the architectural remains of these and other places on the east coast of the Adriatic, were visited and described with considerable appreciation by an English traveller as early as 1675. Mr. George Wheler, in company with "Dr. Spon of Lyons," in that year visited a good many of the places now illustrated by Mr. Jackson, and produced a volume of goodly size recounting his observations in this neighbourhood and in other parts of Eastern Europe. His special object was not architecture, it is true; he had various interests, among others that of botany, and went "asimpling" when he arrived at Istria; "a curiosity which seldom failed to give me satisfaction when all other diversissements were wanting; and there I found *Scapoides limonis foliis* and *Limonium reticulatum*," &c. But Mr. Wheler had an eye for things of architectural and archaeological interest, and a considerable contempt for those who could not share his enthusiasm. "As to the matter contained in this book," he observes, "I have no reason to be ashamed of it, although I do not expect it should escape censure. For I know some will say, why does he treat us with insipid descriptions of weeds, and make us huddle with him over broken stones, decayed buildings, and old rubbish? But, these being things their

curiosity does not extend to, I should but trifle in giving them a serious answer." The illustrations are curious enough, in that kind of half map, half bird's-eye view, which was once so much practised in the illustration of towns and buildings; and, even in this naive form of illustration, Mr. Wheler got into difficulties with his engraver. "In the figure of Zara, the bastions of the walls of the town ought to be round, as I have described them, although I find in the figure, both he that designed it after my sketch [*sic*] and the engraver after him have made it square." Possibly Mr. Wheler's original drawings were not much better than Professor Freeman's, and, in spite of the licence taken by the engraver, it may have been as well for him that he had not the chance of getting them reproduced photographically, like the modern amateur sketcher referred to. But he duly chronicles the architectural objects of each place visited; notes the dome (i.e., cathedral—"Duomo") of "Sebenico" as "much praised by the Venetians, being all of marble and the architecture very good,"—the expression "all of marble" possibly includes a reference to that peculiar roof construction at Sebenico to which we shall refer again; is much pleased with Traù, "the dome well built and ancient"; and suggests that "Spalatro, or, as some call it, Spalatro, seemeth to be a corruption of the word *palatium*," in which he was probably right. The French and English travellers seemed to have differed here, for he adds,—"It hath a square tower at each corner and three gates, and with M. Spon's favour no more, that side to the sea having none, according to the best of my remembrance"; but here, according to Adam's plan, which both Fergusson and Mr. Jackson follow,\* both travellers might think themselves right, for there is a small entry from the crypto-porticus, but only three important entrances, on the three other sides.

It is curious that the decided evidence given by Wheler, though in an amateurish kind of way, in regard to the existence of important and fine architectural work in this part of the world, should have been adequately followed up by no one until quite recently; and that even an accomplished architect and very wide-awake man like Robert Adam should have spent so much time over Spalato without going aside to look after what might be found in any of the neighbouring places. But the region was out of the way and difficult of access; nor is it evidently, very commodious travelling there now. Spalato had a special fame, and Adam, who had generally an eye to business, went there to get what he wanted in as short a time

\* Dalmatia, the Quarnero, and Istria, with Cattigue in Montenegro and the Island of Grado. By T. G. Jackson, M.A., F.S.A., Hon. Fellow of Wadham College, Oxford. Clarendon Press: Oxford. 1897.

\* It is odd that Fergusson repeats the common popular error about the architect's name, giving the plan as "from Adams."



as possible. Nor is it likely that he would have appreciated Traù and Ragusa had he seen them. They would have been in his eyes examples only of a barbarous and corrupt architecture. Stuart devoted some space in his great work on Greek architecture to the Roman remains at Pola in Istria, the Temple of Rome and Augustus, the Arch of the Sergii, and the theatre with its boldly rusticated order; and Allason, whom Mr. Jackson seems to have overlooked, produced in 1819 a fine folio on the same subject, illustrated by some beautifully-executed engravings by George Cooke, and accompanied by a long dissertation on the history of Dalmatia and of Istria, on which Sir Gardner Wilkinson seems to have drawn to some extent in his later work on the neighbourhood in 1848. But Allason, like Sturt, illustrates only the Classic remains; of anything later he takes no note, as far as illustration is concerned. Wilkinson's work on Dalmatia, Montenegro, and Herzegovina does not go much into architectural remains, except in regard to Spalato, on which he dwells at some length, and which he illustrates by some rather tame and mechanical wood engravings, — one of the Porta Aurea and one of a view of the so-called Temple of Jupiter, and some other parts of the remains; engravings which were adopted rather too easily by Fergusson as adequate representations of the remains. He has a good deal to say about many of the other places illustrated by Mr. Jackson, but his views of them are merely picturesque, and only introduce the architecture as a secondary feature in the view.

Paton's book, "The Highlands and Islands of the Adriatic," which followed Wilkinson's a year later, shows more interest in the Romanesque and Medieval remains than any previous writer had shown since the date of Wheler's book, and he understands their value much better than Wheler did, the interest in architecture of this class having now begun to permeate the minds of archaeologists. Of architectural illustration there is not much to speak of; but of intelligent description there is a good deal, so much so, that it is rather curious that buildings so fully described, and the interest of which is so fully recognised by him, should have yet have remained for nearly forty years without any adequate illustration in this country. Paton's description of the cathedral at Sebenico, with its remarkable roof, to which we have before referred, is worth quoting here. He says of it:—

"The peculiar style of Lombardy predominates. The lower part is overlaid with ornament, and two detestable statues of Adam and Eve, standing on each side of the great entrance, look like caricatures of the Apollo Belvidere and the Venus de Medici\* by G. Cruikshank. But the interior is truly grand, not so much in mere dimension as in effect. . . . The roof of the nave is a masterpiece of technical ingenuity, being a semi-cylinder composed of flat flagstones, some of them twelve feet in length, the edges fitting each other with knees and angles, the whole forming an unadorned vault, but so unusual in effect that the spectator, on a superficial view, fears that if one gave way the whole might fall in; but the architect charged with the repairs of the cathedral, having shown me the sections of the edifice, assured me that, serial as the roof might seem, it had a chance of lasting as long as any part of the cathedral."

This is the building, the exterior of which is shown in one of the plates from Mr. Jackson's book, which, by the kindness of the publishers, we are enabled to reproduce (see lithograph). It is, in fact, a most interesting example of what Fergusson always declared to be the great desideratum in a vaulted roof, viz., an outer covering of homogeneous material with the vault and the walls, instead of the perishable timber roofs with which the Medieval builders protected their vaults. Mr. Jackson, who seems to have been as much struck with it as Paton, also gives a full description of it. The exterior effect is not very picturesque, and might be improved upon in that respect; but it is the practical solution of a problem in the construction of a vaulted roof, which Fergusson would have made a good point of in his history, had he

\* The selection of these two statues as typical of classic sculpture is amusingly characteristic of the æsthetic creed of forty years ago.

been aware of it. Paton found metal details to interest him, too. At Curzola he came across an old gentleman who rejoiced in having on his door a superb bronze knocker, representing a Hercules swinging two lions by their tails.

"With a smile of enjoyment he lifted the head of one of the lions, letting it whack against the door so as to make the court ring again. He resumed, 'I have been offered its weight in silver, but we have no fear of thieves in Curzola; if I lock it up in my cabinet, I cease to enjoy the use of it.'"

Signor Boni, who mourns so over the selling of art-treasures at Venice, would have loved that old gentleman.

There must have been a certain amount of interest excited of late years in England about the architecture of Dalmatia and Istria, since the Viennese architect Eitelberger, as quoted by Mr. Jackson, stated that the first edition of his work illustrating some of the buildings had been almost entirely bought up in England. It is gratifying to know that our own country was more forward than any other in appreciating the value of the illustrations of this architectural province; and possibly Eitelberger, whose work was impeded by ill-health and cut short by death, might otherwise have come pretty near to forestalling Mr. Jackson's laurels. Eitelberger's earlier volume, in which he described the Romanesque and Gothic architecture at Arbe, Zara, Traù, Spalato, and Ragusa, we have not seen; in the second one he describes and illustrates the Basilica at Parenzo very fully; giving a chromo-lithograph of some of the mosaic decoration which is found in profusion there, and a considerable number of the details, as well as general views, in very clear and precise, but rather mechanical-looking, illustrations. There is a very considerable resemblance in general arrangement between Parenzo and Torcello, which is a century later (542 is given by Fergusson as the date of Parenzo); and this is, perhaps, one of the instances which might be used in favour of the view apparently held by Mr. Arthur Evans, that the inspiration of the Venetian architects came originally from the other side of the Adriatic; though we certainly cannot accept this as the correct view of the architectural relations of the two sea coasts at the time of the greatness of Venice. The inspiration seems to have been all the other way then; and Mr. Evans and Professor Freeman seem to have mutually led each other astray on this point. But modern archaeology, like modern history, takes a special enjoyment in turning old and long-received creeds the other way about.

Turning now to the new work on the subject, the predecessors of which we have been glancing at, we find a great portion of the first of Mr. Jackson's three well-filled volumes taken up with a pretty long *résumé* of the history of Dalmatia, gathered, the author tells us, from a variety of sources, some of which are not easily accessible, and possessing, therefore, he hopes, a certain value; and, even were it only a *résumé* of known history from accessible sources, the importance of such a historical sketch, as an assistance to the right understanding of the architectural characteristics, is especially obvious in the case of a district which has been for a great part of its history a kind of no-man's land, or every-man's land, a perpetual battle-ground, and where the architectural style is the result of a mingling of elements from south, north, east, and west. Into the details of the history and its influence on the architecture space will not permit us to go here. It is sufficient to note that the architectural history of Istria and Dalmatia commences, as Pola and Spalato give such splendid evidence, under the then omnipresent Roman empire, and that the prominent and important factor in their history as influencing their architecture lies in the struggle between the two elements of Latin civilisation and Slav incursion. By the middle of the seventh century Dalmatia was almost entirely occupied by Croats and Servians:—

"The old Latin or Roman population, however sadly it was crushed and weakened by this irruption, did not disappear, nor did it lose its identity and become merged in the ranks of the conquerors. When the first shock was over, the Romans either returned to their old towns or founded new ones,

where they managed to live in a state between independence and vassalage till they became strong enough in time to take care of themselves. Zara soon arose again from its ruin, the fugitives from Epidaurum settled on an isolated rock not far from their ancient home and founded the city of Ragusa, and the unhappy Salonitans, not daring to return as yet to the ruins of their old capital, crept back to the mainland in reduced numbers, and found a refuge within the impregnable walls of the deserted villa of Diocletian, which has grown into the modern Spalato. The fate of Traù on the mainland, and of the island towns of Arbe, Veglia, and Ossero in the Quarnero, during this general catastrophe, is obscure; but we find them in the tenth century still peopled by Roman citizens, and living under their old Roman institutions."

The author speaks further on of the "dual element" in Dalmatia, without recognition of which the history of the country cannot be understood; but it is not quite clear from the context (page 19) which are his "dual elements," and "dual" is understating the case, which is complicated by many elements. Roughly stated, it may, perhaps, be said that the more important and characteristic monuments of Dalmatian architecture are the result of a combination of Roman tradition and inherited tastes; Byzantine influence brought by a roundabout road through Ravenna, and obvious enough at Parenzo, with its mosaics and Byzantine-shaped capitals; Slavonic influence from the north, especially from the invasions of Hungary, between which and Venice the Dalmatian cities were at one time a bone of contention; and direct Venetian influence when Venice became the paramount power in the waters of the Adriatic.

In speaking of Spalato, which still remains the centre of interest in Dalmatian architecture, Mr. Jackson has a new suggestion to make, namely, that certain parts of the work in the octagon temple (we object to calling it "Temple of Jupiter," as begging what is in fact a question), are made up from the spoils of earlier buildings. He says "one column in the temple is too large for the capital that rests on it; and the columns of the upper order of the interior, stumpy in proportion, only seven diameters high and set without any bases on the cornice of the lower order, look suspiciously like clumsy adaptations of ready-made materials. On no other hypothesis can I account for the difference between the capitals of this upper order and those of the rest of the work; it is not only that they are composite or quasi-composite while the rest are Corinthian, but that, while every other piece of foliage is raffled in the Greek manner, these are raffled in the Roman manner and executed in an entirely different way and by a different school of carvers, and to all appearance they once belonged to a different building."

The inference, of course, is that the bulk of the building was executed by Greek artists; a supposition exceedingly probable in itself. The probable influence of the plan of this temple on Dalmatian architecture is referred to elsewhere, in regard to the singular plans of the ancient baptistery at Zara and of the churches of S. Trinità at Spalato and S. Orsola at Zara, circular central spaces surrounded by six apses opening from them. It is rather startling to find, in regard to Spalato, that the interior of the octagon temple, now the Duomo, has been for some time under a process of "severe restoration." In 1882 the whole of the columns were removed and the church blocked with scaffolding. In 1885 the author found the interior cleared of scaffolding and ready for use, the antique character much gone; but it is satisfactory to learn that the old stones which were considered in sufficiently good preservation to remain, have not been scraped to match the new work. But the antiquarian interest of the interior must have suffered severely indeed.

"The lower entablature has, with the exception of a few stones, been entirely renewed, together with the eight Corinthian capitals. Of the upper entablature, the whole of the cornice has been renewed in Curzola stone, and part of the frieze and architrave. As the dome springs from this cornice, it was necessary, in order to insert the new stones, to cut out the brickwork of the dome all round the building, and to reset it afterwards—a process not likely to increase its stability, and most damaging to its appearance of antiquity. The old reliefs that



run round below the entablature have been retained, and for so much we may be thankful, but the capitals of the upper order, which are in very good preservation, have been assigned to the limbs of the museum, and are represented by copies. The capitals of the lower order had certainly become decayed to an extent that perhaps justified their renewal, but by the removal of these eight upper capitals a most unnecessary injury has been done to the antiquity of the building."

It should seem from this that it is not much worth while to go to Spalato now. But, melancholy as the account is, we have always maintained that, if an ancient building is lawfully in use for modern purposes, those who have the right to use it have the right to keep it in repair for their own purposes, and are not to be expected to regard it only as an ancient relic for other people's enjoyment. In the present day, if such a relic as the temple at Spalato were discovered, it would be thought worth while to preserve it *in statu quo*, without putting it to any practical use; but the Christian got into the temple of Spalato at a time when a Pagan building in pretty good repair was considered as providentially left for his benefit. And now it is too late to turn him out, and the mischief is done.

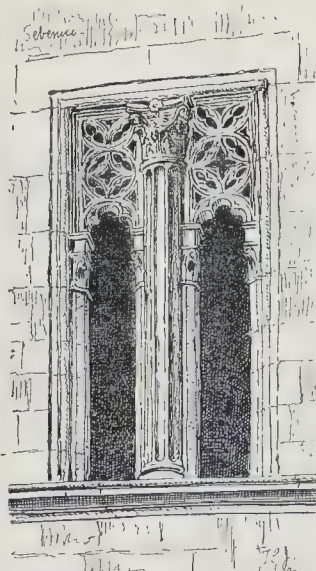
The church of Sebenico, to which we have already referred on account of its remarkable roof, offers a curious example of change of architect and change of style in the same work, and without any further lapse of time than was involved in dismissing the first architect and summoning his successor. Both were Venetians. Antonio, son of Pietro Paolo, commenced the church about 1430, in pronounced Italian Gothic style, and the exterior of intersecting arches shown in the illustration. He appears to have been then dismissed and Messer Giorgio summoned from Venice to take his place, and from that point the building takes a decidedly Classic turn, half Renaissance, half Romanesque. Messer Giorgio, who probably invented the roofing arrangement, if he did not carry it out himself, seems to have been a man of genius, and his name crops up, as we shall see just now, in connexion with a remarkable building at Ragusa. But, without any recorded change of architect, the free-and-easy manner in which round and pointed arches are mingled in the architecture of Dalmatia is one of its most curious peculiarities. We have given on the lithograph part of another of Mr. Jackson's illustrations, showing the double-story arcade surrounding the courtyard of the Dogana or Sponza, the Custom House at Ragusa. The two stories, from examination of their details, Mr. Jackson concludes to have differed very little in their date (probably 1300, or thereabouts). If it were 150 years older one would recognise the natural transition of round changing to pointed as the work ascends, allowing a little time between the completion of one story and the undertaking of the next. But in the interior of the Duomo at Curzola, which is probably about the same date from the appearance of the arcade, the said main arcade has pointed arches, and the wall arcade of the triforium is round arched. But, indeed, Messer Giorgio, in spite of his Classic tendencies, himself left at Sebenico as curious a record as could be of the divided tendencies of the period, for he could not quite forget Gothic tracery, but kept the balance of taste by inserting a fluted column in the midst of it (fig. 1); and really the effect is not so *outré* as might have been expected. There is a "new departure" for the modern architect sighing after originality.

The other view in the lithograph, also one of the illustrations from Mr. Jackson's drawings, the court of the Dominican Convent at Ragusa, we have given partly as a picture in which elements which seem architecturally heterogeneous combine somehow into a remarkably pleasing whole. But the cloister shown in this view is an interesting feature in itself. It is of the date of about the middle of the fourteenth century, as near as can be inferred, and represents, as Mr. Jackson observes, the Dalmatian working out Gothic in his own way; semi-Classic capitals and mouldings with Gothic tracery-forms. The Venetian influence here is, of course, apparent in the general

effect. The Classic well in the courtyard bears the date 1623.

One of the most curious problems in the mixture of styles is that presented by the Rector's Palace at Ragusa. Here we have, as existing, a two-storied building with an upper story of pointed Italian Gothic windows, similar pointed windows but without tracery on the ground floor at each end of the building, and the centre portion of the ground floor

of the arch order and one of the capitals shows that the arch is quite Renaissance in some at least of its decorative detail, *i.e.*, a foliage moulding tied up with a spiral ribbon. The capitals are by two hands, three of them distinctly Renaissance, with festoons and *amorini* according to rule, but all of them have a large massive kind of extra abacus on the top, very thick and decorated with four series of enriched mouldings. The other four



Sebenico Duomo  
Apr. 1885 - Fig. 1.

occupied by a round-arched arcade, looking like other round-arched work of the district, rather like a cross between Renaissance and Romanesque, and with capitals of a curiously mixed description. Mr. Freeman goes into great ecstasies over this building, which he regards as a Romanesque ground story completed by a Gothic upper story. He admits

capitals are very fine pieces of sculpture of Gothic character. Mr. Jackson's theory is that the Gothic capitals are the original ones, and that, so far from the round arches being, as Professor Freeman will have it, of direct Romanesque descent,\* the original arcade was pointed; that the fire and explosion by which the building was known to have

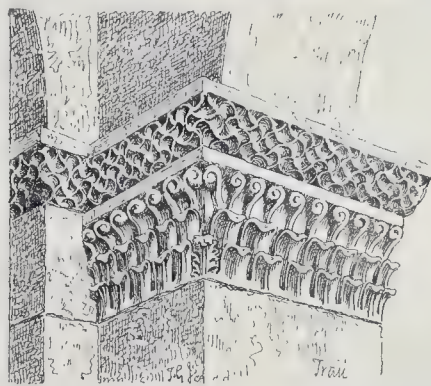


Fig. 2.

that the building dates 1388-1435, but says:—"Never mind the date, here is Romanesque in all its truth and beauty; here, in the land which gave Rome so many of her greatest Caesars, the arcade of Ragusa may worthily end the series which began with the arcades of Spalato," &c., &c. From Mr. Freeman's illustration (!) of course nothing can be made out which could interfere with his rhapsodies; the columns and arches shown there might be anything at all; but Mr. Jackson's detail drawing

suffered rendered necessary the taking down and rebuilding of the loggia and centre part; that the two ends, with their pointed windows, remained *in situ*, but that, when Messer Giorgio (he of Sebenico) was called in to take the work in hand, he replaced the upper windows as before, but rebuilt the important architectural feature, the loggia, with round

\* It must be remembered that all Romanesque is holy with Professor Freeman, and all Renaissance an abomination.



arches, according to his Classic tendencies, put three new Classic capitals in place of the older ones that were the most injured, and added the thick enriched *abaci* aforesaid, to give a higher springing for the round arcade. Mr. Jackson ascertained that the *abaci* are all separate stones from the capitals beneath them, and the one of which he gives a drawing is distinctly Renaissance in its decorative detail. The case is a very curious one, and, perhaps, neither critic has hit on the truth; but Mr. Jackson's view is possible, Mr. Freeman's is not, having regard to the character of the decorative details of the arches. It is amusing to observe that Mr. Freeman is so carried away by his own "Romanesque" theory that he shows the ground-story windows at each end of the

to give us. As an example of the peculiar detail to be found in this church, we subjoin a cut of one of the capitals of the nave piers (fig. 2), which also might very well be taken as a point of departure for some new experiments in capital-designing. The window (fig. 3), with the curious interlaced circle tracery, is from the quasi-Byzantine Church of S. Lorenzo in Pasenatico, a few miles from Parenzo, which Mr. Jackson attributes to the eighth and ninth century. We give it as one of the many examples of architectural curiosities in which Dalmatian and Istrian architecture seem to abound.

The illustration of the stall carving from the Duomo of Zara (fig. 4) represents what the author describes as the finest example of a class of woodwork which abounds in Dalmatia and

rich friezes with running scroll work in the best style of Roman architecture, dedicatory inscriptions, mouldings, and string-courses, all thrown flat on the pavement of the Roman town, some on their sides, some upside down, and some arranged cornerwise or awry, with a rough approximation to the plan of the superstructure. The whole mass of these fragments was filled in with earth and rubbish, and covered over with the pavement of the Christian church, so that till now their existence was not even suspected. The two pairs of columns that were saved and used in front of the apses, were probably spared, not from any admiration or respect, but simply from the difficulty of making new ones in that rude age. The rest seems to have been trodden under foot, with an aesthetic scorn for the meretricious splendour of Pagan rites and Pagan temples, and, with a sublime irony, to have been made to carry the simple piers and coarse masonry of the Christian church.

Thus the whirligig of Time brings in his revenges.

Long as this article has become, we have left much of the contents of Mr. Jackson's sumptuous three volumes entirely untouched and unnoticed. But it is a book which no architectural library can afford to be without, and which exhibits a completeness, in regard to historical information, architectural criticism, and architectural illustration, which not many illustrative works on architecture can boast of. We have only one criticism to make, — a literary one. We do not know whether the pages have been insufficiently corrected, or whether Mr. Jackson has theories of his own about punctuation; but there is an absence of the logically necessary commas in many passages which has a very awkward effect. "The Romanesque and Gothic architecture at Arbe Zara Trau Spalato and Ragusa," for instance; or, "took the Croatian towns of Belgrad Sebenico Nona and Novigrad which had never been Venetian before." This omission of commas makes a very clumsy-looking sentence, and may even lead to obscurity of meaning; it should be corrected in a second edition, which is certain to be called for in due time.

#### NOTES.

**P**UBLIC advertisement has called attention to the fact that an order has been made by the Board of Charity Commissioners for the administration of the trust funds of the "British Institution for promoting the Fine Arts in the United Kingdom." The funds of this now long-established Institution having been intended not merely for the general advancement of art, but, in the words of the Charity Commissioners, "for the benefit and emolument of individual artists," the Trustees of the Institution suggested their employment in the purchase of the works of deceased artists for the National Gallery. There is no doubt such an application of them would be widely approved; but the Commissioners object that "the purchase of pictures generally appears to be a mode of employing the fund now to be dealt with which is peculiarly susceptible to the influences of individual taste, of preference for particular schools of art, and of other collateral considerations which may tend to warp the judgment of those who administer the trust." There is some truth in this, and on the whole, perhaps, the suggestion of the Charity Commissioners for the employment of the funds in question in the foundation of scholarships to encourage and assist artists in the study of art is more to the purpose. The value of such scholarships depends a good deal on the manner in which they are regulated so as to give assistance to the right people, and in the best way, and most of us would be disposed to reserve our judgment until we see a little of the working of the scheme; but the idea is a good one. There are not too many artistic scholarships in existence, and a large proportion of artists and art students are at the outset of their career too restricted in their means to be able to secure all the advantages of study, especially of foreign works, which they would wish and which would be of material assistance to them. We hope architecture will be given a due and proper place in the establishment of such scholarships as are proposed.

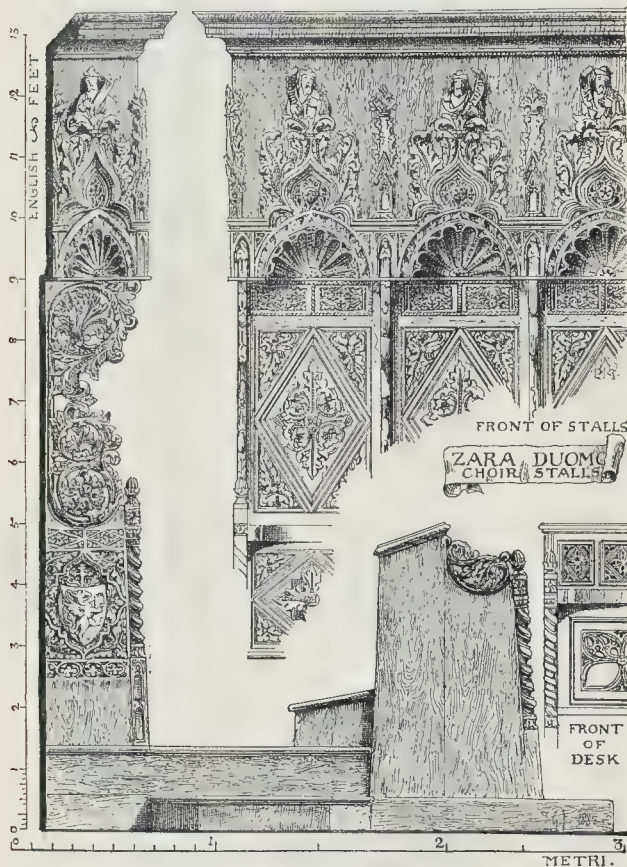


Fig. 4.

arcade as round-headed. Mr. Jackson both describes and draws them as pointed, and of the two witnesses he is certainly likely to be the more accurate. The two accounts should be compared together, they throw light on the value of the architectural criticism of the self-confident and dictatorial historian who, like Macaulay, is always "so cock-sure of everything."

No monument illustrated in this work is finer or of more interest in a purely architectural sense than the Duomo of Traù. This is a grand basilican church, which, though erected in the thirteenth century, is really to all intents and purposes Romanesque. The great west doorway, with its deeply-recessed pilasters covered with carving, and great lion figures on projecting brackets on either side, is truly a work of architectural genius, and the finest thing in the way of illustration of Dalmatian architecture which the author has

the neighbourhood, and which, as shown here, conveys the idea of being wonderfully rich and fine work, though we gather from Mr. Jackson's further remarks on it that the execution is but coarse in detail. The churches at Zara seem to be of great interest, none more so to our thinking than the round church of S. Donato, with its enormous blocks of masonry piers marking off the outer aisle from the centre space, and which actually cover more ground than the interspaces between them. But the most extraordinary thing about this church is the discovery which was made in taking up the pavement in 1877, when the rude Christian building was discovered to be wholly founded on the debris of Roman work. The foundations

"consist of huge fragments of more than one magnificent Classic building, entablatures with Corinthian enrichments, marble columns cut or broken into lengths and laid simply on their side,



IT is with very great regret that we hear of the death of Mr. Richard Jefferies, who first attained a reputation as the author of the charming book on rural life, called "The Gamekeeper at Home," and whose eye for the picturesque, and powers of vivid description, must have interested many an artistic reader in his work. Some time since we quoted in these columns a brilliant bit of writing of his on the picturesque of the London Docks, and the folly of painters in running after Venetian galleys, &c., as subjects, instead of painting the far finer craft sailing out of the Thames, carrying the commerce of that City of London, whose real greatness and poetic effectiveness, the author said, would perhaps be only fully appreciated five hundred years hence.

THE two so-called Technical Education Bills, that for England and the one for Scotland, passed their second reading under a fire of criticism, and with very half-hearted aid from those who supported them.—"They were better than nothing"; "It would be a step in the right direction,"—all of which may be very true, but this does not justify a great national question being dealt with in the way in which a Vestry would begin to pave a street. The mischief of this inadequate treatment is that the public, instead of being impressed with the importance of the subject, are struck with its apparent triviality. Petty measures of this kind are not likely to rally popular support to the important matter of a thorough and matured system of technical education.

THE technical examination announced by the Worshipful Company of Carpenters to commence on the 2nd June of next year, "provided that a sufficient number of candidates present themselves," seems likely to afford a very full and practical test of the knowledge of the candidate in regard to practical dealing with woodwork. The examination paper includes the subjects of the nature of timber, timber framing, joinery, shoring, temporary structures, centering, scaffold and hoisting tackle, timber-work in excavations, history of carpentry and joinery, and description at sight of various kinds of wood, and of defects, from specimens to be placed before the candidates. The examinations will include not only paper work and *visu voce* work, but practical carpentry to be done at the Company's workshops at Stratford on certain days, such as preparing the foot of a king-post, showing portions of the beam and struts, mortises for the keys of strap, &c.; preparing semicircular and elliptical centering, quarter size; erecting a bay of scaffolding, quarter size, &c. The drawing of details is also to be executed on the spot. The examination will unquestionably be worth working up to, for a good position in them will be a very good record for a rising workman.

THE decision of Mr. Justice Kekewich last week, in the case of the Gas Light and Coke Company v. the South Metropolitan Gas Company, is one of some interest to gas consumers on a large scale, as well as to gas companies. The point of the case is that the defendant company supplied gas to the London and South Western Railway through meters which were situated within the defendant company's district, but the gas supplied through which was consumed in buildings or localities within the plaintiff company's district. After going carefully through the arguments on each side of the case, his lordship ruled that, in accordance with legal precedent, the point where the meter of the gas company is fixed and where the gas leaves the meter and passes to the consumer is the point where the risk of the company ends and the risk of the consumer begins, and, therefore, that so long as the meter, the point at which the gas sold, in fact, is within the district of the company supplying it, the consumer may lead it where he likes after that. We hope this is good law; we are quite sure it is good common sense. At the meter the gas company part with their gas; and, as long as the bill is paid, they can have no right to interfere with the use of it by the consumer in the manner most convenient to himself.

ON Wednesday, August 3rd, were opened in Approach-road, Victoria Park, the new buildings in connexion with the Parmiter's Bequest. These comprise seven class-rooms, two master's rooms, a governors' board-room, a hall, dining-room, laboratory, and an art room, together with two fives courts and a playground. The school is designed to receive, at a small fee, 300 boys, between the ages of 7 and 16, being residents at Bethnal Green. The development of the trust funds from a very small amount is remarkable. By his will the founder bequeathed an income derived from some land in Suffolk to his wife for her life, and then to trustees, for the building of "six almshouses in some convenient place upon the waste of Bethnal Green; and further for the building there one free school, house, or room," for ten poor boys of Bethnal Green. At his widow's death, in 1702, the property fell into Chancery, and for some years the actual income of the trust, originally valued by Thomas Parmiter at 48*l.* a year, did not exceed 18*l.* By 1772 the accumulations, increased by certain gifts, had amounted to 540*l.*, and with this sum the governors began to build the original premises in St. John-street, Brick-lane. About this period the trustees bought a parcel of then waste land, 4½ acres in extent, at Cambridge Heath, for 36 guineas, with a sum of 50*l.*, which was advanced to them, *ad hoc*, by Mr. Edward Mayhew. In the year 1800 that property was let in two leases for a total of 225*l.* a year. Seventy years later the Great Eastern Railway Company paid 27,440*l.* into the Court of Chancery on behalf of the Trustees for their frontage in Cambridge-road. Meantime, the St. John-street Schools had been rebuilt (1838). In 1871 the freehold of the new site was bought for 2,100*l.* out of unexpended capital. In 1885 the Charity Commissioners' scheme was ratified, in terms whereof a new site was taken for the present school, and certain changes have been introduced into the administration of this endowment. The new buildings cost, in all, 8,600*l.*; the furniture and fittings amount to about 3,100*l.* The annual income of the charity in 1886 amounted to 3,569*l.* 6*s.* 8*d.*, to be increased by investment of the capital sum derived from the railway company.

WE understand that during the recess the Carlton Club will be supplied with the apparatus necessary for the purpose of electric lighting. The Athenæum and Junior Carlton are already so lighted, and thus the Reform Club will soon be the only large club in Pall Mall remaining a supporter of gas. We may well ask, "What's in a name," when the Reform is the least reforming of clubs?

ON the afternoon of Friday, the 12th instant, some experiments were made, in the Victoria Docks, with Herr B. Loeb's new respirators, by the Maritime and General Improvement Company, of St. Dunstan's-hill. These respirators, being similar to those now used in the German navy, are designed for operators when by smoke, gases, noxious fumes or the like thereto, respiration is difficult or fatal. The apparatus covering the wearer's mouth, nose, and eyes comprises a respiratory appliance fitted with layers of cotton wool and wet sponge, in front of a basis of charcoal and wool damped with glycerine. Some modifications in the contrivance render it applicable for use in hospitals, laboratories, and mines. The inventor demonstrated the capabilities of his appliance, which seems to be well adapted for the end desired.

HAVING been almost completely gutted by fire early on the morning of Wednesday, 10th August current, Macclesfield House, Soho, is officially "condemned" to speedy demolition. It is Nos. 34-5, Gerrard-street, and extends in the rear to Dansey-yard. Facing the southern end of Macclesfield-street, its elevation forms a striking feature amongst some yet remaining old-fashioned fronts in this quarter of the town. This house was built for the celebrated royalist Charles Gerard, who in consideration of his gallant services before Cardigan Castle, and elsewhere in South Wales, was created Baron Gerard, of Brandon, on

October 8th, 1645. After the Restoration he was created, 21st July, 1679, Viscount Brandon and Earl of Newberry, the latter title being changed to Macclesfield. In the following reign he was, together with the Earl of Stamford and Lord Delamere, committed to the Tower and condemned to death. He was, however, pardoned, and lived until 1693. His house here stands upon part of the site, as purchased by him, of the Artillery Ground, otherwise known as the Military Garden, of Henry Prince of Wales, elder son to King James I. It would seem to have been occupied by his elder son and successor, Charles, for in the St. Anne's, Soho, rate-books we lately saw an entry under date 1700 of "Earle Maxfield" as rated to pay 1*l.* 6*s.* in this street. Hatton mentions "*Macklesfield House*, alias *Gerrard House* . . . now [1708] in the possession of the Lord Mohun." Yet his statement is difficult to be reconciled with an entry in the rate-books of this time, wherein Lord Mohun is rated to pay 2*l.* for a house on the opposite side, clearly, of the street. The handsome staircase to which we drew attention in our notice, in the *Builder* of March 22nd, 1884, of the sale of this property, was in No. 35. Though upwards of thirty-one poor persons are rendered homeless by the fire, the flames were fortunately prevented from consuming the adjoining premises, including the house once occupied by Edmund Burke, now part of the Hotel de Versailles.

EXHIBITIONS are becoming a kind of world's monomania. Within the next two years no fewer than nine of them have been arranged. In October of this year a Russian general agricultural exhibition will be opened at Charkoff. In November next an exhibition of lighting will be opened at St. Petersburg; it will last until February, 1888. A German national art industry exhibition will be held at Munich in 1888. The Melbourne international exhibition will be open from August 1 next to January 31, 1889, and will comprise art, education, engineering, mining, general industry, agriculture, and sanitation. Belgium will hold a great international exhibition at Brussels next year. An international exhibition for trade, science, and art will be held at Glasgow in 1888. A northern art and industrial exhibition is to be opened at Copenhagen in May next. The municipality of Barcelona invites to an international exhibition in August next. Finally, Hamburg will hold a trade and industrial exhibition in 1889.

ADVANCE sheets, containing the summary report on the mineral production of the United States in 1886, published by the United States Geological Survey, show the value of building stone quarried last year to have been \$19,000,000, or about the same as in 1885 and 1884. The manufacture of bricks and tiles is valued at \$38,500,000, compared with \$35,000,000 in 1885 and \$30,000,000 in 1884. The production of 1886 is, consequently, about 10 per cent. higher in value than that of the preceding year. The increase in production was rather over 10 per cent.; but the price of bricks and tiles was somewhat lower during part of last year. The production of lime in 1886 is estimated at 42,500,000 barrels, against 40,000,000 barrels in 1885, and 37,000,000 barrels in 1884; the price remaining constant at 50 cents per barrel at the kilns. The manufacture of cement from natural rock was 4,350,000 barrels of 300 lb. each, valued at \$3,697,500, against 4,000,000 barrels in 1885, valued at \$3,200,000. The production of artificial Portland cement was 150,000 barrels of 400 lb. each, valued at \$292,500, as against a similar quantity in the preceding year, of the same value. The total production of cement of all kinds was 4,500,000 barrels, valued at \$3,990,000, against 4,150,000 barrels, valued at \$3,492,500, in 1885, and 4,000,000 barrels, of an estimated value of \$3,720,000, in 1884. The promptness with which these statistics are collected and published in the United States contrasts favourably with the delay experienced in the publication



of similar statistics in the United Kingdom. We are still patiently waiting for the appearance of the latter.

**T**HE Report made to the Local Government by Dr. Thorne and Mr. Gordon Smith, on the sanitary state of Oxford, and the attitude of the local official mind on the subject, is certainly most edifying reading. The Inspectors were much struck with the crowded and overbuilt state of many parts of the town; the gradual building up even of the insufficient open spaces formerly existing, the total want of proper means of ventilation, and of ordinary sanitary precautions in many places. In one place they found back-to-back houses with only 2 ft. 6 in. space in front of them. In an interview with the Local By-laws Committee the Inspectors discovered, by little and little, that not only were the Committee indifferent to this state of things in the present, but that they were averse to any revised legislation such as might work a change for the better in the future. The Inspectors

"Asked the committee if, in order to meet the difficulties they felt, they could describe an area of the city which might be altogether exempted from the operation of new by-laws as to buildings, and remain controlled only by the by-laws at present in force; an improved code, dealing, among other things, with open space about dwellings, being adopted for the remainder of the district. On considering this suggestion, it was contended, by one and another that this and that locality should be included in the exempted area, until it became clear that, although a small minority desired that any such exemption should be restricted to a comparatively small area, others practically insisted on including such an extent of the urban district as could only be regarded by us as altogether unreasonable. . . . But the general outcome of our inspection and interview is that a majority of the sanitary authority of Oxford are not at present really desirous of effecting such changes as would be likely to lead to effectual improvement in its sanitary condition in regard to new buildings, unless they could be sure that such improvement would not interfere with the increasingly fictitious value which house property is acquiring owing to its dense aggregation."

This is a charming state of things in a town which is supposed to be a great centre of "culture," and where a picked body, as one may say, of the young men of this country spend two or three years of their lives at the period when they are passing from youth to manhood, and when their future physical as well as intellectual well-being may be considerably influenced by their surroundings. The majority of undergraduates, it is true, lead tolerably active and open-air lives, and get well oxygenised during the Long; nor are they, perhaps, much given to visits in courts with back-to-back houses; but typhoid may corner them some day unawares, for all that, if such apt lairs are provided for it to lie in wait. Can the University exercise no influence in the matter? or are her children to be left to harmonise with the environment?

#### THE ARCHITECTURAL ASSOCIATION EXCURSION.\*

The district visited this year by the Architectural Association presents a complete change from the scene of last year's excursion. Then it was all red brick; now it is grey stone. In Kent the hop fields undulated over long parallel



RUINS - HINTON ABBEY.

ridges. In Wiltshire the hills are more irregular and varied, and constantly present

\* The small sketches inserted in this report, as also those in the report of the Salisbury Meeting of the Architectural Institute on another page, are made from photographs by Mr. Wilkinson, of Trowbridge.

evidences of occupation by a race to whom architecture was unknown, at any rate architecture suitable for transcription in a sketch-book. The range of interest could hardly be wider than this year. Every phase of work is to be seen, from the Roman baths or the White Horse, cut on the downs above Westbury, to a village of the time of William and Mary, and the still later crescents and terraces of Bath itself, the head-quarters of the excursion.



Hinton Abbey

Church-work and house-work divide the programme about equally. Hinton Abbey, Lacock Abbey, Norton St. Philip, Wellow, Westwood, Steeple Ashton, Edington and Westbury, represent the former; Cheyney Court, Corsham, South Wraxall, Great Chalfield, and Cold Ashton, the latter. Then there are in addition the quaint town of Bradford-on-Avon, the large

examination with a view to determine the original uses of the ruined apartments, but it may fairly be doubted whether the names given in the guide books are quite correct. The work of what is called the Chapter-house is of that simple, supple character which renders un-restored early work so delightful. The object aimed at is achieved with so little effort, every-



Hinton Abbey.

sleepy village of Marshfield, and the treasures in the chapel at Farleigh Castle. So the programme is varied, and he must be a difficult man to please who does not find something to his taste.

#### Bath and the Neighbourhood.

The first day's excursion took place in most favourable weather, and included places of con-

siderable interest, though, fortunately, they were not so replete with matter to be sketched as to put members to great inconvenience. The first stopping place was Claverton, where only the terraces remain of what was once a large Elizabethan house, possessing a good deal of detail both inside and out. The terraces themselves are stately enough, and indicate the nature and extent of the mansion which was pulled down by a recent proprietor, partly

thing is so spontaneous, difficulties are met in such a naive manner, that it is quite refreshing to return to early work after the pomposities of later days.

From Hinton Abbey, by way of the House and Church of Hinton Charterhouse, the party went to Farleigh Castle, the ruins of the stronghold of the Hungerfords. In Leland's time (c. 1536) the castle remained intact, "sette

#### THE GEORGE INN NORTON-ST-PHILIP



on a Rokky Hill." It had "praty towrres," an "ancient Chapelle" with a "praty Mansion at the very Est end of it" for two chantry priests, a fair gate-house to the inner court, and a stately hall and three stately chambers within the court. Of the features thus enumerated only "the ancient Chapelle" and the "praty Mansion" at the east end of it remain; the rest has fallen to decay, and the chapel has become the repository for all frag-

mentary remains of the castle, and the chapel has become the repository for all frag-



ents and curiosities which from time to time e found. The following slight sketch of the castle was given by Mr. Alfred Gotch:— At first sight it might appear that Farleigh castle had no more claim on our attention than lington Castle which we saw last year, but ough the whole, or nearly the whole, of the chitecture has disappeared, there still remains tbin the disused chapel of St. Leonard much

the building mania then prevalent, till it fell to decay long after it had passed from the family who built it. The purchaser of Farleigh, Sir Thomas Hungerford, died in 1398, and lies buried in the chapel here. His son Walter, Lord Hungerford, probably erected the monument which bears his effigy and that of his lady. The same Walter built the chapel itself, and at the same time built the church up on the

an inner court round which the dwelling-house was built, its four corners being formed by four towers, parts of which still remain; the rest of the house is completely gone. This was the home, for something like three centuries, of the Hungerford family, and all their pride and all their possessions, and all the memorials of them, almost, have shrunk into the small compass of this chapel. There you will find many of their tombs, much armour of their retainers, some of their chairs, and numerous scraps of stone and metal which once helped to add to their magnificence, — a magnificence which ended in a blaze of extravagance and dissipation at the Court of the Second Charles. But enough remains here and in written records to show how great a man a Hungerford must once have been and how fine his dwelling was. And now that his house is gone, the best purpose the site serves is to be the bourne of picnic parties, and Hungerford himself, as he lies on his beautiful tomb in all the pride that heraldry can lend, what is he? An object that all the world may stare at on payment of 3d., — an object not the least of whose honours now is that the Architectural Association is willing to sketch him.

From Farleigh the party went to what Leland calls the "pratie Market Town" of Norton St. Philip, where the principal attraction was the "George Inn," a place evidently re-named in its old age, for it dates from the fifteenth century. The lower story, the porch, with its pointed arch and cusped side windows, and the main bulk of the walls, are of stone, but the greater part of the front is of timber and plaster, each floor being brought forward something like 2 ft. The whole effect is very picturesque, but the detail is of no great beauty. There are, however, two octagonal chimneys with battlemented heads and pierced sides which deserve attention, and on an adjacent building is a circular chimney-head of a similar nature. At the back of the house an octagonal stair turret, combined with the pointed arch of a passage, makes a highly-picturesque group, while the wide open fireplace of the common room, with its grate and ornamental ironwork, found many admirers. The church here is of some interest, which is chiefly confined to the tower. This is rather unusual in several respects. It has large mullioned windows on every side, one of which (that on the east face) is contained in a gabled projection thrown out, so it is asserted, to accommodate an altar in the bell-ringers' chamber. Between the buttresses on the west face a porch has been inserted with a panellled soffit of good design, said to have been brought from elsewhere, but if so, we can only admire the lucky chance that made it fit so exactly into its present position. The whole effect of the tower, with its projecting parapet, is rather coarser than most work in Somerset, but, nevertheless, Norton St. Philip may boast of having a notable tower.

Somewhat similar, but less elaborate, is the tower of Wellow, the last place visited on this day. The merits of this church are certainly over-rated by Mr. Murray in his Guide-book, when he classes it "among the finest village churches in the country." Nor can the date, 1872, given by him be correct. The nave is certainly not earlier than the end of the fifteenth century, and is correspondingly poor. The most interesting part is the Hungerford Chapel, where some of the original colouring remains on the roof, recently restored in a judicious manner by Mr. Wallace Gill, of Bath. In the chapel, under a shallow arch, is this inscription, —

"For love of Thee and Mary is sake.—Praye for them that this lete make."

What "lete" might mean no one was able to say. In the village is the Manor-house, once the dwelling of a Hungerford. The back porch is dated in the spandrels of the arch,—G. I. H., 1634. The initials, no doubt, are those of George and Joan Hungerford, who lie buried in the church. He died in 1638; she, in 1679. There is not much to be seen in this house, but a little very good woodwork of a date apparently some thirty years prior to the porch. It consists of an over-mantel and a doorway, both of which are adorned with the delicate foliage and griffins with sprouting tails that mark the work of the Renaissance. The over-mantel contains three panels, surrounding shields which bear the arms of Hungerford, and the pediment over the door bears their device of three sickles interwoven.

Cherney Court, the first place on the programme



ALMSHOUSES, CORSHAM.

at is of interest, and much that will grace a sketch-book. Before, however, examining the beautiful objects gathered together in that building, it will, perhaps, not be altogether beside the mark to learn how they got there. This castle, then, of Farleigh - Hungerford

hill. Up to that time the parish had used the church within the castle walls, but when the castle was completed it was evidently highly inconvenient for them to do so; therefore the great Lord Walter built them a new church outside in the year 1443, and at the same time



LACOCK ABBEY

longed to the powerful family of the Hungerfords, a family which owned immense estates, and which not only dominated the whole country, but took a prominent part in events which help to make the history of England. The first possessor of Farleigh was Sir Thomas Hunger-

built the Chapel of St. Leonard within the walls for his own use on the site (probably) of the old church. This chapel, the priest's house at the east end of it, the gate-house, and a few fragments of the towers and walls, are all that remain of the once formidable structure.



rd, who purchased it from a Lord Burghersh in the year 1369. There was already some kind of a house here, which Sir Thomas converted to a castle by adding towers and a moat, saving the work, however, to be completed by his son Walter, first Lord Hungerford. The castle as they left it remains almost unaltered, save for a few changes made towards the end of the sixteenth century under the influence of

Enough is left to enable us to see what kind of place it was, and Canon Jackson has an approximate plan of it in his exhaustive account of the castle. The gatehouse led into an outer court, in which stood the chapel, detached; while against the walls were stables and guard-rooms, extending from the main gatehouse to another gate on the west side. Beyond and to the north of this outer court was



for Tuesday, is a picturesque gabled house, dating from about the middle of the seventeenth century. The detail is coarse throughout, especially in two large chimney-pieces, in which an earlier style is caricatured. Nevertheless, the mullioned windows, the disused hooded doorway, the flight of steps to the present front door, the ivy-clad walls, and the broad terrace path combine to make the general appearance exceedingly pleasant. Corsham Court, the next place visited, is a far more imposing edifice, but only the south front has any interest to the

feature in the shape of a large window at the east end of the nave contrived above the chancel roof. The north chapel is of great interest and beauty. It is extremely late in style, still Gothic, but drooping into Classicism its pendants. In the north wall is a fine wall tomb to Sir William Sherrington: it bears his initials, "W. S.," in the spandrels of the arch, and the date, 1566, in a panel. The workmanship is of the most delicate in design and execution, and it is a fitting memorial of the author of such good work as Sherrington did



architectural student. This dates from 1582, and is a good example of Elizabethan work. The mouldings of the cornices are clean and well proportioned, the square bay-windows are massive and solid, while the gables, crowned with grotesque figures, give a pleasant variety to the skyline. The treatment of the bays, both in general effect and in the section of the mullions, recalls Longleat, some fifteen miles to the south. By the kindness of Lord Methuen the party was enabled to see the collection of pictures, which is one of the finest private collections in the country. Corsham Church has suffered much of many restorers, and possesses little to attract a sketching party beyond two elaborate tombs in the north chapel, one of which is the tomb of the builder of Great Chalfield Manor-house (a sketch of the north front of which, and a sketch of the adjoining church, are given on pp. 268-81), visited on Thursday. Much more attractive are the almshouses, built in 1668 by a Lady Hungerford, and containing many suggestive little bits in the shape of brackets, panelling, bench-ends, and other woodwork. It is true that the stone details are poor and coarse, including the heraldic ornamentation over the porch; but the porch itself is good in outline, and the many gables which adorn the exterior of the whole building render the grouping picturesque from all points of view, while the whole place has a satisfactory air of being judiciously left alone.

By far the most exciting place of the day's programme was Lacock Abbey, where very excellent work of three periods abounds. Much of the old thirteenth-century work remains, so do the fifteenth-century cloisters, while added to them is some refined Renaissance work of the time of Edward VI. The Abbey was founded by Ela, Countess of Salisbury, in 1238, for Augustinian canons, and at the Dissolution was sold to Sir William Sherrington in 1541. He converted it into a dwelling-house, and added a large stable yard, but he left much of the old work intact, and there it stands to this day with its beautiful rounded caps and vigorous vaulting and crisp orbels, while in the cloisters the vaulted ceiling is dotted over, at the crossing of the ribs, with curious-coloured bosses. Sherrington's own work is no less good, and much of his carving was done by one John Chapman, whom Sir John Thynne begged in order that he might carve him some beasts for his gables at Longleat (there are no gables there now); but his wish could not be gratified, as Chapman was away at Dudley, where he was putting up some carving for my Lord Northumberland. The time at Lacock was all too short to do the place justice, and only a peep could be given to the church, where there is a very unusual

at the Abbey. Both it and the chapel itself are coloured. A hurried glance at the village showed it to be full of picturesque bits, and seldom has the pitiless whistle of the quarter-master been heard with greater distress than on this occasion.

We shall continue our account of the excursion in our next.

#### THE SALISBURY MEETING OF THE ROYAL ARCHAEOLOGICAL INSTITUTE.\*

We continue our notes of this congress.

At Great Durnford Church, which was visited after leaving Old Sarum, Mr. George H. Gordon, A.R.I.B.A., read a short paper. The church is one of considerable interest, with two good Norman doorways, the chancel arch and font being also Norman. Mr. Gordon said that the architecture of the church pointed to a date somewhere between 1120 and 1160. He thought it was probable that if the church were carefully and conscientiously restored, much that would be interesting and instructive about it might be discovered. The north door is of Early Norman work, and is in good preservation. The workmanship is rude, and the porch is of modern date, with no pretensions to architecture. On the north side of the nave is some old glass of the thirteenth century, representing the Crucifixion. Beyond is a small fourteenth-century door, leading probably from the church to the external steps to the roof-loft. The chancel arch is in good preservation, but is coated with whitewash. The string has been cut, and there are other indications of the existence of a rood-screen. The caps to this arch are quaint, being an owl on the north side, representing Night, and a dove on the south, representing Morning. The colouring of the chancel is modern, but is a reproduction of the ancient design, except as to the colours, which were originally brighter. Some curious frescoes were found when the chancel was restored about twelve years ago. The chancel windows are lancets, and show no indications of Norman work. The seats in the nave are thirteenth century, rude, but in good preservation, and afford a good example of the durability of oak. The font is of late Norman date, probably 1160 or 1180, and is in good preservation. Its design is interesting and remarkable. The south porch has an Early Norman arch. Externally, there are two Norman buttresses, and on the north side is a leper's window, which has been filled up on the inside, but has a hinge and latch on the outside. It is Early Gothic in character, and is remarkably near the floor

of the church. The tower, which at first sight appears to be Perpendicular, is Early English. The arch between the nave and tower needs opening out and restoring. There is some curious Early English corbelling on the buttresses at the west end of the tower.

Briford Church, which was visited on the following day, is a very interesting building. It was restored in 1873 under the late Mr. Street, who appears to have been most careful in preserving the few remaining indications of what the original church had been before the alterations carried out by one of the Earls of Radnor during the last century (circa 1764). It was at that period that the massive tower and west front assumed their present appearance, according to the Rector, the Rev. Mr. Morris, who read a short paper on the church. He said that when the church was restored in 1873 the last-century porch at the west end was removed and the present one built in the south wall of the nave. In doing this an old round-headed arch, evidently of a very early period,—presumably of the same date as the two other round arches in the north and south walls of the nave, which form the special feature of interest in the church, were discovered. The two arches last named were opened out for the first time in 1872, when they were found to be perfect, the only part of them before visible being their exterior surface in the outer wall of the church. From their appearance they were mentioned by Blount as being Saxon, but since they have been opened out they have been generally held to be Roman,—an opinion endorsed by the late Mr. Street and also by Mr. Roach Smith, who considers them to be "Roman, *in situ*." There has been much discussion as to the date of the carved work on the arch in the north wall, which appears to be unfinished, and also as to the purpose of the projecting stones at the bottom and towards the top of the springing of the arch.

Mr. R. P. Pullan said the church was a most interesting one, but he inclined strongly to the belief that the arches referred to were Saxon, built with Roman bricks. The carving on the jambs of one of them was the finest and richest of its period that he remembered to have seen in any church in the kingdom. It was somewhat later than the construction of the arches themselves.

Mr. J. T. Micklethwaite said that the church afforded a very interesting example of the very earliest form of the cross church. It was perfectly clear to him that the first church here consisted of a nave of exactly the same size as the present nave. There was probably a small sanctuary, not projecting further eastwards than the tower does at present. The interesting archways whose age was in dispute gave access to small side chapels which were, in fact, the earliest development of the transept.

Mr. Arthur Evans spoke of the carvings on one of the arches as being decidedly Byzantine in character, while Mr. Parke Harrison argued that it is Saxon.

At Bradford-on-Avon, which was reached by special train, the interesting and very fine tithe-barn (of which we give a sketch) was first visited, under the guidance of Mr. C. S. Adye. It has a very fine roof. Some discussion took place as to the date, the conclusion arrived at being that it was erected circa 1330 to 1350. At a meeting of the Architectural Section, however, on the following evening, Mr. Parke Harrison said he was not satisfied that that decision was correct. The buttresses were certainly Early English, but he thought he could adduce good reasons for believing that the walls were Norman. Firstly, the walls were themselves out of the perpendicular, thrown out by the weight of the magnificent roof. But the buttresses, which were admittedly Early English, were not out of the perpendicular, showing that they must have been erected subsequently to the main walls, in order to support them. If the walls themselves were coeval with the buttresses, the latter would have got out of the perpendicular when the walls did. Secondly, having studied masons' marks abroad and at home, he had a good knowledge of the Norman mason's marks, and he had found on the walls of the Bradford tithe-barn certain masons' marks which were found also at Gloucester and in William Rufus's hall at Westminster. Thirdly, the tooling of the stones in the walls of the Bradford barn showed them to be Norman.

\* See pp. 220, 228, ante.



The visitors next proceeded, under the guidance of Mr. Adye, to the old bridge of Bradford-on-Avon. He pointed out that the bridge was originally much narrower (as could be seen by the inspection of the underside of the arches), being only a foot or pack-horse bridge. The bridge was widened circa 1645. The curious little building on one side of it (shown in the accompanying sketch) excited some discussion. Was it ever a chapel? Aubrey

displayed in the architectural features of the surrounding terraces and balustrades, by the rich and imposing details of the interior decorations, and also by the unique similarity of the three in style, in ornament, and in general effect. The first of these is Kirkby, in Northamptonshire, the seat of Lord Winchelsea; the second is the old manor house of Claverton, near Bath, formerly the seat of Wm. Bassett; and the third the Duke's, or Kingston House, in Brad-



said it was, and this was the opinion of Precentor Venables and the Rev. Dr. Cox. It was long used as a lock-up, but is now, Mr. Adye said, made available as a powder magazine! It was the opinion of most of the visitors who were competent to judge that the dome-like roof was of late date, probably Jacobean. The fish (a gudgeon) which forms part of the final is the emblem of St. Nicholas. The inhabitants of the town were familiarly spoken of as "Brad-

ford gudgeon," purchased and restored by the late Mr. Moulton. Longleat, situated only a few miles from here, is usually referred to as very similar in style and about the same period. The older parts of Kirkby House were built in the latter end of the fifteenth century, while that which so closely resembles Kingston House must have been erected in the seventeenth. The date, 1625, of the old Manor House at Claverton was, with the arms and initials of the



owner, recorded on the building itself, which was unfortunately taken down by the late owner, Mr. Geo. Vivian, and a new mansion built from a design by Sir Jeffery Wyatville. The terraces and balustrades only are preserved intact. Kingston House clearly belongs to this time, possibly a little later, for not only is the building in a better state than Claverton prior to its destruction, but the style of architecture and the details are more developed and elaborately treated. The genial and enthusiastic John Britton, and Richardson, author of "Observations on the Architecture of England

during the reigns of Queen Elizabeth and King James," have both written descriptions and published drawings of this house. The last publication relating to it is a volume of illustrations of Claverton and the Duke's House, of Bradford, published by Mr. George Vivian, of the former place, in 1837, and containing some admirable drawings of the buildings and internal decorations. In these works it is described as being of the Transitional style, between the Old Tudor or Perpendicular and the new or Palladian: many of the enrichments are copied from German work in fashion at that time. The front facing the south is divided into two stories, with attics in the gables. The windows are in beautiful proportion, with stone mullions. These are formed by three projections, the central one square, and the two side ones recessed, with semicircular bows. In the centre is a large sculptured doorway to a porch, and the summits of the window bays are adorned with open parapets. The characteristic feature of this style of architecture is, of course, the window light. As seen from the outside, the windows are extremely handsome; from within, they are in the winter suggestive of cold, and in the summer of heat.

Returning through the narrow lane known as "The Shambles," the visitors next proceeded to the interesting Saxon Church of St. Laurence, under the guidance of Mr. Adye, who has restored the building in a very conservative spirit, only doing what was necessary to put it into repair and to keep it in good preservation. He pointed out that the string-course and arcading, partly shown in the view which forms one of our phototype illustrations are constructional, — i.e., cut out of the wall-stones, and quite irrespective of joints.

Mr. E. Chisholm Batten read an interesting paper on the church. He said that very shortly after Ina's accession Aldhelm communicated to him his intention of going to Rome to obtain a grant from the Pope of the largest privileges of a monastery for the abbey of Malmesbury and its dependent house at Frome, to which proposal not only Ina, but Ethelred, the King of the Mercians, gave full countenance. Aldhelm obtained at Rome a bull or charter of privileges from Pope Sergius exempting the monasteries of Malmesbury and Frome from episcopal jurisdiction and secular services, and conferring on the monks the privilege of electing their abbot. After his return from Rome Aldhelm founded a monastery at Bradford. (It was probably not founded before that time, as Bradford is not named in the charter of privileges of Pope Sergius.) When Ina divided the Bishopric of Winchester into two, in 705, and founded the Bishopric of Sherborne, he insisted on Aldhelm becoming the first bishop of the new diocese. The monastery of Bradford is first named in the episcopal letter of Aldhelm, which he wrote in 705, stating that he had desired, on becoming a bishop, to resign the position of abbot in his monasteries of Malmesbury, Frome, and Bradford; but his monks insisted on his remaining their head, which he consented to do, and King Ina was a witness to the letter. William of Malmesbury, after mentioning this episcopal letter of St. Aldhelm, in which the monastery of Bradford is named, adds the now well-known sentence:—

"Et est ad hunc diem eo loci Ecclesiola quam ad nomen beatisimi Laurentii fecerant predicatur"; which may be translated: "And there is to this day in that place a little church which he (Aldhelm) is asserted to have made for the name of the most Blessed Lawrence." The question to be submitted to the visitors was: "Does the building now standing only occupy the site of the church built by Aldhelm, or is it the actual church itself?" Mr. Chisholm proceeded to argue that the present building was the building erected by Aldhelm. He said that in a tract published by the Committee of Trustees for the preservation and restoration of the building in 1872, Mr. Freeman expressed his opinion of its date in these words: "From the character of the building I should be inclined to place it early in the last of the three ante-Norman periods which I tried to make out in my 'History of Architecture.' There is certainly in this building nothing that can be described as Norman." The opinion of the late Mr. J. H. Parker was thus expressed:—"The church was built, as it seems to me, in the time of Bishop Ethelwold, between 970 and 975, or possibly then built of wood only and rebuilt of stone about 1025, not



later." The foundation for this opinion of Mr. Parker's was the great similarity between the sculptured angels in the east wall of the chancel (one of which is represented by the annexed sketch), and the figures of angels



found in the Benedictional of St. Ethelwold, who held the see of Winchester from A.D. 963 to 984. In 1874 Mr. Freeman, who had in the meantime most carefully examined the building, wrote, in his paper on "Ina," printed in vol. xx. of the "Transactions of the Somerset Archaeological Society":—"As Abbot of Malmesbury, Ealdhelm had been one of the greatest builders of his time. The realm of Ina was adorned with a number of churches, the work of his saintly kinsman. Of these one happily remains to us, the church reared by Ealdhelm on the scene of his uncle Cenwealh's victory,—the lately-rescued church of St. Lawrence at Bradford-on-Avon. There it stands, telling its tale that the English of the seventh and eighth centuries were not savages unable to put stone and mortar together." In pursuing his argument, Mr. Chisholm Batten pointed out that Aldhelm certainly built the great church at Malmesbury of stone, and the church he built at Wareham was also of stone. Then why not this church at Bradford? No one, he said, would insist on the church, as it now stood, being exclusively the work of Aldhelm, and certainly the angels in the east wall of the chancel might well have been added after the nuns of Shaftesbury owned the church. Much of the ornamentation externally must have been done after the erection of the walls.

At South Wrexall Manor House,—of which we give a sketch of a gateway and (on our sheet of phototype illustrations) a view in the courtyard, besides views of three of the chimneypieces, Mr. C. E. Ponting, architect, Marlborough, read a short paper, in which he said that this charming specimen of English Domestic architecture illustrates in a remarkable manner the development of the dwelling-house from the later middle ages onwards. The oldest parts of the building are the hall, the kitchen, and parlour on the south of it, with the host's chamber over; and the buttery, with guests' chamber over, on the north of the hall. Of the latter only the roof remains of the original features to indicate the date. The whole of this was erected in the early part of the fifteenth century, and probably by Robert Long, M.P. for Wilts in 1433, who died in 1447. Next in date (and very little later) is the block of offices at the north-east angle of the courtyard, which then stood detached. This also has its original roof. The entrance gateway, with the porter's dwelling over, and the buildings connecting it with the parlour, were apparently erected at the beginning of the sixteenth century, after the acquisition of the Manor of Draycot Cerne by Sir Thomas Long, as the badge of the possessor of this manor is cut on the label termination. The original part of the gateway only extended to about 14 ft. from the south face, and the quoins is visible on the west side, as well as a blocked-up doorway forming a foot entrance from the outside. An enlargement, by the erection of what Walker calls the "Dining Room (east of Withdrawing Room)," with the new guests' room over, was made at about this time, this being indicated by the roof, with its cellar and wind-braces; and it is doubtless owing to this not being accessible to him that Walker sets this part of the building down as dating from early in the reign of James I. During the latter part of the reign of Elizabeth and the early part of the succeeding one, very extensive alterations appear to have been made in the house to adapt it to the changed habits of the people. A fireplace was added to the hall. The chimneypiece bears date 1598, and was erected during the ownership of the property by Walter Long, who was Sheriff of Wilts in 1601. The greatest change, however, was made in the remarkable remodelling of the part north of the hall. The ancient guests' chamber over the buttery was transformed into a "With-

drawing Room," and its dimensions increased both in length and in width; and in order to effect this without disturbing the original roof, a piece of the north wall was left to support it, in such a position as to come in the centre of the extended length of the room, and the space between this pier and the new north wall was built up. The whole block (of the pier) was then made an ornamental feature by forming five niched seats in it. Lintels were thrown across east and west of the pier, to carry the north plate of the roof. A large bay was then formed on the east side of the pier, and the widened room lengthened 8 ft. westward, the entire available space in the new walls being occupied by mullioned win-

name from *creech* or *creeken*, a hill,—being placed on an isolated eminence fortified with a ditch and having a rampart all round the summit. The word "scratchy" was sometimes applied to land where the rock was only thinly covered with earth, and that had been given as the origin of the name "Scratchbury," but the late Canon Jones derived the name of the camp from the Scandinavian word *scratti*, a demon,\* the idea being common in ancient times that great works like the fortifications at Scratchbury were carried out by the help of evil spirits. The fortified space has three entrances, the south-east entrance being approached by a narrow neck of land called Burberry. The camp is ancient British, and the area comprised



dows of three lights in height. The beautiful chimneypiece in this apartment (shown in the left-hand bottom corner of the sheet of phototypes) looks up the doorway which formerly led into the small chamber over the north-west bay of the hall. The rich coved plaster ceiling was erected under the braces of the original roof, which were cut off at the plate level for the purpose. The oak panelling is apparently coeval in date. The two rooms east of this, which Walker terms the "Dining Room" and "New Guests' Room," appear to have been refitted at this time, as the chimneypieces indicate. At about the same time a new kitchen was added. The hall itself was enriched about the year 1600 by the erection of the carved screen. About a

within the fosse and vallum exceeds 40 acres. The circuit of the outer rampart is 1 mile and 86 yards. The greatest height of the vallum is 66 ft. Within the circuit are several tumuli, and an inner earthwork of circular form. The material of the ramparts is chalk and earth, obtained from the fosses and firmly bedded together. These ancient fortresses of a primitive and simple people, said Prebendary Scarth, in conclusion, were, as features in the history of the races that had peopled this island, well worth preserving, and he hoped they would always be respected and preserved.

In the Architectural Section, the Rev. J. A. Bonnett, B.A., read a paper entitled "The Architect of Salisbury Cathedral." He commenced by remarking that it was a



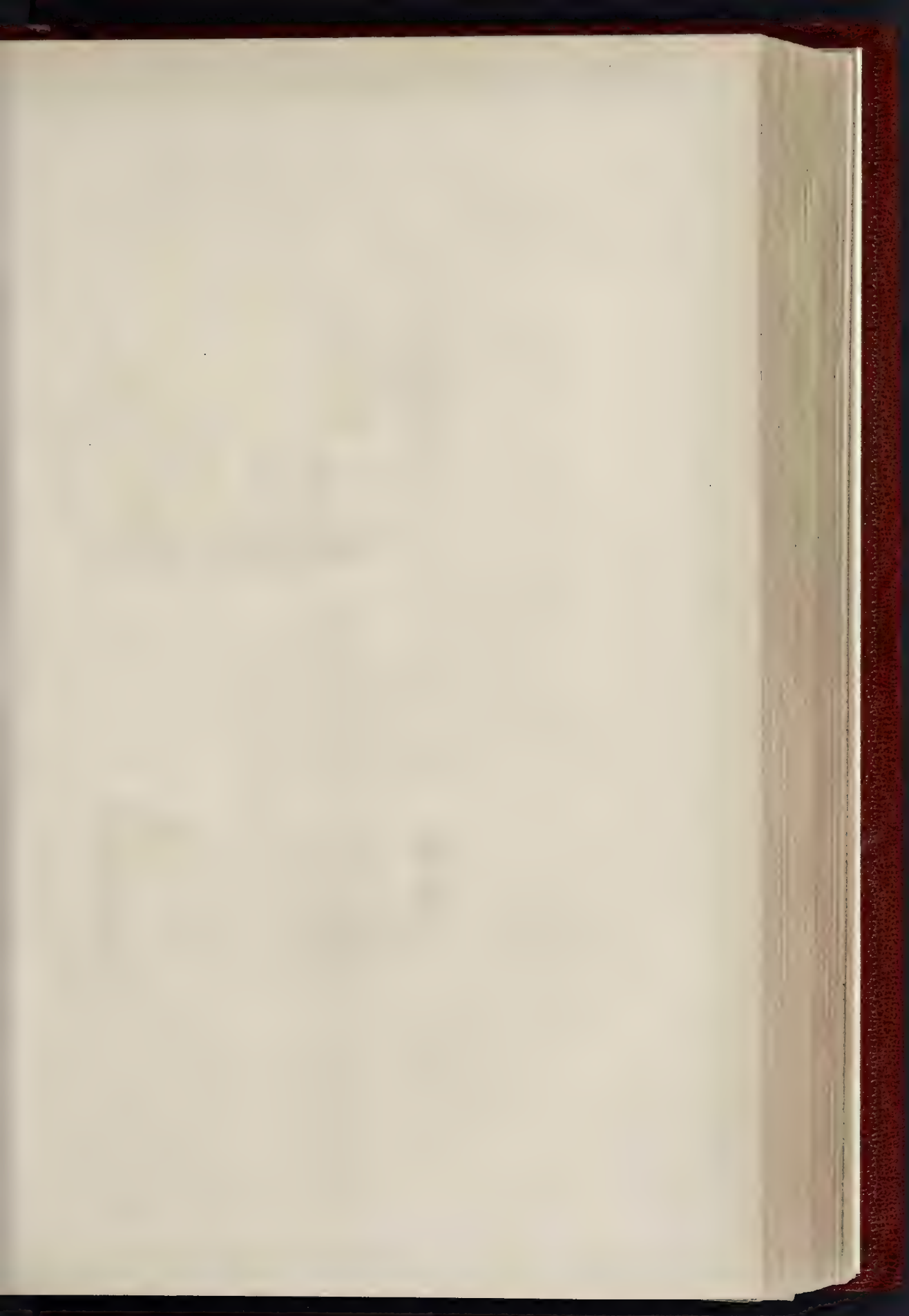
century later a great deal was done in modernising the fittings and surroundings of the house.

Subsequently the visitors proceeded to Great Chalfield, to inspect the church and manor-house, under the guidance of the Rev. E. Kingston and Mr. E. Green. We append a sketch of the north front of the Manor-house. The gable shown to the left hand has nothing behind it, the building being partly a ruin. Closely adjoining this end of the Manor-house is the church, with its picturesque turret perched on the gable end.

Scratchbury Camp was visited on the last day but one of the meeting. Prebendary Scarth said that Scratchbury Camp, which is situate to the north-west of Heytesbury, South Wilts, was supposed to derive its

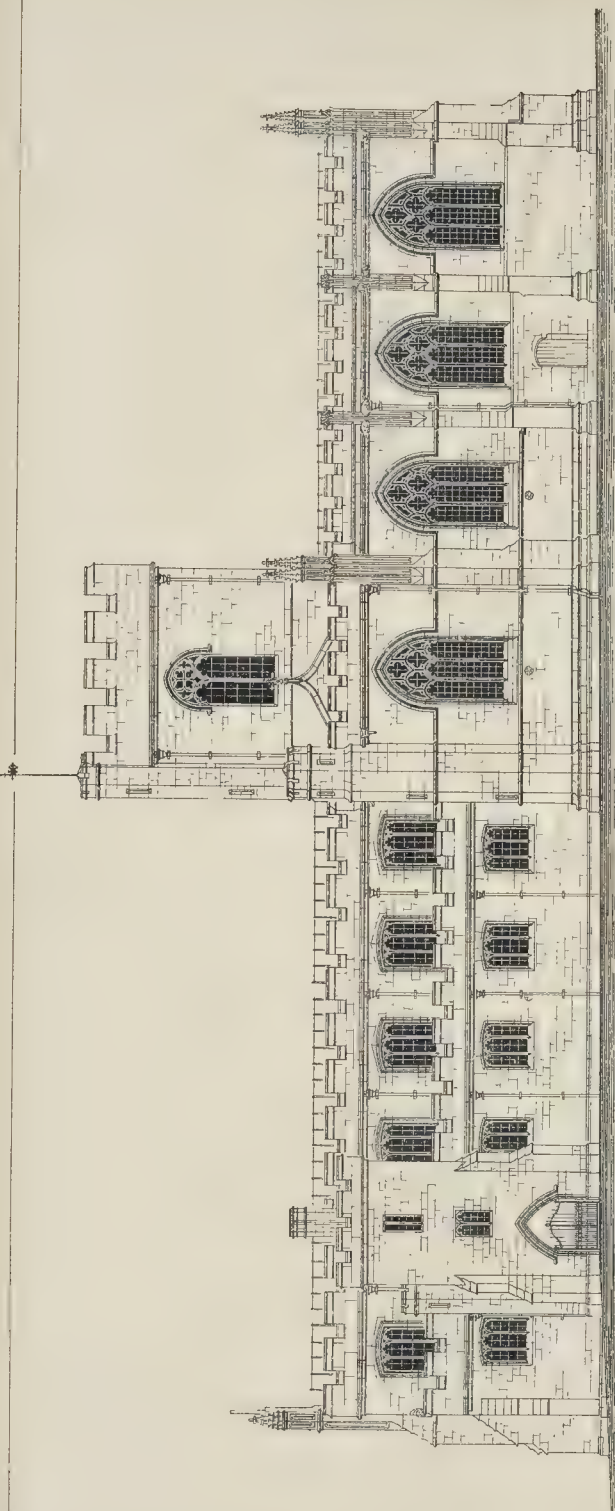
common subject of regret that while we had, in every part of the kingdom, works of art in stone second to none in the world, the names of the men who had created them were lost. It was his aim to show that in one Master Elias de Derham we had the name of one of those great men of old,—one of the masters in the school which created for us our own distinctive Early English style. He was a man of considerable eminence among the personages of the time. The earliest date at which the author had met with the name of Elias de Derham was in a Close Roll of A.D. 1205. In it, he, as one of the executors of the will of Archbishop Hubert Walter, was ordered to pay over

\* As bearing on this question, one of the visitors, Mr. Greville Chester, remarked that in some parts of the country "Old Scratch" was a vulgar name for the Devil.

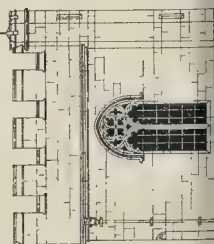
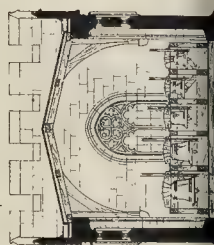
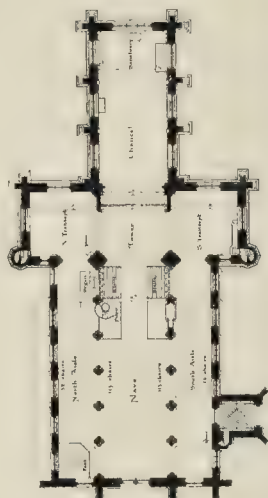
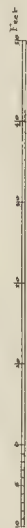




THE BUILDER, AUGUST 20, 1887.

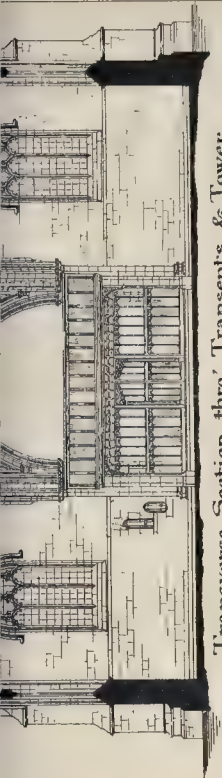


South Elevation





Transverse Section thro' Nave, Aisles, & Porch.  
Looking East.



Transverse Section thro' Transepts & Tower,  
Looking East.



West Elevation.



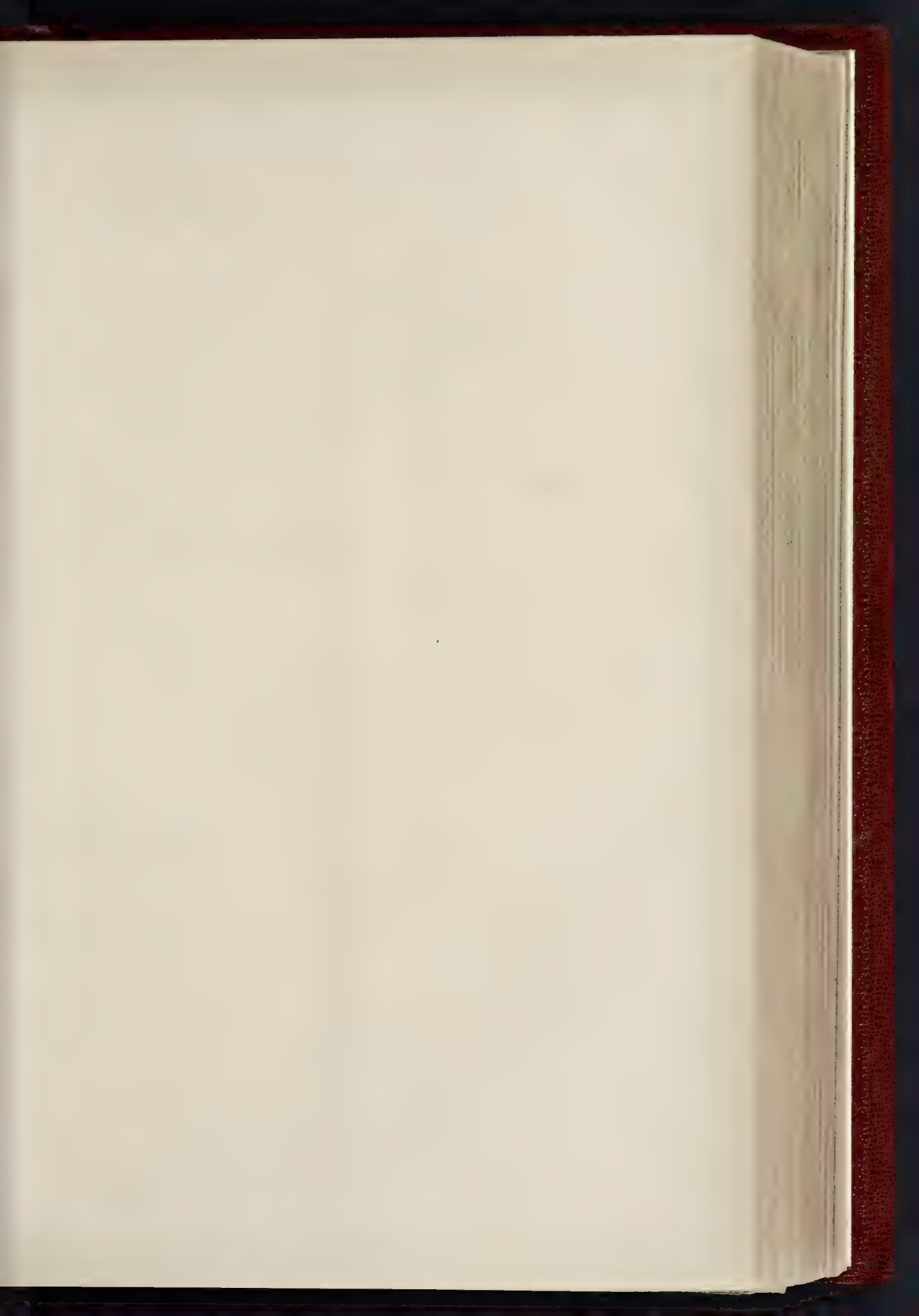
East Elevation.

PHOTO. BY THE ARCHT. & L. 22 WEST. N. AND. K. 1875. N. 1875.

EDINGTON CHURCH, WILTS., AS PROPOSED TO BE RESTORED.—MR. C. E. PONTING, ARCHITECT



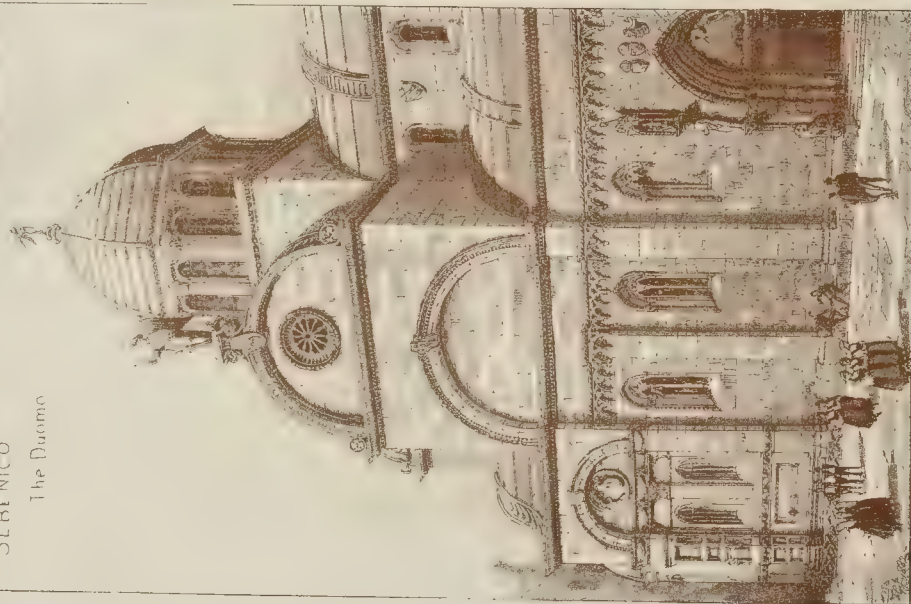






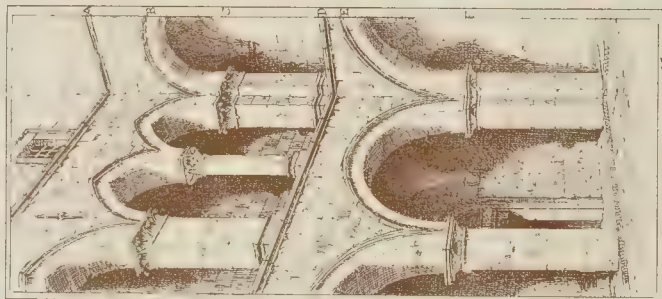
SERENICO

The Duomo

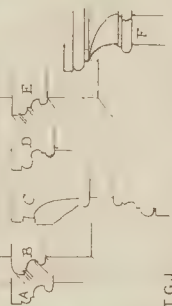


T.G.J.

RAGUSA.



Choir of the Duomo



T.G.J.

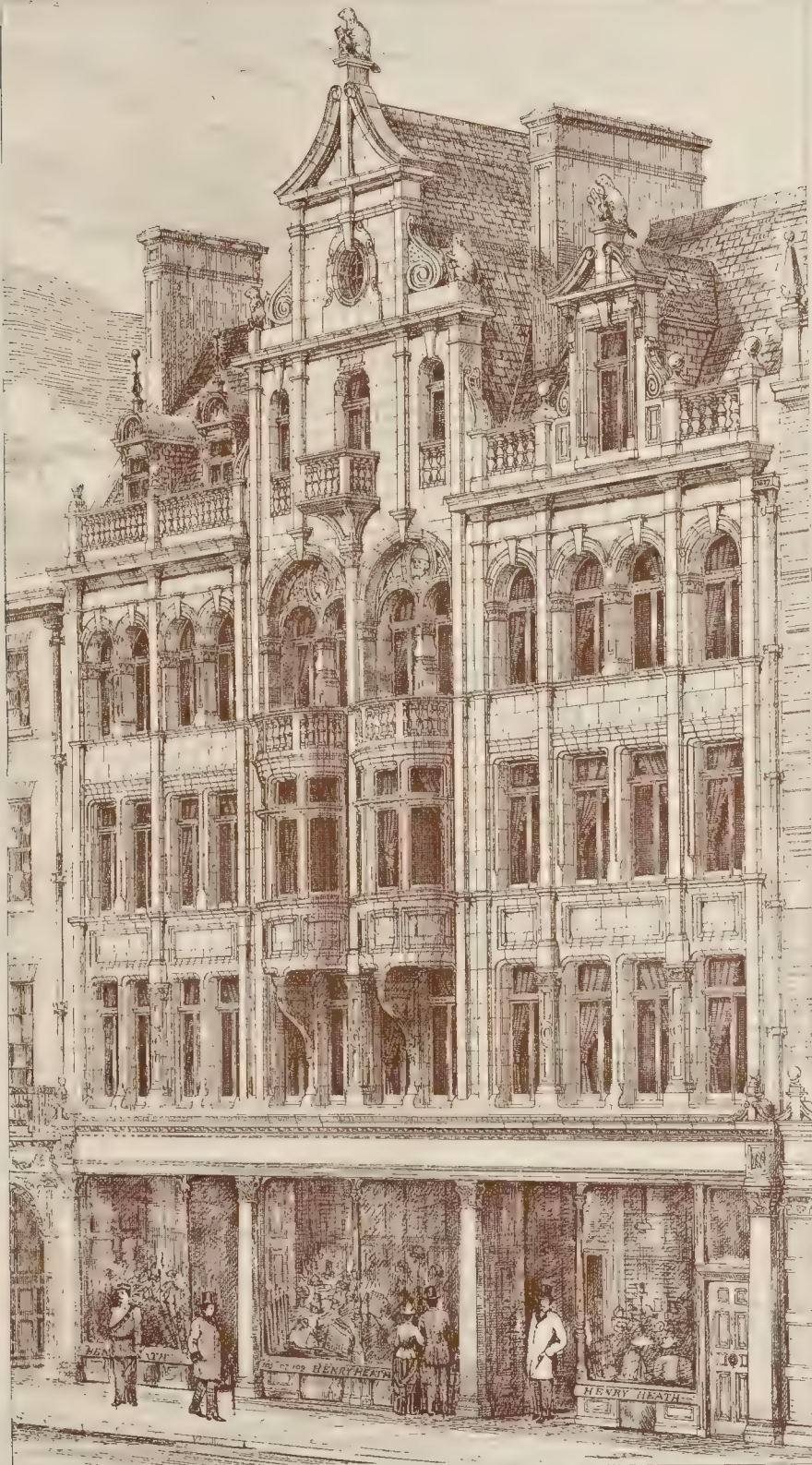
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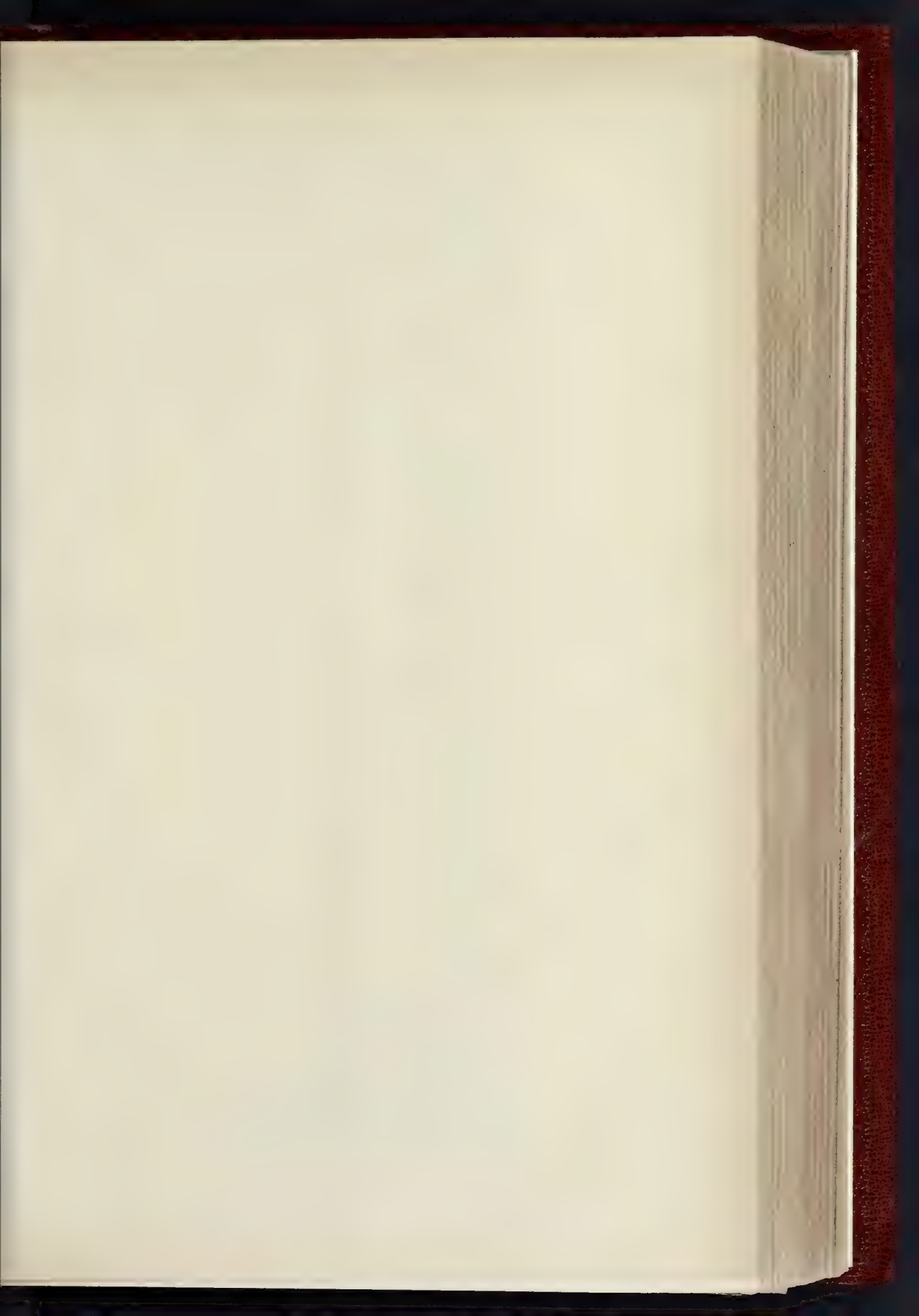




NEW PREMISES OXFORD STREET —MESSRS CHRISTOPHER & WHITE, ARCHITECTS.









THE BUILDER AUGUST 20, 1887



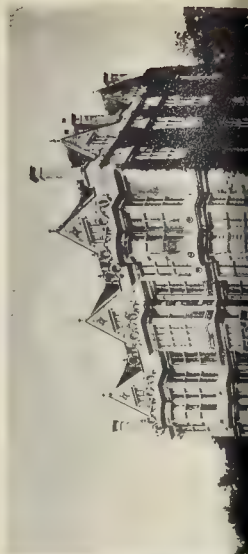
STEEPLE-ASHTON CHURCH.



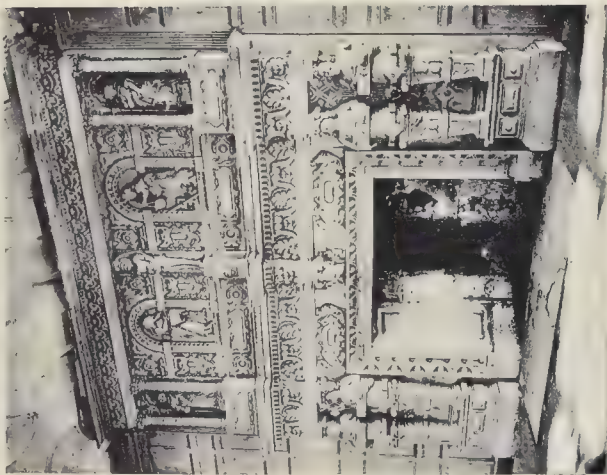
FIRE PLACE IN BLUE ROOM  
WRAXALL MANOR HOUSE



WRAXALL MANOR HOUSE



EDINGTON CHURCH.



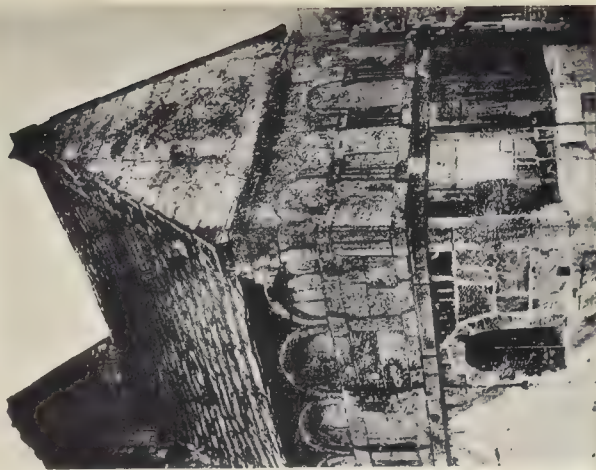
FIREPLACE IN DRAWING ROOM  
WRAYALL MANOR HOUSE.



FIRE PLACE IN DINING ROOM  
WRAYALL MANOR HOUSE.



MONUMENT IN EDINGTON CHURCH.



SAXON CHURCH, BRADFORD-ON-AVON

KINGSTON HOUSE, BRADFORD-ON-AVON.

THE ARCHITECTURAL ASSOCIATION EXCURSION, 1887.—ILLUSTRATIONS OF SOME PLACES VISITED.

From Photographs by Mr. Wilkinson, of Trowbridge.

The Photo type Co., 30, Strand, London.





in moneys which had belonged to the then Bishop of Bath. The author said he had been told on what should be good authority that King John's Palace at Westminster was fired by Elias de Derham in the year 1209, but he had not been able to verify that statement. The next mention of his name was found in an early will of Hugh de Wells, Bishop of Exeter (a copy of the will is amongst the documents of Wells Cathedral). In it Bishop John appointed Master Elias de Derham to be

and that the architect employed was Elias de Derham, who seemed to have been in close connexion with the King, and, indeed, to have been in much the same relationship to him as William of Wykeham was to King Edward III. and his successors. Mr. Bennett continued his paper by arguing inferentially, from certain resemblances between contemporary work at Salisbury, Winchester, and Wells, that these works must have emanated from one master-mind, viz., that of Elias de Derham.

was, by royal favour, appointed to the See of Winchester, and shortly afterwards made Lord High Chancellor of England. Soon after his consecration to Winchester he appears to have set about improving the state of the church in his native parish of Edington. He first (in 1351) arranged with the Abbess of Romsey for the establishment at Edington of a collegiate body of secular priests under a warden. But a short time after this, at the special request of the Black Prince, he converted his college into a monastery of the Augustine order of Bonhommes, and built the present church. Leland gives the following extracts from a certain Latin book of Edington monastery:—"3rd July, 1352, was laid the first stone of the monastery of Edindon."

"A.D. 1361. The Conventual Church of Edindon was dedicated by Robert Wyville, Bishop of Sarum, to the honour of St. James the Apostle, S. Katherine, and All Saints." We are thus able to fix the exact date of the commencement and completion of the church, the whole of which was carried out during the bishop's lifetime. The church is especially interesting, Mr. Ponting remarked, as marking the period of change from one of the great divisions of Gothic architecture to another,—from the Decorated (which Parker set down as ending about 1360, and Rickman as 1377) to the Perpendicular (which both authorities considered as commencing about the year 1400). The value of the example is enhanced by the fact that (with the exception, perhaps, of the porch, which appears to have been added to the aisle wall rather than built up with it, and is somewhat later in detail), the building is all of one date, and it remains practically unaltered, so that it presents to us a complete specimen of the monastic church of the fourteenth century. The tower was formerly vaulted in stone at its lower stage, but the corbels, springers, and wall-ribs only remain. The chancel being the church of the monastery, the parish altar was doubtless placed under the tower. The original chancel roof (which must have been of wood and not of stone, as so often stated) has disappeared, and a modern roof and plaster ceiling of about a century old have taken its place. But the corbels which supported the roof trusses remain,—two on each side,—as well as four niches, which probably contained figures of the Evangelists. On the east wall, flanking the window, are two niches of very elaborate design and delicate construction, the slender proportions of their tabernacle work being suggestive of wood rather than stone. In the centre of the south side of the chancel is a doorway which (doubtless from its plain external appearance) has been considered modern, but which is richly moulded on the inside, the label being carried up as an ogee canopy with flanking pinnacles and crockets, and dying into the string course. But the rebate for the doors is on the outside, where the western jamb and arch have a small plain chamfer, whilst the eastern jamb is deeply splayed off. This was evidently not originally an outside entrance to the chancel, as at present, but opened into a long narrow chamber against the two eastern bays. Referring to the south elevation, it will be seen that the outer sills of the windows of these two bays, are on this side, kept higher, the sills being flatter to admit of it. There is a built-up window in the battress at the west end of the chamber, and an archway for passage through the intervening one, also blocked up. In the chancel wall at this part there are two built-up squints or windows (with a mullion between) which once looked into the sanctuary. The object of this passage-like chamber opens the field for much conjecture. It must have been too narrow for a sacristy. Was it the kind of anchor-hold described by Mr. Mackenzie Walcott, the openings being made to enable the recluse to see the mysteries? Or was it a place for the leper? However that might be, all these features, including the doorway, were certainly coeval with the chancel. The roofs of the nave, aisles, and transepts are Jacobean, the dates on them ranging from 1605 to 1674. There are reasons for believing them to be, in general form, copies of the original. They are of the king-post and tie-beam type. The exterior of the church is remarkable for the regularity of its design. The west front is notable for its unique window and doorway. The doorway appears to have been intended more as an architectural feature than for use, as the splayed wall-plinth of soft stone is carried through as a sill, and



executor, together with his own brother John, Bishop of Bath. At about the same time he was employed as architect upon a work of great importance,—the Shrine of St. Thomas at Canterbury. The authority for that was the Paris, who added to his account of the shrine of St. Thomas, in A.D. 1220, the statement that the shrine whither the body was moved was the work "of the incomparable Robert, Walter de Colchester, Sacrist of St. Dunstons, and Elis de Derham, Canon of Salisbury."

Another notice of Elias de Derham about the same date was found in connexion with Salisbury. The Diocesan Registers spoke of him, as a canon of Salisbury, eleven times, and there were positive statements in the "Book of Evidence," among the Bishop's documents, that he was the builder of the manse house in the close called "Aula mense," or "Leden-hall." Leland gave a page from an old martyrology of Salisbury which spoke of Elias de Derham as "rector" of the new fabric of the church of Salisbury from its first foundation for twenty-five years. Prebendary Jones, in his history of the diocese, states that by a sort of dim tradition Elias de Derham was believed by some to have been the designer of the cathedral. Prebendary Jones did not give a decided opinion as to the exact meaning of the word "rector," but there seemed to be every reason for taking the word in its usual sense meaning the chief person concerned, and not merely as the equivalent of "magister rationum,"—"clerk of the works,"—and for saying that the tradition was founded on fact. It seemed to Mr. Bennett also that the fact that Elias de Derham was employed in an architectural capacity during the same time at Salisbury, Canterbury, and Winchester, that he accompanied Bishop Poore to Rome in the midst of it all, was quite inconsistent with the position of a (mere) clerk of works, the very reason for whose employment it was that he should be in daily superintendence of some particular building. Mr. Bennett, in his paper on the King's Hall at Exeter, which was printed in the Winchester volume of the Institute for 1845, showed, by extracts from the Close Rolls and Liberators, that a great deal of work was going on at the hall about the years 1230-1235,

Another paper read in this Section was by Mr. C. E. Ponting, on Edington Church. We give a summary of the paper on another page, and accompany it by some illustrations reproduced from Mr. Ponting's drawings for the restoration of the church.

We have a few more brief notes to follow in completion of our report.

### Illustrations.

#### CHURCHES AND OTHER BUILDINGS VISITED BY THE ARCHITECTURAL ASSOCIATION.

OUR sheet of phototype illustrations shows some of the churches and buildings visited by the Architectural Association during the present week. By a coincidence elsewhere mentioned, some of these buildings were visited a fortnight ago by the Royal Archaeological Institute, in connexion with its meeting in Salisbury, now being reported in our columns.

#### EDINGTON CHURCH, WILTSHIRE.

THIS fine church, of which we give plan, transverse sections, and south, east, and west elevations (as well as a small view on our sheet of phototype illustrations), has been visited this week by the Architectural Association. As elsewhere mentioned, it formed the subject of an interesting paper read in the Architectural Section of the Salisbury meeting of the Royal Archaeological Institute a fortnight ago by Mr. C. E. Ponting, the architect for the restoration of the church. Mr. Ponting, at the outset of his paper, said the church would be restored in the most conservative sense of the word. He went on to say that the rectory of Edington belonged to the Abbey of Romsey, of which the rector was a resident prebendary, and the parochial duties, with the services in the church (the predecessor of the building under notice) were discharged by a vicar. About the year 1300 William of Edington (whose surname is unknown) was born in the village whose name he adopted. After education at Oxford, and having held two previous livings, he in 1322 became rector of Middleton Cheney, in Oxfordshire. In 1345 he



shows little sign of wear. A noticeable fact in the design of the church is that effect is produced by good proportions, solid construction, and rich mouldings, rather than by carving. The capitals throughout are plainly moulded. In concluding his paper, Mr. Ponting adduced from this church reasons for believing that it was its founder, William of Edington (and not William of Wykeham, who has generally been credited with it) who introduced the leading principles of the Perpendicular style.

We may add that Mr. Ponting's report on the condition of the church reveals a sad state of neglect and dilapidation, and it is quite clear that the structural repairs which he recommends ought to be carried out with as little delay as possible if the church is to be preserved intact.

#### DALMATIAN ARCHITECTURE.

THE page of illustrations which we give from drawings by Mr. T. J. Jackson, M.A., are referred to in our first article this week.

#### NEW PREMISES, OXFORD-STREET.

WE give this week a perspective view of premises in the course of erection in Oxford-street for Mr. Henry Heath. They extend from Oxford-street to Hollen-street, the manufactory being in the rear, and already completed and occupied.

The erection of the front has been delayed till the end of this season, so as not to unnecessarily interfere with the business.

The front is to be faced with terra cotta from the Burmantofts works.

Messrs. Peto Bros. are the contractors; and the work is being carried out from the designs and under the superintendence of Messrs. Christopher & White, architects.

#### THE BRITISH ARCHAEOLOGICAL ASSOCIATION.

THE British Archaeological Association is now holding its Forty-fifth Annual Congress at Liverpool, the President, who will also continue in office during the ensuing year, being Sir James Allanson Picton, F.S.A., an old member of the Association and inhabitant of the city. There is an influential reception committee, consisting of seventy or eighty of the principal citizens and others. The Local Hon. Secretaries are Messrs. C. W. Bleasde, Ed. M. Hanco, LL.B., and R. D. Radcliffe, M.A.

The proceedings commenced at three o'clock on Monday with an "At Home," given by the Mayor of Liverpool, Sir James Poole, in the Town-hall, where the reception committee assembled to formally welcome the members of the Congress. An adjournment was then made to the Council-chamber, where Mr. John Hughes, acting on behalf of the Mayor, presided.

After rendering the members a hearty welcome, Mr. Hughes called upon Sir J. A. Picton to deliver his inaugural address, and vacated the chair for the purpose. We have the greater part of Sir James Picton's interesting address in type, but it is unfortunately crowded out this week; it shall appear in our next.

The address was listened to with much interest by the audience, which completely filled the Council Chamber. At its close a vote of thanks to the lecturer was proposed by the Rev. H. H. Higgins, who dwelt upon the important services rendered to the city by Sir James Picton, during a long life, particularly with respect to the Free Public Library of Liverpool. The vote was carried by acclamation, and the party adjourned to the upper silver plate belonging to the Corporation were laid out for inspection. The whole of the charters granted to Liverpool by various kings of England were also exhibited, and these were described by Mr. de Gray Birch, F.S.A., one of the honorary secretaries of the Association. The first in order of date is the so-called charter of King John. It is written on a small slip of parchment a few inches in length. It recites that the burghesee who have taken up their abode at Liverpool are to possess free customs as are enjoyed by other maritime towns. This cannot, therefore, be regarded as a Charter of Incorporation, such as is the next in date, that granted by King Henry III. in 1229, by which Liverpool is constituted a free town with a merchant guild, no one being allowed to make any merchandise except by a member of the

guild, or by its permission. In addition, other rights and privileges are granted. There is no seal to either of these documents. The charter, or rather the confirmation of the former documents, made by King Edward III. at York, was also exhibited. This is an interesting document from the number of signatures of members of the king's court attesting it. Various other charters of later date were also exhibited, among them being those of King Charles I., William III., and the market grant of Queen Anne.

Mr. Birch called attention to the excellent state of preservation of the documents, which indicates careful treatment of a better kind than is frequently found, and the example of the municipal authorities may be followed with much advantage by other corporations.

Refreshments having been partaken of, the party proceeded, under the guidance of the Town Surveyor, to inspect St. George's Hall, which was specially thrown open and lighted up for the inspection of the party, the intention having been not only to show the visitors a monument of which Liverpool is so justly proud, as to indicate its resemblance to some of the works of ancient Rome. The building was seen to great advantage. At the conclusion of its inspection the thanks of the party were rendered to the City Surveyor by Mr. Arthur Cates, F.S.A.

The party then adjourned, to re-assemble at a public dinner, which was partaken of at the Adelphi Hotel, under the presidency of Sir J. A. Picton.

On Tuesday, the 16th, the party proceeded to inspect the remains of the old Priory of Birkenhead, where, on assembling in the ancient Chapter-house, a paper was read by Mr. Charles Aldridge, F.R.I.B.A. The building was founded by Hamon de Massey in 1150 for sixteen Benedictine monks, and the lecturer showed that although the establishment was at first in some way considered as an offshoot from the great Abbey of St. Werburgh at Chester, yet it was independent of the parent house. A plan was produced showing a curious resemblance between the disposition of the buildings at the two monasteries, both having the domestic portions north of the church. At Birkenhead the remains consist of the Chapter-house and the Scriptorium over it. This building is roofed in and is in fairly good condition. The remains of the abbot's house on the west side of where the cloisters have been, and the refectory on the north side, complete the bulk of the ruins, although portions of the north side of the church may be traced. The entrance to the Chapter-house and its vaulted ceiling are of Norman date, of very plain and early description, which are fully thirty years earlier in date than the period so usually assigned for the foundation. These portions indicate that they had been erected at the earlier period, and only devoted to the use of the community at the date named in the documents, which seem to be well attested. Other portions of the ruins are of early fourteenth-century work, and there are many insertions of later date. The broken walls form a singular group of ivy-clad ruins hemmed in with small modern houses, close to the present church of Birkenhead. Reference was made to the ferry to Liverpool owned by the monks, which is continued with all the appliances of modern times down to our own days; and passing mention was made to the discovery about forty years ago of an oak-framed bridge completely buried beneath the modern level. The lecturer supposed this to have been the work of the monks. Since, however, it was found completely silted up and buried beneath alluvial soil, it points clearly to a period when the level of the land was higher than at present. The subsidence has to be taken in relation to the submerged forest on the Meols shore many miles off, which points to a similar sinking. The discovery, which deserves more attention than was bestowed upon it at the time, has considerable interest in relation to the former condition of the district, and a Roman origin, which was claimed for it at the time, is none too remote a date to assign to its formation.

The party then proceeded by carriage to Bidston Hall, one of the homes of the Stanley family, a moderate-sized stone-built house, having a long, low front with apparently a poor modern roof, the only marks of antiquity being the walls, the mullioned windows, a projecting oriel, and a plain entrance door, the building having a gloomy look from the entrance court,

and also the garden in the rear being enclosed with low walls. Sir Jas. A. Picton described the connexion of the Stanleys with the building, and pointed out the most salient of its features, also the peculiar manner in which the stone floors are decorated with patterns by the present occupiers whenever they are washed. The church, dedicated to St. Oswald, of which only a very elegant but simple tower remains was described by Mr. E. P. Loftus Brock, F.S.A.

Passing by the Meols shore and its submerged forest, close to the supposed site of a Roman settlement, a halt was made at West Kirby Church, where the Rev. Canon Eaton received the party. The church, dedicated to St. Bridget, is a conspicuous object of no little interest. In its restoration several stones with incised patterns of Saxon date were found.

Progress was then made along the banks of the Dee, whence a beautiful view was obtained of the Irish Channel and the Welsh mountains of Flintshire. At Thurston Hall, Sir David and Lady Radcliffe welcomed the party, and luncheon was partaken of in a large marquee. The ancient hall was then examined, and many curious features of the building pointed out. The old fabric stands beside a beautiful new parish church, recently completed by Mr. Pearson, which was thrown open for the inspection of the party. The huge mass of red sandstone on Thurston Common, was then visited, and here Sir Jas. Picton read a paper, pointing out that the stone was most probably called after Thor.

Rapid progress was then made to Woodchurch, where the well-kept church was inspected, and, by invitation of the Rev. Canon Robin, tea was partaken of. A visit to the quaint old half-timbered hall at Irby had to be abandoned for want of time. This was much regretted, since the building is said to be greatly decayed, and its partial renovation is contemplated.

Tuesday's proceedings were brought to a close by a meeting in the Walker Art Gallery, when the following papers were read:—"The Continuity of Christianity in Wirral from Roman Times," by the Rev. A. E. P. Gray, M.A., F.S.A.; "Relations of Wales and Cornwall in the Fifth, Sixth, and Seventh Centuries," by the Rev. W. S. Lach-Szyrna; and "Considerations on the Plan of the Walls of Chester," by Mr. Loftus Brock.

On Wednesday, the 17th, the party proceeded by carriages to inspect various antiquities in the southern and eastern suburbs of Liverpool, the first halt being made at the celebrated prehistoric circle of stones called Calder Stones. Instead of their being found on some open moor or other site which may seem to be fitting to such early remains, they are, in fact, surrounded by a dwarf wall and a circle of iron railings, at the junction of three well-frequented roads, close to modern houses. An inscription indicates that they were enclosed in 1845, and, although their appearance through the iron railings is not good, yet we may be thankful that the enclosure has prevented the stones from being entirely covered over with initials and other marks of popular interest. Entering through an iron gate into the small circular enclosure, the party listened to an able address by the President, who called attention to the curious cup and ring marks which occur on almost every one of the group of stones. These are not yet obliterated. The name Calder he considered to be derived from the Saxon, Galdre, meaning witchcraft or magic; and nothing could be more likely than that the little circle of stones would have been regarded with superstitious feelings by the Saxon invaders. Entering upon the wider inquiry as to the age of the stones, he referred to the large extent of the earth over which stones similarly marked have been found, and could only say that he believed their erection to be the work of some Turanian tribe at a very remote period. In the discussion which ensued, Mr. de Gray Birch, F.S.A., suggested that the markings on the stones might probably have been rude maps of some ancient settlement. Prior to the enclosure the stones had been covered by a sand hillock now removed, and the sepulchral nature of the circle was shown by the discovery of several urns filled with burned bones, which were scattered by the workmen.

A short visit was paid to Messrs. Paley & Austin's fine new church at Mossley Hill, some of the principal features of which were pointed out by Mr. Paley. A visit was then paid to the



autiful old timber mansion, Speke Hall, which as thrown entirely open to the inspection of a party by special invitation of Miss Watt, who welcomed the party in the old banqueting hall, and where refreshment was laid out. Sir James Picton read a brief description of the hall, and pointed out the fine panelling brought from Holyrood Palace by Sir William Norris, who was killed in 1547. A moat surrounds the mansion, the only relic of a still more ancient building which once occupied the site. Entrance obtained by a stone bridge, 20 yards long, the work of E. N., as is recorded by the well-known Latin inscription on the entrance. The plan is a parallelogram of half-timber buildings surrounding an inner quadrangle, in which are two ancient yew-trees of large size. The drawing-room has a ceiling of elaborately-modelled plaster decoration in panels, while the beams dividing it into squares are covered with foliage decoration laid in; the walls are panelled with dark oak, and here is a quaint old fireplace covered with carving, representing a whole generation of over twenty children of the Norris family. The house is filled with old panelling, carvings, old bedsteads, chairs, tapestry, and suchlike. The party lingered around this beautiful mansion, in which there is nothing of modern date, and which is seldom shown to the public, and left it with not a little regret. The position of the building is admirably chosen, and it presents a charming picture with its background of pretty old gardens and trees.

A passing visit was then paid to the "Hutty," by which name the residence of the Ireland family is now known. It consists of an entrance gateway of brick, approached by a stone bridge over a moat. The work is of Elizabethan date, and it has a coved cornice of half-timber work. It led to the ancient Hall, which is now demolished, but the whole site is enclosed by the moat. The entrance door into the ancient Hall remains as a ruin, a good example of fourteenth-century work, while near it are the remains of a chimneypiece of Elizabethan date, and a good window.

Childwall Church was next inspected, a large building with a tower and spire, but which has been almost entirely modernised in the style of the last century. There remains within it an old arcade on the south side of the nave, of poor work, and two brasses of the Norris family now screwed to some panelling in the south aisle, the brasses having been removed from the Norris monument on the demolition of the latter, apparently about 1760.

After leaving the church, the party proceeded to Sandy Knowe, Wavertree, the residence of the President, on his invitation, and here an elegant luncheon was partaken of. The weather being very wet, an intended inspection of the site of Edward the Confessor's castle at Croxeth, still called Castle Field, had to be given up.

We will continue our report of the proceedings next week.

**Sheffield Society of Architects and Surveyors.**—A general meeting was held at the Sheffield School of Art, on Tuesday, the 16th inst., to receive the report of the provisional committee appointed at the preliminary meeting in May last. Mr. T. J. Flockton presided, and there were also present Mr. C. Hadfield, Mr. J. B. Mitchell-Withers, Mr. F. Fowler, Mr. C. J. Innocent, Mr. G. W. Wilson, Mr. R. Davidson (Borough Surveyor), Mr. W. C. Fenton, Mr. W. F. Hemmell, and a large number of the members of the profession, the meeting being of a thoroughly representative character. The rules, which have been modelled on those of the Manchester and other societies, were carefully discussed and finally adopted, and it was decided that the society should be styled "The Sheffield Society of Architects and Surveyors," and that a special meeting should be called in a fortnight's time for the election of officers, &c.

**Sale of Property.**—On Wednesday last the Lincolnshire estates of the late Rev. Lord Saye and Sele were put up for sale by auction at Spalding. The property, divided into 100 lots, comprises twenty-three farms, of from 40 acres to 200 acres a piece, covering an aggregate of 2,780 acres, all tithe-free, and yielding an annual rental of nearly 5,200l. In the result only 808 acres were purchased, for 30,273l., being at an average of less than 40l. an acre, including the buildings.

ST. MARY'S CHURCH, HOLME-NEXT-SEA.

SIR,—As architect for the restoration of the above church I am desirous of ascertaining through the medium of your paper if any of the posterity of the Stone family are living in England. It may interest them to know that in excavating a few days ago for the foundations of the new seating, a large flag-stone, 6 in. in thickness, was found at the south-east corner of the nave with the following inscription roughly carved thereon:—

"Richard Stone and Clemens his Wife."

In the chancel is a richly-carved monument of alabaster and marble with husband, wife, and thirteen children kneeling, with the following quaint inscription on a tablet beneath:—

"Here under lyeth Richard Stone and Clemens his Wife who lived in Wedlocke joyerly together for 64 years and three months; of them proceeded 7 sones and 6 daughters, and from those and theirs raised 72 children which gave to the said Richard Stone and Clemens great comforte. Richard Stone died the 5th of October 1807 aged 87 years and Clemens died 10th day of November aged years."

King's Lynn.

WM. ADAMS, Architect.

WOLLATON HALL.

SIR,—So far as I can judge from the references to Smithson (at pp. 165 and 234, ante), there need be no difficulty in reconciling the statement on his tomb with the ascertainable fact that John of Padua was the architect of this house.

The title "architect" used in the seventeenth century was not equivalent to the modern title of architect. It denoted a master builder,—one who, by contract or on other terms, would carry out building operations; a constructor, or, as we now say, a "builder." He might be capable of designing and executing an ordinary structure, but his business was building, and not designing. John Abell, a clever and substantial Herefordshire village carpenter, who died probably in 1674, had an epitaph beginning,—

"This craggy stone a covering is for an architect's bed"; but the stone has been recut, and the word changed to "architect's," in disregard of metre, and Abell, like Smithson, is credited with works which he never thought of claiming.

I do not know what evidence Lady Middleton may have collected, but I suggest that it is improbable that Smithson's epitaph,—set up before the eyes of those who would best know the facts,—would state anything but the truth. It means to state that he built Wollaton or some considerable portion of it, perhaps only the masons' work, which was probably the most important part. He might well be "surveyor" over the other work, or standing surveyor of the whole house when it was completed. John of Padua would furnish the original design. The difference which appears to exist between the main façades and the rest of the work rather suggests that the builder had to finish the work without his assistance.

THOS. BLASHILL.

MASONS' MARKS.

SIR,—Allow me to add a few words to Sir Robert Rawlinson's letter [p. 252, ante] in further explanation.

In Mediaeval work you will find these marks out on the face of the stone; in all modern work they are cut on the top bed, and this was no doubt introduced into this country with Classic architecture, requiring a finer finish to the face.

It must be remembered that the art of writing was not generally acquired, and that in early days operative masons, as well as the classes above them, signed their name with a cross.

In order that the foreman should be able to detect the worker of a stone, and to save disputes as to a stone being worked wrong, it was, and is still, the custom for each mason to adopt a particular mark. In early work these can be seen on the face, but now they serve a double purpose: they are the signature of the mason to his work, and an instruction to the setter as to the part of the stone that is upwards in the building.

ROBERT PHILLIPS,

Clerk of County Works for Gloucestershire.

ASPHALTE AND CONCRETE PAVEMENTS.

SIR,—If the letter which appeared in your last issue [p. 253] emanated from a slab-pavement manufacturer, I would not have troubled to notice it; but as it is signed by a C.E., I would ask you to allow me space for a few remarks on the assertions of this capacious critic.

1. When asphaltic paths become worn they can be most readily repaired, and with less inconvenience

\* Dates gone.

to the public than either stone or slab pavements; an ordinary gang of workmen will lay upwards of 300 super. yards per day, and the path can be thrown open to the public within three hours after the asphalt is laid.

2. All paths will become sloppy "in wet weather, when worn below the kerb level," but asphalt pavements, having no joints for dirt to accumulate in or work through, are undoubtedly the cleanest.

3. A reliable analysis of the asphalt used is most important, as spurious asphalt is, unfortunately, often met with. Within the last fifteen years numerous asphalt were laid in the City of London; of all these, the asphalt of three companies only now survives.

Mr. Strachan's paper dealt with facts relating to two of these successful companies, and would, no doubt, have included the third company,—which also supplies asphalt of excellent quality for paving,—had information from an independent and reliable source been available. In every case Mr. Strachan gives the situation of the particular pavements referred to in his paper, so that the interested or sceptical may satisfy themselves by personal observation.

4. The life of an asphalt footway pavement, composed of 1 in. of best compressed asphalt on 3 in. of Portland cement concrete, may be fairly taken at from twenty to thirty years for the asphalt surface, with ordinary traffic. The Local Government Board sanction the borrowing of money by local authorities for such pavement for a period of twenty years. Mr. A. M. Hiscocks suggests that the analyses and geological quotations might have been left out of Mr. Strachan's paper "to make room for statistics of traffic actually sustained by the various kinds of pavements in a number of streets, and the effect of the traffic upon them, together with a few simple calculations as to the approximate cost of each material per million or hundred million of persons passing over them." To obtain such information in a reliable manner is not so easy as Mr. Hiscocks imagines. A few years ago I had traffic returns taken for another purpose. The traffic varies in each street daily and hourly, and is much influenced by converging streets, character of the surroundings, state of weather, and numerous other circumstances; and in many streets the traffic on one side is often three or four times that of the opposite side. How, then, are reliable comparisons to be made?

5. With regard to the noise (especially at night) of traffic on concrete slab pavements, I can testify to this nuisance, as I reside in a street so paved; and I have received numerous complaints from residents on the same subject.

T. DE COURCY MEADE,  
Engineer and Surveyor to the Hornsey Local Board.

WHAT ARE FIREPROOF MATERIALS?

SIR,—A fire which occurred in Colchester in 1878 burnt three houses to the ground in High-street. The houses were divided from each other by 9-in. brick walls, which were demolished.

They were divided from the two outer adjoining houses by old oak partitions pugged with thatch and clay, which effectually stopped the fire.

The houses destroyed had fir joists and deal floor boards and joinery.

No material commonly considered fireproof can resist a flame feeding on fir and deal.

Iron will conduct the heat; stone will fly to pieces; and brick crumble to dust.

While the forests of Canada and Scandinavia are becoming exhausted, some districts in England are becoming overgrown with oak and elm for want of a market. The trees are left to rot internally and become harbours for wasps and other vermin.

Elm floors would be far safer than deal, and not more expensive. Try and light a fire with elm, oak, ash, or other English wood when you want an early breakfast to enable you to catch a train!

We have had plenty of foreign competition against home labour. Let us try a little home competition against foreigners.

W. SCARBOLL.

A SURVEYOR'S APPOINTMENT.

SIR,—While on a visit to Derbyshire a few days since, my notice was called to a recent appointment of a local surveyor. If you could give it publicity, I think you would be serving the interests of qualified men, as your journal has always been willing to do.

The Local Board of a rapidly-growing town near Chesterfield lately required the services of a surveyor and inspector of nuisances, to fulfil the ordinary duties of a surveyor and manage the sewage farm.

There were three applicants selected from among the candidates for the post: one, an architect in practice in the adjoining town; another, a gentleman connected with building and surveying for more than twenty years; and the third a farmer.

The first two had long and varied experience, but were put aside by the Board (the vice-chairman is a C.E.), and the farmer elected!

To test the candidate's knowledge before election, the Board asked him a few questions, among them the following:—

The Board.—"How would you make the joints to an earthenware drain?"





ent, and is founded upon a proposition of solid (Book I., Prop. 7), that upon the same, and upon the same side of it, there cannot be two different triangles, having their sides, terminating at the same extremity of the base, and to one another. Thus the line marked 7 in the diagram, proceeding from a point in the line A B to the intersection of lines marked 3 and 6, forms a tie to the triangle formed by the lines marked 1, 3 and 6 respectively. The main terminal stations are lettered in the field-book, but not the intermediate stations, otherwise in an extensive survey the alphabet would soon be exhausted. A peg is driven into the ground at each station, and the chain is always started from the peg, which denotes the station. Thus, in line 2 from station B to station A, the zero of the chain is placed at B when running the line B C. The position of the peg, twenty links back, can be most accurately determined by measuring this distance in the direction of the line B C, but this is done with the tape or with the chain, before measuring the 2. The total length of line 1 at station B is 352 links from station A. This is written in the field-book sideways, as shown, to distinguish from the other chain measurements. The line is then continued on, to meet the fence at 15 links. In line 2 the measurement is continued on in a similar manner to meet the fence at 176 links.

The Surveyor should endeavour to have as few pegs as possible near each other in running in the details of a survey, a station on which several lines radiate being more correctly determined than where several single lines commence or terminate close to one another at a base-line. The exact distance of an intermediate station from the commencement of the base-line may be best distinguished by ensuring the length entered in the field-book in a oval or oblong, and placing a circle with a dot in the centre upon the side, right or left, in which the branch line is to be chained. This is shown in the case of line 7, which is measured on 170, in the line 1, to the right hand of A B. The most usual form of field-book is that indicated in our diagram as pages 1, 2, and 3, with two central lines, generally ruled in blue, on each page. As a rule it is not necessary to page a field-book. The leaves of the book should be regarded as forming a continuous roll, divided into pages, for convenience of binding. The surveyor commences his entries at the bottom of a page, and works upwards as he proceeds along the base-line. Thus the bottom page 3 follows immediately the top of page 2. To render the central column of the field-book intelligible, we will assume that a draughtsman could have no difficulty in lotting the irregular fence-line which crosses the line marked M M, if perpendicular measurements are given, as shown, at distances as 1 links apart along the line M M. If this right angle, M M, be supposed to be widened into a column, N N, sufficiently broad to write in the measurements taken along the line M M, and the offsets varying from 7 links to the right of 60, up to 29 links to the left of 210, be repeated, we have practically in the form N N a field-book, as indicated by page 2 in the diagram. It will be observed that the vertical offsets for the offsets, measured from the line M M, or the column N N, are omitted in a field-book, and the distances only are figured, against the line indicating the fence. As the central column is simply provided for the convenience of early recording the chain measurements taken on the base-lines, and therefore practically indicates a single line, the fence line at 50, 90, and 200 links respectively, where it crosses the base-line A B, should not be drawn across the column, but should be sketched, as shown, on each side of the column, and the measurement at the intersection upon the chain stated in links by figures within the column.

**Metropolitan Board of Works.**—The Board have adopted a report of their Works Committee to the effect that Ravenscourt Park, amersmith, has been purchased for 68,000l. This estate covers 32 acres. By a unanimous vote the solicitor has been instructed to furnish return which shall set forth (1) particulars of all plots of land sold by the board to members or officers of the board during the last ten years; (2) particulars of all land leased to members or officers, with the annual rent and premium, if any, during the like period; and (3) the like information of all land transferred to members or officers by the Board's lessees.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

11,502, Improvements in Closets. G. H., and S. Jennings.

This invention relates to a further improvement upon closets previously manufactured by the patentees. A valve is specially applied, and the flushing arrangement is managed under special control. Thus, the handle has fixed to it the ends of two rods, one on each side of the valve rods, and their other ends are fixed to a ring sliding outside the tube in which the ring valve-rod works. When the handle is drawn up, the afore-mentioned ring comes against and raises a weighted forked lever, which opens the water supply. When the handle is put down again, the weighted lever is not forced down, but gradually descends by its own weight, so that the water supply is not immediately cut off, but the flow continues sufficiently long to fill the pan.

12,099, Ventilators. E. J. Gillis.

The ventilator, which is the subject of this patent, consists of perforated zinc and tinted glass, and is fastened to the upper part of the outside lining of the window-frame, and does not interfere with the sashes in any way. Ventilation can be regulated as required or shut off completely. When ventilation is required, the upper sash of the window is to be lowered to within half an inch of bottom of ventilator, thus admitting fresh air in between the sashes, and allowing foul air to escape.

14,837, Skylight or Fanlight Opener. H. K. Bromhead.

This contrivance consists of an endless cord working over a flanged wheel in such a way as to turn the wheel in either direction. This wheel is fixed upon a rod which forms a screw on one side of the wheel. This screw works in a screwed boss or nut, placed on an arm or stay fixed to the sash. On the other side of the wheel is a swivel or cup-and-ball joint attached to the rod on which the wheel is fixed. The action of the endless cord in rotating the wheel revolves the screw, and thus moves the screwed boss backwards or forwards.

479, Improved Sink and Gully. John Shaw.

The grate, with a bell under it, is hinged, and falls over the trap, which is so formed that it may easily be taken out and cleaned if required.

797, Roofing Tiles and Slates. M. Hussey and W. Clark.

According to this invention, each tile is formed square or of other suitable shape in plan, but has two of its four corners cut off, the tiles or slates being formed with flanges or not according to the purpose for which they are required.

6,493, Metallic Roofing. L. L. Sagendorph.

The object of this invention is the same as mentioned in the previous specification, but applicable to metallic roofing such as is common in America, from whence the patent is communicated. Lips and ridges are arranged for fastening, and the ends of the shingles are cut away to give a more ornamental appearance.

7,644, Paving and Flooring. F. Wicks.

This invention consists in the manufacture of blocks or slabs by means of a combination of natural or artificial stone, slag, or other building material with a metal or mineral so that the stones may be embedded to a sufficient depth within the bedded metal or mineral which, on cooling, holds the parts rigidly together, and, combined with the embedded materials, form compound blocks of unequal qualities or degrees of hardness in the working or wearing surfaces.

NEW APPLICATIONS FOR PATENTS.

Aug. 5.—10,769, W. Lewis, Construction of Fire Clay, Terra Cotta, or Fire-brick Domestic Fire-places.—10,779, E. de Pass, Imitating by Casting White and Coloured Marble.

Aug. 6.—10,816, J. Gowlan, Chimney Tops, Ventilator or Cowls.—10,830, J. Docton, Combined Hot and Cold Water Waste and Overflow Lead Fittings for Baths.

Aug. 8.—10,857, W. Holland, Valve for Discharging the Contents of Water-closets, Cisterns, &c.—10,858, J. Gill, Brick-pressing Machinery, &c.—10,881, R. Warwick, Producing Mosaic and Jigsaw Work in Wood.—10,895, J. Anderson, Stays and Fasteners for Hinged Window-sashes, Casements, or Doors.—10,925, A. von Fuchs-Bardé, Water-closets, Privies, &c.

Aug. 10.—10,944, N. Kimberley, Bolts, Latches, and Locks.—10,950, J. Bean and W. Gaines, Closing Doors and Preventing the Slamming of same.—10,969, W. Akerman, Roofing Tiles.

Aug. 11.—10,998, F. Henson, Bolts for Doors, Casements, &c.—10,998, J. Pullan and Others, Brick-pressing Machinery.

PROVISIONAL SPECIFICATIONS ACCEPTED.

8,786, J. Watson, Wood Graining Apparatus.—9,548, E. Hurley, Chimney and Ventilating Shafts.—8,887, J. Rust, Material for Colouring Paints, Cement, &c.—7,331, J. Dudley and J. Hamilton, Concrete and Artificial Stone Mantel-pieces.—7,517, T. Tyack, Saws.—10,812, R. and R. Hughes, Gas and other Hangings.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

12,764, W. Harris, Trap for Waste-water Outlets. 12,889, H. Obbard, Chimneys and Chimney Tops or Caps.—7,516, H. Godwin and W. Howitt, Making and Connecting Tile or Ceramic Fenders and Ceramic Mouldings.—8,341, W. Griffiths, Door and Window Fittings.—9,553, D. Goddard, Wood Block Paving for Floors and Pavements.—8,835, J. Lindley, Thumb Door Latches.—9,666, W. & N. Haigh, Flooring Clamp.—10,469, J. Gibson, Securing Hammer-heads, Picks, &c., to Handles.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

AUGUST 8.

By WEATHERALL & GREEN. Kensington—15, Young-street, freehold ..... £2,575 New Bond-street—No. 32, Corporation Lease ..... 5,800 Beuliet, Essex—Lubbing's Farm, 116a. 1r. 14p. .... 4

By WALKER & RUNZ.

Bethnal Green, Usk-street—Freehold site, area 1,080 ft. .... 100 Bethnal Green—The letting of fourteen plots of land on lease, for 80 years, were all let.

By ROBSON & PERRIN.

Seven Sisters road—12, Alexandra-villas, 75 years, ground-rent 14l. .... 1,000

By E. & F. SWAIN.

Notting Hill—98, Bramley-road, 76 years, ground-rent 2l. 6s. .... 300 17, Silchester-road, freehold ..... 710

By Mr. CHAMPNESS.

Chigwell Row—Woodlands Cottage, freehold ..... 650

By T. H. WAKEFIELD (at Finchley).

Finchley—14, 18, 20, and 21, Burghley-villas, 93 years, ground-rent 33l. 12s. .... 1,805

AUGUST 9.

By DRIVER & CO.

Upper Clapton—The Avenue House Estate, about 7 acres, freehold ..... 10,000 Greenwich—The Residence, Park Hall, freehold ... 1,300

By HORNCASTLE & PEMBER.

Acton—3, Brougham-villas, freehold ..... 265 Acton, Allison-road—Bodminton House and Double View, freehold ..... 730

By GREEN & SON.

Brentwood—The Brentwood Brick and Tile Works, with fired plant, buildings, and land, about 33 acres, freehold ..... 3,750

By TUNLEY & CO.

Walworth-road—No. 91, 67 years, ground-rent 16l. .... 1,200

By F. MATTHEWS.

Hampstead road—No. 269, 21 years, ground-rent 30l. .... 500

By F. J. BISHOP.

East Dulwich—130, Friern-road, freehold ..... 800

By NEWBON & HARDING.

Caledonian-road—91, Bemerton-street, 63 years, ground-rent 4l. .... 240

Holloway—129, St. James's-road, 40 years, ground-rent 2l. 10s. .... 355

300, Morussey-road, 64 years, ground-rent 10l. .... 260

New Southgate—2, Station-road, 79 years, ground-rent 4l. .... 110

Islington, Upper-street—The letting of ten plots of land, for 81 years, averaged from 2l. 2s. to 3l. 7s. 6d. per foot frontage.

By Messrs. CROWE.

Oxted, Surrey—Brook House, freehold ..... 610

Maldstone—The Kingsley Arms public-house, freehold ..... 2,480

St. Peter-street—The White Swan, beer-house ..... 2,060

Sevenoaks—A plot of freehold land ..... 94

By DEBENHAM, TEWSON, & CO.

Byfleet, Surrey—Ground-rent of 17l. 10s., reversion in 61 years ..... 500

A plot of freehold land, 6a. 3r. 29p. .... 350

Nuffield—A plot of freehold land, 6a. 3r. 37p. .... 200

Essex, Great Yeldham—A plot of freehold land, 1a. 0r. 29p. .... 160

AUGUST 10.

By FAREBROTHER, ELLIS, CLARK, & CO.

West Drayton—An enclosure of land, 6a. 1r. 14p. .... 1,100

By BRAY, YOUNG, & CO.

Willesden-lane—Improved ground-rent of 78l., term 72 years ..... 1,450

By ROGERS, CHAPMAN, & CO.

Belgrave—3, Graham-street, 34 years, ground-rent 6l. .... 660

68, Warwick-street, 36 years, ground-rent 8l. 10s. .... 680

By J. W. COUCHMAN.

Tottenham, High Cross—Five freehold houses, with shops ..... 2,235

AUGUST 11.

By KINGSTON & SONS.

Ealing—31, Hamilton-road, 92 years, ground-rent 12l. 12s. .... 1,000

By BRADY & CO.

Basingstoke, near—The White House, and 1a. 1r. 32p., freehold ..... 600

By C. C. & T. MOORE.

Ratcliff—97, Brook-street, freehold ..... 280

By NEWBON & HARDING.

Potter's Bar—1 and 2, Heath-road, 73 years, ground-rent 10l. 7s. 2d. .... 160

City—25, Wormwood-street, Corporation lease ..... 2,180

Walworth-road—Ground-rent of 49l., term 36 years ..... 740

By D. YOUNG.

Pimlico—2 to 5, Churton-place, 43 years, ground-rent 29l. .... 2,105

21 and 23, Berwick-street, 32 years, ground-rent 10l. .... 1,040

4, 5, and 6, Ranagh-grove, 36 years, ground-rent 6l. .... 1,490

Rotherhithe—7, Clarence-street, freehold ..... 110

Camberwell, Gloucester-road—Stabling, with loft, 68 years, ground-rent 8l. .... 60

20, Gloucester-road, 66 years, ground-rent 22l. ... 180



By E. STIMSON.	
Pekham—77 to 87 odd, Cator-street, 78 years, ground-rent 30l.	2980
Walworth—51, Olney-street, 28 years, ground-rent 4l. 10s.	260
2, 4, and 6, Montpelier-road, 28 years, ground-rent 13l. 10s.	600
38, East street, freehold	650
Brookley 18, Foxberry-road, 85 years, ground-rent 4l. 10s.	200
6, Harcourt-road, 33 years, ground-rent 8l.	200
Beatrice, Edmund-place—Smith's shop, &c., 75 years, ground-rent 3l.	35
East Dulwich—267 to 283 odd, Crystal Palace-road, 60 years, ground-rent 24l. 10s.	610
Plumstead—79, Sandy-hill, freehold	340
By WILKINSON & SON (at Brighton).	
West Brighton—4, Albany-villas, copyhold	1,050
2, Osborne-villas, copyhold	650
By WOOD & SPINK.	
Upper Holloway—62, 64, and 84, Mayton-street, 74 years, ground-rent 16l. 10s.	970
By BAZTON & SONS.	
Regent's Park—1, Lorne-gardens 25 years, no ground-rent	275

### Miscellaneous.

**Value of Building Sites at Hampstead.** Last week a large number of building sites in Hampstead were let by auction by Messrs. Walker & Runtz, by order of the Metropolitan Board of Works. The sites, forty-seven in number, formed the surplus and vacant land acquired by the Metropolitan Board for the construction of the new road from Fitzjohn-avenue to the junction of Heath-street and High-street, by which a new route has been opened out to the West End. The several sites were let on building leases for eighty years, the whole of the forty-seven sites covering an area of 54,000 ft., or about an acre and a quarter in extent. Eleven of the plots have frontages to High-street, and all of these were let, one of the plots, at the corner of High-street and Heath-street, containing 1,970 ft., and described as suitable for a bank, being let at a rental of 80l. per annum. The adjoining lot, having a frontage of 800 ft., was let at a rental of 36l. per annum, the remaining plots in this thoroughfare having frontages of from 18 ft. to 20 ft., being let at rentals averaging about 1l. 15s. per foot frontage. Of the plots in Heath-street, having frontages varying from 18 ft. to 40 ft., twenty were let at an average of about 1l. 10s. per foot frontage, the highest price obtained being 100l. per annum for a plot having a frontage of 70 ft., and containing an area of 9,150 ft., and described as suitable for a public institution. Of the forty-seven plots offered all but ten were let, the total rentals produced by the letting being 1,030l. per annum.

**Royal College of Surgeons.**—Messrs. Higgs & Hill, of South Lambeth, contractors, are carrying out the designs of Mr. S. Salter, of Woburn-place, architect, for the addition of another floor, in two stages, to the front portion of the Royal College of Surgeons in Lincoln's Inn-fields. As it now stands, that building is mainly the work of Sir Charles Barry, who (1835-7) extended the front to 108 ft., and designed the massive Ionic portico. The original structure had been erected by Dance on the removal hither of the College from their Hall in Old Bailey,—site of the now Sessions House and Criminal Courts,—upon their incorporation in 1800. John Hunter's anatomical collection was opened to view here in 1813. In 1836 the Museum was enlarged, and again some years later, when the Fellows acquired possession of the ground in Portugal-street, at the rear, which had been the site of the Lincoln's Inn-fields Theatre, or Duke's playhouse. About the middle of the eighteenth century the theatre was converted into a soldiers' barrack, and then into an auction-room. It was finally demolished in August, 1848, having latterly served for Spode & Copeland's china warehouse.

**The Institution of Civil Engineers.**—By warrant under the Queen's sign manual, letters patent under the Great Seal of the United Kingdom, dated the 3rd of August, have been issued, granting a Supplemental Charter to the Institution of Civil Engineers, extending the power to acquire and hold lands from 1,000l.,—as in the original Charter of 1828,—to 8,000l. annual value.

**Appointment.**—Sir Henry Tichbourne, Bart., has appointed Messrs. Thurgood & Martin, of Chancery-lane, surveyors to his Doughty Estates, situate in the neighbourhood of Bedford-row, Great James-street, John-street, Doughty-street, and King's-road.

**Hyde Park Court, Limited.**—Messrs. Archer & Green, of Buckingham-street, Strand, are appointed architects to this new undertaking. The Company propose to erect a range of about 500 residential chambers on a plot of ground between Albert-gate and the Drive, Hyde Park. This site has been leased by them for a term of ninety years, at 7,000l. per annum, with a right reserved of acquiring the freehold on twenty-two years' purchase. It has frontages of nearly 200 ft. along Knights-bridge-road and the Park, and extends over 28,300 ft. superficial. The buildings are estimated to cost 160,000l.; Messrs. J. W. Hobbs & Co., Limited, of Southwark Bridge-road, being the contractors. The members will have the use of the club-rooms in common; and ladies will be received in the drawing-rooms and the strangers' dining-room, but will not be admitted as residents. Each member's individual expenses for rent and living are calculated to range from 150l. to 200l. a year.

**Unitarian Church, Carlisle.**—Mr. H. Higginson, architect, whose plans of a Unitarian Church and School were recently selected in a limited competition, has now received instructions to proceed with the working drawings of same. The site, which is a very awkward one, has a rounded corner of 50 ft. radius. The difficulty has been overcome by stepping back the walls of main building and forming a triangular porch (with curved front) surmounted by a circular turret. The style of building may be termed modernised Romanesque. The walls will be faced with local red stone relieved with glazed tiles or faience ware of a rather sombre tint. Accommodation will be provided for 210 persons with children's and choir galleries. The cost will be about 1,800l.

**Stockport Technical School Competition.**—A meeting of the Executive Committee of the Stockport Technical School was held on the 8th inst., to receive the report of Mr. A. M. Fowler, the Borough Surveyor, on the twenty-two sets of plans submitted in competition. Mr. Fowler drew the attention of the committee specially to two designs, but declined to say which in his opinion was the best, preferring to leave it to the committee. After a lengthy discussion and careful examination of the drawings, the committee unanimously selected the design under the motto "Stet," the author being Mr. George Sedger, of London.

**The Registration of Plumbers.**—"At the fifty-fifth annual meeting of the British Medical Association, the following resolution, proposed by Dr. T. Churton, and seconded by Dr. J. W. Moore, was carried unanimously: 'That the Section of Public Medicine, convinced of its absolute necessity in the interest of the common weal, is strongly of opinion that an organised and efficient system of Registration of Plumbers and of Plumbing Work should be put into force in all parts of the United Kingdom.'—*British Medical Journal*, Aug. 13, 1887.

**Building in Oxford Street.**—A large block of shops with offices and chambers over is about to be erected on the corner plot of ground, Oxford-street and Charing Cross-road (having a frontage of about 106 ft.), by Messrs. Marler & Bennett, of Sloane-street, from designs prepared by Mr. T. Marcus Houghton.

### PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	5 10 0	7 10 0
Teak, E.I. ....load	8 10 0	13 0 0
Sequoia, U.S. ....foot cube	0 2 3	0 3 0
Ash, Canada ....load	3 0 0	4 10 0
Birch ....	2 0 0	3 10 0
Elm ....	3 10 0	4 10 0
Fir, Danish, &c. ....	3 10 0	4 0 0
Oak ....	2 10 0	4 10 0
Canada ....	3 0 0	6 0 0
Pine, Canada red ....	2 0 0	3 10 0
Latv, Danish ....fathom	3 0 0	5 0 0
St. Petersburg ....	4 0 0	5 10 0
Wainoot, Riga ....log	2 10 0	3 0 0
Odesa, crown ....	2 10 0	3 0 0
Deal, Finland, 2nd and 1st, std. 100	6 10 0	8 0 0
Riga ....	7 10 0	6 10 0
St. Petersburg, 1st yellow ....	6 10 0	7 0 0
2nd ....	7 0 0	8 0 0
Sweden ....	6 10 0	8 10 0
White Sea ....	0 0 0	0 0 0
Canada, Pine, 1st ....	16 0 0	24 0 0
2nd ....	10 0 0	15 0 0
3rd, &c. ....	6 0 0	9 0 0
Spruce, 1st ....	8 0 0	9 0 0
3rd and 2nd ....	5 0 0	7 0 0

TIMBER (continued).	£. s. d.	£. s. d.
New Brunswick, &c. ....	5 0 0	8 10 0
Battens, all kinds ....	4 0 0	10 10 0
Board, First ....	0 8 0	0 11 0
Second ....	0 6 0	0 7 0
Other qualities ....	0 4 0	0 6 0
Cedar, Cuba ....foot	0 0 34	0 0 34
Honduras, &c. ....	0 0 3	0 0 34
Australian ....	0 0 2	0 0 3
Mahogany, Cuba ....	0 0 4	0 0 6
St. Domingo, cargo average ....	0 0 4	0 0 6
Mezian ....	0 0 34	0 0 6
Tobacco ....	0 0 34	0 0 6
Honduras ....	0 0 34	0 0 6
Maple, Burd's-eye ....	0 0 3	0 0 6
Rose, Rio ....	8 0 0	11 0 0
Bahia ....	7 0 0	9 0 0
Poz, Turkey ....ton	6 0 0	12 0 0
Satin, St. Domingo ....foot	0 0 6	0 0 6
Porto Rico ....	0 0 6	0 0 10
Walnut, Italian ....	0 0 34	0 0 6

METALS.	£. s. d.	£. s. d.
Iron—Bar, Welsh, in London, ton	4 7 6	4 15 0
" " in Wales ....	4 2 6	4 7 6
Staffordshire, London ....	5 10 0	6 0 0
Sheets, single, in London ....	6 15 0	8 10 0
Hoops ....	6 0 0	7 0 0
Nail-roads ....	6 15 0	6 10 0

COPPER—	£. s. d.	£. s. d.
British, cake and ingot ....ton	43 10 0	44 0 0
Best ....	44 10 0	45 0 0
Sheets, strong ....	50 0 0	0 0 0
Chili, bars ....	40 7 6	40 15 0
YELLOW METAL ....lb.	0 0 0	0 0 0

LEAD—	£. s. d.	£. s. d.
Fig. Spanish ....ton	11 0 0	11 0 0
English, common brands ....	12 2 6	12 5 0
Sheet, English ....	12 5 0	12 10 0

SPELTER—	£. s. d.	£. s. d.
Silesian, special ....ton	14 12 6	14 15 0
Ordinary brands ....	14 10 0	14 12 6

TIN—	£. s. d.	£. s. d.
Strait ....ton	104 0 0	0 0 0
Australian ....	104 0 0	0 0 0
English ingots ....	108 0 0	0 0 0

ZINC—	£. s. d.	£. s. d.
English sheet ....ton	0 0 0	0 0 0

OILS.	£. s. d.	£. s. d.
Linseed ....ton	20 7 6	20 10 0
Cocnut, Ceylon ....	30 0 0	33 0 0
Ceylon ....	23 15 0	24 0 0
Palm, Lagos ....	20 0 0	21 0 0
Rapeseed, English pale ....	21 15 0	22 0 0
Cottonseed, refined ....	20 15 0	0 0 0
Tallow and Oleine ....	25 0 0	46 0 0
Lubricating, U.S. ....	6 0 0	12 0 0

TURPENTINE—	£. s. d.	£. s. d.
American, in casks ....cwt.	1 5 9	0 0 0
Stockholm ....barrel	0 14 0	0 14 8
Archangel ....	0 9 0	0 10 0

### TENDERS.

<b>ALVERSTOKE (Hants).</b> —For workshops and tramways at the House of Industry, Alverstoke, Gosport.	
Fullford, Fareham	£1,727 0 0
W. Lowe, Gosport	1,615 12 2
J. H. Cooke, Southampton	1,683 0 0
Jas. Plummer, Fareham	1,550 0 0
Wm. Rapley, Gosport	1,546 1 8
J. & S. Roberts, West Bromwich	1,545 0 0
Jas. Crockett, Landport	1,545 0 0
C. M. Dash, Gosport	1,493 0 0
J. Butt, Gosport (accepted)	1,493 0 0

**BOURNEMOUTH.**—For the supply of pipes, bolts, nuts, screw piles, &c., in connection with the storm cut-off, laying the same on the bed of the sea, and for brack work in connection therewith, for the Bournemouth Commissioners. Mr. G. R. Andrews, engineer and surveyor.

#### Section A, Supply of Pipes.

Dorset Iron Foundry Co., Poole	£3,490 13 11½
Wood & Co., Bournemouth	3,664 7 3
Cochrane, Grove, & Co., London	2,751 4 6
E. J. Perkins, Lymington	2,724 14 8½
W. H. Dearle, Chichester	2,753 18 0
Jules, Coulson, & Co., London	2,668 3 9
J. Harrison, Brighton	2,473 11 8
E. Howell, Poole	2,439 10 0
Butterley Co., Alcester	2,463 5 2
Stavely Iron Co., Chesterfield	2,379 15 0
Hilton & Sons, Birmingham	2,362 10 3
J. & S. Roberts, West Bromwich	2,349 17 0
The Steel Side Iron Co., London	2,337 7 4
The Clay Cross Co., Chesterfield	2,231 12 6
Frere & Co., London	2,127 8 8
Duncan Bros. (mild steel) London*	1,900 0 0

#### Section B, Laying Pipes.

H. I. Sanders, Southampton	£5,310 0 0
Frere & Co., London	3,897 0 0
Hilton & Sons, Birmingham	3,052 0 0
Duncan Bros., London	2,400 0 0
W. H. Dearle, Chichester	2,314 10 0
E. J. Perkins, Lymington	1,923 2 0
J. Harrison, Brighton	1,618 10 0
Dorset Iron Foundry Co., Poole*	803 16 0

#### Section C, Brickwork.

Hilton & Sons, Birmingham	£377 0 0
H. I. Sanders, Southampton	333 0 0
W. H. Dearle, Chichester	264 15 0
J. Harrison, Brighton	248 0 0
E. J. Perkins, Lymington	238 14 6
Dorset Iron Foundry Co., Poole	243 7 6
Wm. Hoare, Bournemouth*	148 0 0

\* Accepted.



# COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

## COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designate to be delivered.	Page.
tal, West Ham	The Committee.	50 <i>l</i> .	October 4th	ix.

## CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Down and Rebuilding Bridge	Kent Justices of the Peace	F. W. Ruck	August 23rd	ji.
on of Stores	Royal Arsenal Co-op. Soc.	J. O. Cook	August 25th	ix.
ing and Fitting-up Lifts	Windsor and Clapham Un	T. W. Aldwinckle	do.	ii.
Church, Acton Green	Local Committee	E. Monson, Jun.	August 26th	ii.
ing Nursing Institute	Cheltenham Union	J. Houghton Spencer	August 30th	ii.
as Works to Workhouse Buildings	Lynton Local Board	J. Lemon	do.	ii.
ron Outfall Sewer	Bromley Local Board	Official	do.	ii.
ware Pipe-Sewers, &c.	Walhamston Sch. Bd.	W. A. Longmore	do.	ii.
Schools	Burton-on-Trent Sch. B.	R. Churchill	Sept. 1st	ii.
Coke, and Lime	Hendon Local Board	S. S. Grimley	Sept. 2nd	ix.
ware Pipe-Sewers	Tottenham Local Board	De Pepe	do.	ii.
g Roads and Laying Drains, Tulse	Owner, Meadow Hill		Sept. 3rd	ix.
Guernsey Granite	Romford Local Board	Official	do.	ix.
Metal	Rochester Corporation	Filliter & Rofe	Sept. 6th	ix.
rection of Road	Cewesley Corporation	Official	Sept. 7th	i.
gement of P. O. at Bristol	Com. of H.M. Works	do.	Sept. 10th	i.
School Buildings, Skipton	The Governors	do.	Sept. 30th	ii.
and River Walls	Met. Board of Works	do.	October 7th	ii.
gathering Laubeth Bridge	do.	do.	do.	ii.
as Carriageways & York Stone Footways	do.	do.	do.	ii.

## PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
ector of Nuisances and Surveyor	Newmarket U. R. S. A.	120 <i>l</i> . per annum	August 23th	xiv.
gh Surveyor of Works	Dunstable Local Board	2 <i>l</i> . 3 <i>s</i> . weekly	August 31st	xiv.
			Not stated	xiv.

**BURNEMOUTH.** For carrying out sea-water scheme watering roads and flushing sewers with sea-water, including about thirteen miles of cast-iron pipes, engine, gas engines, pumps, brick water towers and tanks, &c. water-pumps, hydrants, valves, &c., for the Bourne Commissioners. Mr. G. R. Andrews, engineer and surveyor.  
Blake & Co., Staffordshire.....2*l*. 8*s*. 7*d*.  
Freer & Co., London.....8*s*. 4*d*.  
H. W. Gould, Southampton.....8*s*. 10*d*.  
Sterling & Swan, Manchester.....7*s*. 7*d*.  
S. Harrison, Brighton.....8*s*. 7*d*. 9*d*.  
E. J. Perkins, Lynton.....8*s*. 6*d*.  
Harrison, Brighton.....8*s*. 6*d*.  
Wood & Co., Bourne-mouth.....8*s*. 7*d*. 1*s*.  
W. H. Dearn, Chichester.....8*s*. 7*d*.  
Hilton & Sons, Birmingham.....7*s*. 8*d*.  
H. I. Sanders, Southampton.....7*s*. 8*d*.  
W. H. Hill & Co., Plymouth.....6*s*. 8*d*.  
\* Accepted.

**BURNEMOUTH.** For kerbing, channelling, sewers, pits, road and path metalling, for the Bourne-mouth Commissioners. Mr. G. R. Andrews, surveyor.  
Sterling & Swan, Manchester.....2*l*. 4*s*. 10*d*.  
Freer & Co., London.....2*s*. 7*d*. 9*d*.  
W. Hoare, Bourne-mouth.....1*s*. 7*d*. 9*d*.  
S. Minty, Bourne-mouth.....1*s*. 8*d*.  
Harrison, Brighton.....1*s*. 8*d*.  
W. H. Dearn, Chichester.....1*s*. 8*d*.  
C. Buckland, Bourne-mouth.....1*s*. 8*d*. 7*d*.  
Geo. James, Bourne-mouth.....1*s*. 10*d*. 11*d*.  
Harrison, Brighton.....1*s*. 10*d*. 11*d*.  
J. White, Bourne-mouth.....1*s*. 10*d*. 11*d*.  
F. Hoare & Son, Bourne-mouth.....1*s*. 10*d*. 11*d*.  
John Locks, Chichester.....1*s*. 10*d*. 11*d*.  
Hilton & Sons, Birmingham.....1*s*. 10*d*. 11*d*.  
W. H. Saunders & Co. Bourne-mouth.....1*s*. 10*d*. 11*d*.  
\* Accepted.

**BURNEMOUTH.** For the erection of public urinals lavatories, both under and above ground, in various parts of Bourne-mouth, for the Bourne-mouth Commissioners. Mr. G. R. Andrews, engineer and surveyor.  
Crook & Sons, Southampton.....2*l*. 4*s*. 10*d*.  
Barrow & Entwistle, Bourne-mouth.....2*s*. 3*s*. 10*d*.  
W. H. Dearn, Chichester.....2*s*. 3*s*. 10*d*.  
F. Hoare & Son, Bourne-mouth.....2*s*. 3*s*. 10*d*.  
\* Accepted.

**BEWE.** For offices, Mill-street, for Mr. R. Fedley, Mr. P. B. Granger, M.A., architect, Clinton-street, tingham, and Mill-street, Crewe.  
N. Johnson.....4*s*. 50*d*.  
Michael & Sons, Birmingham.....4*s*. 50*d*.  
Thomas Lee.....5*s*. 0*d*.  
A. P. Cotterill (accepted).....4*s*. 7*d*. 0*d*.

**ARLSTON.** For erecting board room, public dining, and library, for the Arlston Local Board.  
Jethro A. Coates, architect, Birmingham.....2*s*. 6*s*. 8*d*.  
Mr. George Ewart, Unity Buildings, Temple-street, Birmingham.....2*s*. 6*s*. 8*d*.  
Piller Bros., Tamworth.....2*s*. 6*s*. 8*d*.  
J. Smith & Sons, Birmingham.....2*s*. 6*s*. 8*d*.  
J. Evers, Malvern.....2*s*. 6*s*. 8*d*.  
J. Barnley & Sons, Birmingham.....2*s*. 6*s*. 8*d*.  
W. Sapote & Son, Birmingham.....2*s*. 6*s*. 8*d*.  
H. Lees, Wolverhampton.....2*s*. 6*s*. 8*d*.  
R. Thompson, Kidderminster.....2*s*. 6*s*. 8*d*.  
E. A. Horton, Brierley Hill.....2*s*. 6*s*. 8*d*.  
H. Willcock, Wolverhampton.....2*s*. 6*s*. 8*d*.  
Trow & Son, Walsley.....2*s*. 6*s*. 8*d*.  
J. Mallin, West Bromwich.....2*s*. 6*s*. 8*d*.  
J. Jones & Son, Wolverhampton.....2*s*. 6*s*. 8*d*.  
T. Tidley, Willenhall (accepted).....2*s*. 6*s*. 8*d*.  
J. Guest, Bettle Lane.....2*s*. 6*s*. 8*d*.  
Barker & Son, Birmingham.....2*s*. 6*s*. 8*d*.

**PINCHLEY.** For building four shops and stables in High-street, North Finchley, for Professor Attfield. Mr. A. Basil Cottam, architect.  
Stullwell & Elv.....2*l*. 2*s*. 9*s*. 0*d*.  
Clifford & Goff.....2*l*. 7*s*. 7*d*. 0*d*.  
Hale & Twicken, Bow Common-lane.....2*l*. 7*s*. 7*d*. 0*d*.  
[Hale & Twicken's amended estimate for 2,440*l*. was accepted.]

**HEREFORD.** For The Granary, Bath-street, Hereford. Mr. T. Clarkson Wakeling, architect. Quantities by the architect.  
H. Welsh, Hereford.....2*l*. 20*s*. 0*d*.  
Williams, Merthyr.....1*l*. 12*s*. 0*d*.  
Meredit, Birmingham.....1*l*. 12*s*. 0*d*.  
Pritchard, Hereford.....1*l*. 12*s*. 0*d*.  
Jones & Son, Wolverhampton.....1*l*. 12*s*. 0*d*.  
Bowers & Co., Hereford (accepted).....9*s*. 2*d*. 0*d*.

**HORNSEY.** For street fire alarms and electric communication throughout the District of the Hornsey Local Board. Mr. T. de Courcy Meade, engineer and surveyor.  
Radcliffe, Birmingham.....2*l*. 3*s*. 8*d*.  
Jennings, Lambeth.....1*l*. 3*s*. 8*d*.  
Stuart, Twickenham.....1*l*. 3*s*. 8*d*.  
Siemens, Westminster.....1*l*. 3*s*. 8*d*.  
Sax, Bloomsbury.....1*l*. 3*s*. 8*d*.  
Telegraph Manufacturing Co., 100 to 120  
Blackburn, Nottingham.....1*l*. 3*s*. 8*d*.  
Reid Bros., Walsford.....9*s*. 6*d*.  
Sharpley, Preston.....9*s*. 6*d*.  
Nelson, Leeds.....9*s*. 6*d*.  
Theiler, Cauxbury.....9*s*. 6*d*.  
Edgforth & Munford, Holloway.....9*s*. 6*d*.  
India Rubber, & Co., Essex.....9*s*. 6*d*.  
Fowler, Lancaster, & Co., Birmingham.....5*s*. 9*d*.  
Robertson & Sunderland, Hall-fax.....5*s*. 9*d*.  
Rheinheim, Egham (accepted).....4*s*. 10*d*.  
Exchange Telegraph Co., 100 to 120  
A. — Maintenance per annum.....3*s*. 8*d*.

**LEE (Kent).** For the erection of residence, for Mr. Walter Garrett.  
Kennard Bros. (accepted).....2*l*. 10*s*. 0*d*.

**LEWISHAM.** For alterations to roofs of 208 and 209, High-street, Lewisham, for the Governors of St. Dunstan's Church.  
Kennard Bros. (accepted).....2*l*. 20*s*. 0*d*.

**LONDON.** For making certain alterations and improvements at the Plough Tavern, 33, Fore-street, City, for Mr. Charles Tilley. Mr. Charles Jones, architect, 151, Ebury-street.  
Patnam & Fotheringham.....2*l*. 24*s*. 0*d*.  
Fyles & Co., 1015 to 0  
Moir, Wallis, & Co., 898 to 0  
Taylor (received too late).....780 to 0  
Coulthard (accepted).....735 to 0

**LONDON.** Alterations at the Fox, Bishop's-road, Bethnal Green. Mr. Edward Brown, surveyor, 21, Liverpool-street.  
J. Anley.....2*l*. 25*s*. 0*d*.  
G. Mower.....2*l*. 25*s*. 0*d*.  
J. A. Taylor.....2*l*. 25*s*. 0*d*.  
Walker.....2*l*. 25*s*. 0*d*.  
Hawkins (accepted).....1*l*. 17*s*. 0*d*.

**LONDON.** For repairs, alterations, and decorations to Calverley-street Schools. Messrs. Searle & Hayes, architects.  
Triggs (reduced estimate).....2*l*. 38*s*. 0*d*.

**LONDON.** For the erection of ten workmen's cottages, meeting room, foreman's residence, &c., at the Brewery, Nine Elms, S.W., for Messrs. Thorne Bros. Messrs. Lee Bros. & Fain, architects, 3, Adelphi-terrace, W.C.  
Roberts Bros.....2*l*. 38*s*. 0*d*.  
Bywaters.....2*l*. 38*s*. 0*d*.  
Patrick & Son.....2*l*. 38*s*. 0*d*.  
Peto Bros.....2*l*. 38*s*. 0*d*.  
Lathey Bros.....2*l*. 38*s*. 0*d*.  
Gregory.....2*l*. 38*s*. 0*d*.  
Higgs.....2*l*. 38*s*. 0*d*.  
Holloway Bros.....2*l*. 38*s*. 0*d*.  
Turtle & Appleton (accepted).....2*l*. 38*s*. 0*d*.

**LONDON.** For additional stabling, shed roof, &c., for the London General Omnibus Company, at Kilburn-lane, Kensal Green, under the superintendence of Mr. G. T. Lanham. Quantities by Mr. A. J. Bolton.  
Flow & Co.....2*l*. 10*s*. 0*d*.  
King Bros.....1*l*. 7*s*. 0*d*.  
Turtle & Appleton.....1*l*. 6*s*. 0*d*.  
Stephens.....1*l*. 6*s*. 0*d*.  
Evans.....1*l*. 7*s*. 0*d*.  
Garrud.....1*l*. 7*s*. 0*d*.  
Knight.....1*l*. 7*s*. 0*d*.  
Haynes.....1*l*. 6*s*. 0*d*.  
E. Toms (accepted).....1*l*. 6*s*. 0*d*.

**LONDON.** For Home of Industry, Bethnal Green-road, for Miss Macpherson. Mr. George Baines, architect, Great Winchester-street, E.C.  
S. J. Jerrard.....2*l*. 14*s*. 0*d*.  
T. Boyce.....2*l*. 14*s*. 0*d*.  
R. G. Battley.....2*l*. 14*s*. 0*d*.  
H. & H. F. Higgs.....2*l*. 14*s*. 0*d*.  
Harris & Wardrop.....2*l*. 14*s*. 0*d*.  
Holiday & Greenwood.....2*l*. 14*s*. 0*d*.  
S. J. Scott.....2*l*. 14*s*. 0*d*.  
H. L. Holloway (Union Works, Church-street, Deptford).....1*l*. 8*s*. 0*d*.  
\* Accepted.  
(Time extended three weeks).

**For Ironwork to Fireproof Staircase to the above.**  
Oakley.....2*l*. 10*s*. 0*d*.  
Walter Jones.....1*l*. 10*s*. 0*d*.  
R. Moreland & Son, Old-street.....9*s*. 0*d*.  
\* Accepted.

**For Granolithic Steps to the above.**  
Stuart & Co.....2*l*. 10*s*. 0*d*.  
Drake.....8*s*. 0*d*.  
Wilkinson, 61, George-street, Westminster (accepted).....7*s*. 15*d*. 0*d*.  
\* Accepted.

**For Ironwork and Steps.**  
Homan & Rodgers.....2*l*. 24*s*. 0*d*.  
**LONDON.** For Baptist school chapel, Honor Oak, London, S.E. Mr. George Baines, architect, Great Winchester-street, E.C.  
W. & F. Croaker.....2*l*. 30*s*. 0*d*.  
Ryder & Son.....1*l*. 24*s*. 0*d*.  
John Marsland.....1*l*. 24*s*. 0*d*.  
S. J. Scott.....1*l*. 24*s*. 0*d*.  
Holiday & Greenwood.....1*l*. 24*s*. 0*d*.  
F. & H. F. Higgs, Station Works, Loughborough Junction (accepted).....1*l*. 24*s*. 0*d*.  
[Architect's estimate, 1,170*l*.]

**LONDON.** For new mission chapel, Yerrbury-road, Upper Holloway. Messrs. Searle & Hayes, architects.  
Clampson.....2*l*. 8*s*. 4*d*.  
Dove Bros.....2*l*. 8*s*. 4*d*.  
Evans.....1*l*. 6*s*. 3*d*. 0*d*.  
Macfarlane.....1*l*. 4*s*. 9*d*. 0*d*.  
Grover & Son.....2*l*. 8*s*. 4*d*.  
Triggs (accepted).....1*l*. 4*s*. 9*d*. 0*d*.

**LONDON.** For sanitary work to 17, Victoria Park-square. Mr. Hale surveyor.  
Triggs (accepted).....2*l*. 10*s*. 5*d*. 0*d*.  
[No competition.]

**LONDON.** For repairs and decorator's work, and alterations to Nos. 23 and 26, Gledhow-gardens, South Kensington. Mr. W. H. Colbran, surveyor.  
Beath.....2*l*. 17*s*. 0*d*.  
Holdstock.....1*l*. 7*s*. 1*d*. 0*d*.  
H. J. Ball & Co.....1*l*. 6*s*. 4*d*. 0*d*.  
Nash.....1*l*. 6*s*. 4*d*. 0*d*.

**LONDON.** For artisans' dwellings, Green-street, Bethnal Green, for the East End Dwellings Company (Limited). Messrs. Davis & Emanuel, architects, Finsbury-circus, E.C. Quantities by Mr. F. Downing, White-hall-yard, S.W.  
W. Shurmer, Clapton.....2*l*. 8*s*. 6*d*. 0*d*.  
John Mowlem & Co., Millbank.....2*l*. 8*s*. 6*d*. 0*d*.  
F. & E. J. Wood, Mile End.....2*l*. 8*s*. 6*d*. 0*d*.  
S. J. Jerrard, Lewisham.....2*l*. 8*s*. 6*d*. 0*d*.  
Wall Bros., Kentish Town.....2*l*. 8*s*. 6*d*. 0*d*.  
Thos. Boyce, Eagle Works, Hackney.....2*l*. 8*s*. 6*d*. 0*d*.  
G. S. S. Williams & Son, Barnsbury.....2*l*. 8*s*. 6*d*. 0*d*.  
Colls & Sons, Moorgate-street.....2*l*. 8*s*. 6*d*. 0*d*.  
Harris & Wardrop, Limehouse.....2*l*. 8*s*. 6*d*. 0*d*.  
Lawrence & Sons, Wharf-road, N.W.....2*l*. 8*s*. 6*d*. 0*d*.  
Grover & Son, New North-road, N.W.....2*l*. 8*s*. 6*d*. 0*d*.  
\* Accepted.

**LONDON.** For the erection of Mission Hall in the Hornsey-road, in connection with St. Mark's Church, Tollymore Park. Mr. W. Jacob Gibbon, architect.  
Macfarlane Bros. (accepted).....2*l*. 4*s*. 7*d*. 0*d*.

**LONDON.** For alterations at 7, Queen's-gardens, Baywater. Mr. W. Jacob Gibbons, architect.  
Head & Son.....2*l*. 4*s*. 7*d*. 0*d*.  
F. L. Nunn.....2*l*. 4*s*. 7*d*. 0*d*.  
Gibson & Son (accepted).....2*l*. 4*s*. 7*d*. 0*d*.

**LONDON.** For repairs and decorations at No. 31, York-place, Portman-square, for Mr. R. A. Knight. Mr. Alfred J. Hopkins, architect, 27, Mortimer-street, Regent-street, W.  
Turner.....2*l*. 6*s*. 10*d*. 0*d*.  
Adams.....2*l*. 6*s*. 10*d*. 0*d*.  
Reed.....2*l*. 6*s*. 10*d*. 0*d*.  
Ashwell.....2*l*. 6*s*. 10*d*. 0*d*.



LONDON.—For an extension of the Wiltshire Brewery, Hackney-road, for Messrs. Chandler & Company. Mr. F. Warburton Scott, architect. Quantities supplied.—  
 Ashby Bros. .... £7,193 0 0  
 Bywater ..... 7,440 0 0  
 Brans ..... 7,163 0 0  
 Sawyer ..... 6,892 0 0

LONDON.—For rebuilding No. 32, Hertford-street, Marylar, for Miss Packer. Mr. A. J. Styles, Westminster-chambers, architect. Quantities by Mr. W. H. Deasle.—  
 Haylock ..... £4,523 0 0  
 Adamson ..... 4,365 0 0  
 Colls ..... 4,228 0 0  
 Bywaters ..... 3,886 0 0  
 Simpson ..... 3,050 0 0  
 Woodward ..... 3,827 0 0

MANCHESTER.—For the erection of a house at Fallowfield, near Manchester, for Dr. A. Emrys Jones. Messrs. E. & F. Hewitt, architects, Albert-square, Manchester.—  
 Southern & Sons ..... £1,750 0 0  
 Wilson, Toft, & Huntley ..... 1,712 0 0  
 Robert Neil & Sons ..... 1,701 0 0  
 Shaw ..... 1,697 0 0  
 Johnson ..... 1,665 0 0  
 Wood ..... 1,639 0 0  
 Brown & Son (accepted) ..... 1,647 0 0

NEASDEN (Middlesex).—For restoring the parish church of Neasden-cum-Kingbury.—  
 A. B. C. D.  
 Priestly & Gurney ..... £888 0 0  
 J. Twyford, Neasden ..... 831 0 0  
 Roberts, Islington ..... 830 0 0  
 A. General restorations to nave and roof.  
 B. Oak porch.  
 C. Re-seating in oak.  
 D. Re-seating in deal.  
 Accepted.

POLEGATE (Sussex).—For drainage works, outfall works, and machinery, for the Hailsham Union. Mr. C. O. Blaber, engineer. Mr. G. Fuller, surveyor.—  
 Contract No. 1.—Pipes Sever, Manholes, &c.  
 Thomas Reeves, Staplehurst ..... £1,793 0 0  
 John Jackson, Bexfield ..... 1,645 0 0  
 Bostel Bros., Brighton ..... 1,500 0 0  
 G. Ossenton, Erith, Kent ..... 1,463 0 0  
 Piper & Son, Hastings ..... 1,443 0 0  
 John Moon, St. Leonards ..... 1,371 0 0  
 Innes & Wood, Birmingham ..... 1,354 19 6  
 J. Harrison, Brighton ..... 1,337 0 0  
 James Hayward, Eastbourne ..... 1,300 10 0  
 A. Catley, London ..... 1,286 0 0  
 Parsons & Sons, Hove ..... 1,258 0 0  
 W. H. Deasle, Chichester (accepted) ..... 1,191 17 0

Contract No. 2.—Outfall Works and Engine House.  
 Innes & Wood, Birmingham ..... £415 19 3  
 Parsons & Sons, Hove ..... 410 0 0  
 G. Ossenton, Erith, Kent ..... 345 0 0  
 W. H. Deasle, Chichester ..... 308 11 0  
 J. Harrison, Brighton ..... 280 0 0  
 T. Reeves, Staplehurst, Kent ..... 286 0 0  
 James Hayward, Eastbourne ..... 274 0 0  
 A. F. Catley, London ..... 260 0 0  
 Berry & Bussey, Lewes (accepted) ..... 235 16 0

Contract No. 3.—Machinery.  
 Sylvester & Co., Newcastle, Staffordshire ..... £131 5 6  
 C. A. Wells, Lewes ..... 295 7 6  
 Innes & Wood, Birmingham ..... 273 18 6  
 W. H. Deasle, Chichester ..... 272 5 0  
 Parsons & Sons, Hove ..... 263 0 0  
 T. Reeves, Staplehurst ..... 257 0 0  
 James Hayward, Eastbourne ..... 255 4 0  
 A. Shaw, Lewes ..... 253 13 9  
 J. Harrison, Brighton (accepted) ..... 239 0 0  
 G. Ossenton, Erith, Kent ..... 225 0 0

STREATHAM.—For sundry works to be done at Cromwell Lodge, Streatham Hill, for Mr. A. T. Groom. Mr. D. Henry North, architect.—  
 Marsland ..... £233 0 0  
 Gifford ..... 229 0 0  
 Exton & Burton ..... 223 0 0  
 Bassett ..... 231 10 0

BUTTON.—For the erection of six-stall stable and out-buildings, Oak Hill-road, Sutton, Surrey, for Mr. H. Watson. Mr. J. P. Curtis, architect.—  
 Cuff ..... £146 14 0  
 Balchin & Shopland ..... 142 0 0  
 Dawson ..... 140 0 0  
 Garner ..... 138 5 6  
 Lye (accepted) ..... 130 0 0

TOTTENHAM.—For sundry works in repairs to Nos. 18 to 34, Templeton-road, for the North Suburban Building Society.—  
 Exton & Burton, Birkbeck Works, Kingsland ..... £393  
 \* Accepted.  
 [No competition.]

\* SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than 12 Noon on THURSDAYS.

### TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

"Aquasilia" (our correspondent presumably knows the ordinary formulae for calculating the velocity over a weir crest. In the case illustrated by him such velocity may be taken as the velocity acquired before the water descends the slope, and he reckoned as velocity of approach. The actual velocity at any given point on the slope will be that due to the perpendicular height of such point below the level of the surface of water on the crest. The depths or thicknesses of the film passing over that point will be found by dividing the volume over any unit of length by the velocity.—W. A.—L. Bros. & Co. (the Falls market; Jersey market; Derby market-hall; Bradford market; Leeds market; Smithfield; the present and proposed Ruddledand markets; new market about to be erected at Llanelli. These are some of the principal ones of the class you inquire about.—L. V. H. hardly to the point).—N. and N.—M. W. P. (drawings received).—B. & E.—A. J. H.—T. C. W.

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline pointing out books and giving addresses.

Note.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications beyond mere advertisements which have been duplicated for other journals, are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

## FIRE BRICKS.

BEST STOUTERIDGE FIRE BRICKS, and Cement Fire Clay, Gas Retorts, Muffles, &c. Fire Bricks and Blocks for the Highest Heats, for Lining Furnaces, Forges, Rolling, Puddling, and Steel Furnaces, Flint Glass Furnaces, Roasting and Refining Furnaces, Chemical Works, Coke Ovens, &c. Boiler Sealing Blocks, Fire Covers, Locomotive Bricks, Tyres, Steel Ranges, Grate Backs. Special Sizes and Shapes made to Engineers' Drawings. Prices quoted to any Port or Railway Station.

LONDON AGENTS:—  
 R. CULL & SON, Palmerston-buildings, E.C.

## GLAZED BRICKS.

GLAZED BRICKS (White and Coloured), Special Salt-glazed Bricks, Sanitary Tubes, Glazed Earthenware Sinks, Cattle, Sheep, and Pig Troughs, Horse Measures, Patent Automatic Trough Closes, Patent Fluid, Tank Ventilating Bricks, Patent Ventilating Gullies and Traps, Patent Chimney Pots for Down Draughts. Six Prize Medals. Copies of Testimonials sent if required. LONDON AGENTS:—  
 R. CULL & SON, Palmerston-buildings, E.C.

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THE KETLEY BRICK COMPANY, KINGSWINFORD Staffordshire, Manufacturers of Blue Bricks. LONDON AGENTS:—  
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## DRAIN PIPES.

Lime, Cement, Bricks, Slates, Laths, Hair, Plaster, Wall Copings, Channel Bricks, Blue and Red Ridges, Red Plain Tiles and Pan Tiles, Closet Pans and Traps. Bonds, HURDLES, &c. all sizes. Chimney Pots, Red and White. PRICES ON APPLICATION.

R. CULL & SON'S Stores, Railway Arches, London-street, Bethnal Green Station, E.  
 Chief Office:—72, Palmerston-buildings, Old Broad-street, W.C.

### Best Bath Stone.

CORSHAM DOWN. | FARLEIGH DOWN.

BOX GROUND. | COMBE DOWN.

WESTWOOD GROUND. | STOKE GROUND.

RANDELL, SAUNDERS, & CO., LD.,

CORSHAM, WILTS.

### Bath Stone.

Pictor's Monks' Park. Combe Down.  
 Corsham Down. Stoke Ground.  
 Box Ground. Winsley Ground.  
 Farleigh Down. West Wood.

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# The Builder.

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SATURDAY, AUGUST 27, 1887.

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### "Walks in Rome."

THE extraordinary popularity of this book,\* which has now reached its twelfth edition, must clearly be due to its supplying a real want, commonly felt by the general mass of English-speaking visitors to Rome, most of whom are neither learned in classical archaeology nor very familiar with the history of Mediæval art.

For this purpose the general scheme of the book is a very good one; the grouping of the places described into a series of walks about Rome has many conveniences, and it is always pleasant and sometimes instructive to read the numerous extracts which are so copiously inserted from English, French, and American writers on the very site to which the quoted passage refers. Moreover, Mr. Hare has considerable literary facility and the gift of putting things in a pleasant and readable way, valuable qualities in a book meant for popular use.

Other qualifications are, however, necessary in the author of a work on Ancient and Mediæval Rome. Some classical scholarship and some real acquaintance with the science of archaeology are absolutely essential, and in these qualifications Mr. Hare appears to be almost wholly deficient.

The result is that nearly every page is marred by some inaccuracy or blunder, very frequently of the most serious kind, both in the descriptions of the existing remains, and also in the accounts of the accepted theories relating to the attribution and history of the various buildings. It would be a weary and thankless task to make out a complete list of Mr. Hare's mis-statements; a few examples may suffice to show that our accusation is not made without some just ground. At p. 124 of vol. i. we read that the great flight of steps leading up to the Church of Ara Cœli marks "the site of the famous staircase to the temple of Jupiter Capitolinus." Now, putting aside the fact that recent discoveries on the other peak of the Capitoline Hill have made it almost, if not quite, certain that the Church of Ara Cœli stands on the ancient Arx, and not on the site of the great Tuscan temple of Jupiter, we know that till the fourteenth century there was no access whatever to the Capitolium from the side of the Campus

Martius; the steep ascent, both to the temple of Juno Moneta and to that of Capitoline Jupiter, being alike on the side of the Forum Romanum. In ancient times an inaccessible cliff, strengthened by a fortification wall, formed a complete defence on the western side,—that by which the Capitolium is now most easily approached.

In describing the so-called Tabularium, which occupies the Forum side of the Capitoline Hill, Mr. Hare writes,—“This is one of the earliest architectural relics in Rome. It is built in the Etruscan style, of huge blocks of tufa or peperino.” The fact is that both the documentary history of the building and the character of its masonry show that it is not older than the early part of the first century B.C. In what may be called “the Etruscan style” blocks of much greater size, and of very varying dimensions, are used; while in the Tabularium (so-called) the blocks are all accurately worked to the same sizes, 4 ft. by 2 ft. by 2 ft., so that the courses of “headers” and “stretchers” work in with absolute regularity in the fashion of a modern well-built brick wall in “English bond,”—a method of building which certainly was not developed to this extreme pitch of accuracy till the latter years of the Republican period.

The long staircase leading down through the Tabularium to the Forum level, of which Mr. Hare says (i., 130) that “traces exist,” is, on the contrary, the best-preserved portion of the building; all its sixty-four steps are as sharp and perfect as when they were built, mainly owing to the disuse of this approach caused by Domitian, who built the existing Temple of Vespasian close up against the Tabularium in such a way that the cells of the temple completely blocked up the only lower access to the staircase.

The celebrated inscriptions known as the Fasti Consulares were discovered, not near any temple of Minerva Chalcidica (as we are told, i., 147), but near the Temple of Vesta. This is an important point, as Mr. F. M. Nichols has recently shown in an interesting paper (printed in *Archæologia*, vol. 50, part i.) that there are many reasons for believing that these consular lists were engraved on the marble walls of a chamber in the Regia, the official residence of the Pontifex Maximus, remains of which have recently been exposed close by the Temple of Vesta.

With regard to the Forum of Julius Cæsar, (i., 180), Mr. Hare writes:—“The only visible remains of this Forum are some courses of high square blocks of stone (*Lapis Gabinus*) in a dirty court.” A careful examination of the remains will show that much more than this really exists. There is a series of arched openings, behind each of which is a vaulted

chamber, still well preserved, though partly buried below the modern ground level. The construction of these arches is of special interest as an example of the skilful Roman use of different materials. The head of each opening is formed by a very carefully-jointed flat arch, made of brown tufa, not *Lapis Gabinus*, except the springers and key-stones, which are of the harder cream-white travertine. Over each flat arch is a semicircular relieving arch with tufa voussoirs. The vaults of the chambers are of concrete, made of pozzolana, lime, and fragments of tufa. These chambers, which once probably surrounded the whole Forum Julium, appear to have been offices for lawyers' clerks and other officials connected with the business of the place.

There is no authority for the author's statement (i., 186) that distances within the walls of Rome were inscribed upon the *Umbilicus Romæ*, which stood close to the Arch of Severus, on what has been conjecturally called the *Græcostasis*. Except a bare mention in the *Regionary catalogues*, little or nothing is known about the *Umbilicus*. Judging from its name and the conical shape of the existing remains, it was probably a sort of copy of the celebrated *Omphalos* at Delphi, which was supposed to mark the centre of the world. The form of the *Omphalos*, which is represented on various Greek vases and coins, especially on the electrum staters of Cyzicus and silver tetradrachms of the Seleucids, seems to have been very similar to the brick and concrete cone in the Forum Romanum, from which all the once rich marble linings have been stripped off. The account of the adjoining Rostra, together with a good deal more of the newly-inserted paragraphs about recent discoveries, is taken, without any acknowledgment whatever, from Middleton's “Ancient Rome in 1885,” but with his usual inaccuracy Mr. Hare has introduced blunders of his own among the borrowed information.

At i., 202, we are told that “the front of the Church of S. Adriano is a fragment of the basilica of *Æmilius Paulus*”; the real site of this basilica was to the east of the church, and its remains, if any exist, are hidden 20 ft. below the present level, under a row of modern houses. The Commendatore Lanciani has pointed out, in his able monograph on the history of the Curia or Senate House, that it is this building, as reconstructed in the reign of Diocletian, which still partly exists as the Church of St. Adriano.

At i., 230-31, Mr. Hare appears to think that the upper story of the Colosseum was built by Titus; whereas, the Flavian work really ends with the third tier of open arches; the remainder was very carelessly built in the

\* Walks in Rome. By Augustus J. C. Hare. Twelfth edition, revised. London: Smith, Elder, & Co.



time of Severus Alexander and Gordianus III., after a fire caused by lightning, which burnt the upper galleries, which at that time were of wood. The difference of workmanship between the masonry of the Flavian period, c. 80 A.D., and that of the third century, is very striking, the later part being mostly composed of drums of columns, pieces of entablature, and other fragments taken from older buildings, and very clumsily fitted together.

A more serious blunder is contained in the statement (at i., 206) that the Basilica of Constantine occupies the site of the Temple of Peace.

This magnificent temple, one of the most splendid in Rome, formed the central object in Vespasian's Forum Pacis; part of its precinct wall still exists, built of massive blocks of peperino, with a doorway formed in travertine under a neatly-jointed flat arch. The basilica of Constantine stands quite clear of the Forum of Peace; and, indeed, the Templum Pacis had been rebuilt by Severus after the fire in the reign of Commodus, and was still standing when Maxentius and Constantine built the great basilica. The real site of the Temple was near the Church of S. Cosmo e Damiano, on the side away from the basilica.

One passage (i., 308) is so very funny that we must quote the whole of it. It appears not to be intended for a joke. Describing the Flavian Palace on the Palatine, Mr. Hare writes:—"Beyond the triclinium is a disgusting memorial of Roman Imperial life, in the *Vomitorium*, with indications of its basin, whither the feasters retired to tickle their throats with feathers, and come back with renewed appetite to the banquet." This novel meaning applied to the common Latin word *vomitorium* is the more startling, as at i., 231, Mr. Hare uses it in its right meaning as a passage for the exit of a crowd. It need hardly be said that the indications of such a basin exist only in Mr. Hare's imagination, or were perhaps derived from the fertile invention of some *violet de place*. The house buried under the peristyle of the Flavian Palace is not, as Mr. Hare states at i., 306, any part of the Palace of Augustus, which really stood quite clear of Domitian's Palace on the S.E. Any of the more recently published plans of the Palatine will show this.

The author does not often commit himself to a translation of the Latin which he quotes, but it may be noted that *schola* does not mean school in such a connexion as *Schola Xanthi* (see i., 256), or *Schola Græca*, and that the word *pseudo-peripteral* (i., 259) does not mean "one side being enclosed in other buildings."

A better Latin scholar would know that Varro is not an authority with regard to the etymology of Roman names, and would not have seriously quoted the derivation of *Esquiline* (Hill) from *æsculus*, because of the ornamental groves which were planted by Servius Tullius. It is really derived from *es-quil-ia*, "the dwellers outside," the root "quil" occurring in *in-quil-inus*, "dwellers within." Varro's other derivations, such as *velabrum* from *vehere*, to carry, because people were ferried across its pools, are equally fanciful and groundless, as was nearly all the etymology of two thousand years ago, and yet this is the authority which is usually given throughout the book.

Mr. Hare's knowledge of Mediæval art and archaeology is little if any more complete than his acquaintance with the Classical period. He gives (ii., 219) the year 1370 as the date of the unique "Pointed" Church of S. Maria sopra Minerva; the fact being that it was built in 1280-90 by the same Dominican architect-monks who designed another grand church for their order,—that of S. Maria Novella at Florence. The lovely cloisters of S. Paolo fuori le Mura, designed by one of the Cosmati in about the year 1285, is called by Mr. Hare (ii., 425) a work of the twelfth century, in spite of its obvious connexion both in date and design with the Lateran cloisters, which he rightly refers to the thirteenth century.

Another misstatement at ii., 427 (note), is more excusable, as it has been previously made by many writers on Mediæval art:—

"Among the most interesting of the objects lost in the fire [that which destroyed the nave of S. Paolo fuori le Mura in 1823] were the bronze gates ordered by Hildebrand (afterwards Gregory VII.) when legate at Constantinople, for Pantaleone Castelli, in 1070, and adorned with fifty-four Scriptural compositions, wrought in silver thread." These very valuable relics of the eleventh century were happily preserved from the flames, and are now kept in a large wooden case in the sacristy of S. Paolo, where they are very seldom seen by visitors, as a special permission from the ecclesiastical authorities is required in order to get the case unlocked. Mr. Hare's "silver thread" really is a fine variety of niello, with broadly-drawn silver inlay.

One great fault in the sections of this work devoted to Mediæval art is the utter want of selection in describing pictures and sculpture. Long lists of quite worthless paintings are given, and really notable works of art are often passed over without notice. Thus, in the account of S. Maria Maggiore, a good deal of space is devoted to the costly rubbish in the Capella Borghese, and nothing is said about the magnificent reliefs by the great Florentine sculptor, Mino da Fiesole, which are now built in to the walls of the apse, inside the church, under the windows. These reliefs, together with a number of others,—one signed by Mino,—now in the sacristy, once formed part of a magnificent reredos behind the high altar, which in the seventeenth century was broken up and its reliefs dispersed; when perfect it must have been the largest and most elaborate of all this sculptor's works. Another of Mino's finest works is also passed over in silence, namely, the reredos in the N.E. chapel of S. Gregorio on the Coelian. Mr. Hare does casually mention the altar, which belonged to this reredos, and is now moved to the other side of the church, but he says nothing as to its authorship.

The account of another beautiful work of the Florentine is strangely blundered. At i., 38, note 2, we read:—"The beautiful fifteenth-century altar of four virgin saints at S. Cosimato in Trastevere is said to have been brought from this chapel," i.e., that of Card. Cibo, in the Church of S. Maria del Popolo. This so-called "altar" is really the tomb of Cardinal Cibo himself, the altar which now stands under it is quite a modern addition. Several other instances exist in Rome of a fine fifteenth-century tomb having been made into the reredos for a later altar. A notable example is to be seen at the east end of the south aisle of the Church of S. Cecilia.

With regard to the fifteenth-century bronze doors of St. Peter's, Mr. Hare repeats an often-corrected blunder of Vasari. The Simone, who with Filarete modelled and cast this noble piece of bronze-work, was not the brother or any relation whatever to the Florentine Donatello. His real name was Simone di Ghini, and he was also the principal sculptor of the effigy of Pope Martin V., which at ii., 103, is attributed to Filarete.

The truth is that this later part of the work needs as much careful revision and pruning as that which deals with ancient Rome, and the general conclusion that one is led to is that a book which deals with so complex and often difficult a subject requires on the part of its author more knowledge and much more power of patient labour than Mr. Hare possesses.

It is greatly to be regretted that so very successful a work (financially) as this should not possess the solid merit of accuracy; it would obviously be no less pleasant reading, and no less suited to the general public if all its many blunders were carefully sought out and corrected. The so-called "revision" of this last edition appears to have done little or nothing in this direction.

**The Metropolitan Fire Brigade.**—A lecture on "Our Fire Defences" was given before the members of the Balloon Society, on the 19th inst., by Mr. Jenkin Ingram, who, in the course of his address, contended that Captain Shaw's position was too autocratic, and that the brigade should be controlled by a committee with more expert knowledge.

## BURGES'S "DETAILS OF STONE WORK."



HIS thin folio forms a second volume\* or second series of the illustrations of Burges's architectural designs, of which the companion volume, showing the general designs of buildings, has already been issued under the editorship of Mr. Pullan, and was noticed in the *Builder* for June 23, 1883. Three or four of the same plates, giving general views of buildings, are repeated in this volume, in order to render the meaning of the details more obvious.

Burges's curious and very rough, and even, one may say, ugly drawings, illustrating his studies on the spot of Mediæval masonry and detail, published a good many years ago, will be in the memory of many of our readers, though not many, perhaps, possess a copy, for the edition and its circulation were, if we remember rightly, somewhat limited. The plates, both in their subjects and manner of drawing, were strongly marked by Burges's sturdy and defiant originality, which, indeed, was in this case so defiant that some of his most intimate friends and architectural allies confessed to a difficulty in swallowing the fare put before them. The work now before us,—a much smaller one in page area,—does not partake of the *outré* character of the larger stonework drawings just referred to. It consists, in fact, of general plans and sections of some of Burges's most remarkable designs, executed or unexecuted, accompanied by details of portions, with plans and sections showing the masonry construction. The general sections and elevations are of the most businesslike character, drawn squarely and mechanically in line, with the details merely blocked out in outline for further delineation in larger drawings.

In a short preface the editor, after remarking truly that correct detail no less than good proportion is essential to the perfection of Gothic architecture, claims for Burges that, while extremely accurate in his knowledge of Gothic detail (which no one will question), he had the power of so using his collected materials as to produce originality and correctness without copyism. Among the buildings illustrated in this volume, which include Cork Cathedral and Hartford College, Connecticut (executed), and the School of Art, Bombay, and the Memorial Church for Constantinople (unexecuted), "each was adapted to suit the climate, the site for which it was intended, and the circumstances under which it was designed. In his own house, which was one of his best works, although there are ideas taken from Greek and Assyrian architecture, they are carried out exactly as a thirteenth-century architect would have carried them out had he possessed the enlarged opportunities of observation that we possess in the present day." That is true enough as far as it goes, but there is exactly the rub: Burges *did* carry out buildings "exactly as a thirteenth-century architect would have carried them out," and Mr. Pullan puts forth this qualification as if it were to satisfy all demands. But why did not Burges endeavour to carry out buildings exactly as a nineteenth-century architect should carry them out? That he had "a great power of assimilation" is quite true; he assimilated the Mediæval spirit more fully, in reality, than either Street or Scott did; and it is also true that he adapted his buildings to their sites and purposes with a considerable amount of variety and originality. But it is the variety and originality of a thirteenth-century architect, not of a nineteenth-century one. And it is for that reason that, as we turn over these pages we seem to be looking back at a chapter of architectural revival of which the page has been already turned. Mr. Pullan notes that there is a great deal of "discordance" in the detail of Gothic architecture as carried out now, an admixture of English, French, German, and Italian details from both ecclesiastical and domestic buildings. If this change is intended

\* The Architectural Designs of W. Burges, A.R.A. Details of Stonework. Edited by R. P. Pullan, F.S.A., F.R.I.B.A. London: B. T. Batsford. 1887.



against the leading men who have practised this architecture during the revival, we truly think it is true; not, at any rate, to the tent which is implied. But it is curious, most pathetic, to read that "this will not be in future, when increased knowledge and a more extended power of analysis will enable people to distinguish good architecture from inferior"; and so we are offered Burges's simulated Mediæval architecture as an assistance in the right direction. Does not Mr. Pullan perceive any sign that the page is read, and that this particular chapter of architectural revival is pretty nearly closed?

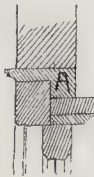
We do not question the interest of the publication, however; we only question it having a precise kind of value which the editor tributes to it,—in that it comes too late. Burges's plates are more likely to warn the student of Gothic revival than to spur him in trying it on, for the kind of work they present is so palpably out of touch with the present day. In the first place, the spirit of the architecture is so completely and uncomprehensively Mediæval; and the English world is pretty well got over its Mediæval fever. When it is nonsense to say there is not copyism, it is true that in the general scheme of composition and distribution of the materials there is originality. In the design for the Bombay School of Art, for instance, there is a distinct element of Gothic to suit it to a tropical climate. Perforated slabs were, wherever practicable, to be substituted for glass windows. The roofs were to be of low pitch, and eaves double, to allow of perfect ventilation, and the eaves were to have great projection, in order in some degree to shade the windows.

If this is well, though, after all, it is not more than the exercise of ordinary common sense, nor one could have lived in a Gothic building in that climate if it had not been modified for the circumstances. But then, we are told, Mr. Burges chooses the architecture of the latter part of the twelfth century, which is characterised by broad masses and deep shadows, as that most suitable for an Eastern climate." But why the European style of the twelfth century for an Eastern country? Why, there must be a past style adopted, not take the native to the soil? or, finally, was it not possible, by "power of assimilation," to develop something "characterised by broad masses and deep shadows," without going back to the twelfth century for it? We cannot be surprised that Burges did not attempt to do so, because he lived in the midst of the Gothic movement, and the most original of us can hardly go right against the stream; but we are surprised that Mr. Pullan should not perceive that things have moved since then. However, granting that in this and in the memorial church design there is an adaptation to the site and circumstances which takes each of his designs, as a whole, out of the region of copyism, surely it cannot be denied that the details shown in these pages are full of copyism. They are, for the most part, simply early French Gothic adopted wholesale. And where they are modified, they are not improved.

The massive character of this phase of Gothic was, no doubt, peculiarly attractive to Burges's genius, which leaned towards weight and mass in architectural expression; but his desire for these qualities led him to exaggerate his models; and a good deal of the detail shown in these plates, the short, thick, stunted shafts and big capitals and bases, impresses as, though powerful, decidedly wanting in refinement; in some cases even "clumsy" would hardly be too harsh a word to apply to it.

The real value of these drawings to the architectural student, old and young, consists, in the first place, in the preference for solidity and massiveness which they show, the absence of anything that is flimsy or at variance with monumental character; but still more in the evidence given, by the detail drawings more especially, of Burges's truly architectural feeling in designing. His way of treating the sections and plans is so distinctly that of a man who was not designing a design, but building a building. Everything in his detail seems thought out with reference to the putting together of the stones, and not as a process of

putting lines on paper. We should not recommend any young student to go to the book to study Gothic detail, or to adopt his style from it, as if that were the same thing as going to original mediæval work, as the editor fondly suggests. But what he is likely to acquire from the study of it is a feeling for massiveness and monumental character in architecture, and a clearer perception of the relation between masonic construction and outward architectural expression. We do not know that all the constructive details are to be recommended as models,—at least, if we take the drawings as intended accurately to show the jointing. The student will learn from them how solid and massive was Burges's manner of putting stones together, and how religiously he carried his string-course stones right through the wall, so as to make them real constructive bond and not mere ornamental facing. The details of Cork Cathedral tower may be studied with particular advantage, and the section through the nave. But we should hope that Burges did not really mean the window-label stones in the drawings for Brisbane Cathedral, for instance (plate 12), to be shaped as shown on the section (see A in figure). If the stone was really intended to be cut that way, it is not only a great waste of labour and material, but it is a form in which, in the event of any settlement, the stone would be almost sure to crack at the angle; and if it is not meant so (and we can hardly think it is), the drawing is misleading for purposes of study.



The drawings were, however, well worth publishing, as the record of a very gifted and original architect's manner of working, and though the editor somewhat exaggerates their value as models, they are well worth study if taken as sources of architectural inspiration and instruction, though not as models of style. Mr. Pullan speaks of possible future volumes containing illustrations of Burges's designs for woodwork and metal-work. These could hardly fail to be of interest; probably of greater interest than the volume we are now noticing, as there would be more scope in them for the exercise of the powerful originality in detail which Burges undoubtedly possessed, but which, in regard to purely architectural detail was, to our thinking, somewhat weakened by his loyalty to Mediæval precedent.

#### NOTES.

**D**URING the remarkably severe thunderstorm which prevailed in London for nearly three hours on the evening of the 17th inst., several buildings were struck by the electric fluid and more or less damaged. The most serious case which has come to our notice is that of the spire of Christ Church, Endell-street, Long Acre, which has been very badly shattered, especially on its north-eastern side. The spire, which rises to the height of about 120 ft., was built, with the church, more than forty years ago, the architect being Mr. Benjamin Ferrey. (A view and description of the church appeared in the *Builder* for March 8, 1845.) The stone appears to be a variety of Bath, and is in parts very much decayed. An iron finial surmounts the spire, but there was no lightning-conductor. The electric fluid apparently struck the iron finial, by which it seems to have been conducted into the interior of the spire, and, possibly attracted by iron cramps in the stonework, to have burst its way through to the outside of the spire, carrying away large masses of stone. The side of the spire most affected looks as though it had suffered bombardment, great holes being made in it. These holes, especially one above the uppermost lucarne, have been partly filled up again by blocks of stone, displaced from above, lodging there in their descent, and showing by their projection that they were only just saved from falling to a lower level. Altogether, the spire is in a very precarious condition, as may be seen by viewing it through a glass from the workhouse

yard adjoining. An inspection of the interior still further reveals the ruined condition of the spire, and makes one marvel how it holds together. Services have been discontinued in the church, and a considerable area of the street in front of the spire has been hoarded in, and the carriage traffic diverted for fear of the effects of vibration. The work of restoring the spire has been very promptly placed in the hands of Messrs. E. A. & Co., of Putney, and we wish them and their workmen well out of their hazardous undertaking. Mr. Coleman, their courteous representative on the works, pointed out to us the curious way in which the electric fluid, on reaching the base of the tower, travelled for some fifteen yards or so along the iron railings on the north side of the church, and was conducted by an iron stay-bar into the eastern-most buttress but one, seriously rupturing it. At this point the course of the fluid is lost sight of. The moral of this and of many previous casualties is, of course, that every church and every prominent building ought to be provided with a lightning-conductor, whose efficiency should be periodically tested.

**M**R. DE LISLE, the member who "did not even smile," deserves the best thanks of all who are interested in decorative painting generally, and in the completion of the decoration of our national palace of legislature more particularly, for his sensible letter in the *Times* of Tuesday in regard to the unfinished decoration of the Central Hall of the Houses of Parliament. As Mr. De Lisle says, the existing mosaic of St. George by Mr. Poynter "may not be faultless," but its general effect is "bright and splendid" (we presume Mr. De Lisle uses "splendid" in its literal Latin sense), and its cost, 650*l*, might be said to be almost absurdly small for a work of high-class design, covering so large an area, and executed in so costly and laborious a method as mosaic. To our thinking, Mr. Poynter's design deserves a good deal more than the faint praise which even those in favour of continuing the series have been content to bestow upon it. His "St. George" is a fine and heroic-looking figure, and the general effect of the design is decorative and well suited to mosaic. But, at all events, it is a commencement of the scheme of decoration, which ought to be continued, and which has long remained incomplete, to our national discredit. Mr. De Lisle is also quite right in his conclusion that mosaic alone can be advantageously or rightly employed for the completion of the series of pictures in the central octagon, and that for one more reason than he seems to be aware of. Not only is it the case that the brilliant scheme of decoration of the Central Hall, with its gilding and stained glass, requires a no less brilliant medium than mosaic for its pictorial decoration; but also, the one area having now been filled with mosaic, the treatment of the other similar spaces with fresco, as one or two of the æsthetic (?) blockheads in the House have proposed, would be a proceeding architecturally out of the question, unless those who propose it are prepared to back out Mr. Poynter's mosaic, and replace it also with fresco. Mosaic and fresco will not range together; and fresco pictures would be killed in that position by their decorative surroundings. We fear Mr. De Lisle's appeal has little chance of success in an assembly where vulgarity and economic claptrap are so rampant as in the present House of Commons; but he is, at all events, to be thanked for having made one more effort to arouse attention to the discreditable manner in which the central rendezvous of our legislative palace, the architectural keystone of the design, is left year after year in its incomplete state, a derision to visitors, foreign and English alike.

**B**Y an order of the 4th of July last, only just published in the *Journal Officiel* of August 25th, the French Minister of Public Instruction and Fine Arts has created, in connexion with the Museum of Comparative Sculpture, at the Trocadéro, a French Chair or Professorship of Mediæval and Renaissance Architecture; and M. de Baudot, Inspector-General of "Travaux Diocésains," and member of the



Commission des Monuments Historiques, is nominated as the first occupant of the office. This appointment has a certain significance, as it implies a desire on the part of the Government to promote a more definite and regular study of that phase of architecture, which though it is recognised by many in France as more especially "national" than any other, is yet little studied at the École des Beaux Arts. M. de Baudot is the oldest Inspector-General of "travaux diocésains," and one of the most devoted disciples and followers of Viollet-le-Duc.

**T**HE subscriptions to the second series of the New Obligations on the Panama Canal, which was opened on the 26th July, 1887, show a marked abatement in the confidence with which M. de Lesseps's appeals are responded to in France. The three per cent. loan of October 3, 1883, amounting to 12,000,000*l.*, was all taken, at a discount of 43 per cent. Of the first series of the "New Obligations" at 3 per cent., issued at a discount of 55 per cent., 91·7 per cent. were taken last year. Of the offer of the present year, also at 3 per cent., at a discount of 56 per cent., only 51·7 per cent. has been applied for, giving a cash amount of 4,556,000*l.*, for which the Company incurs a liability of 10,355,480*l.* The total loan liabilities of the Company, outside of the original capital of 12,000,000*l.*, now amount to 53,900,880*l.* (less a small reduction for the action of the sinking fund). For this the Company acknowledges the receipt of 29,909,348*l.* in cash, showing a rebate of 23,991,532*l.* The total to the debit of capital account thus stands at 65,900,880*l.*, of which some 8,000,000*l.* is in hand. The annual sum required for interest on the above, together with 1 per cent. for sinking fund, is 2,668,458*l.* The total amount of excavation for the canal and river deviations is now estimated at 150,000,000 cubic metres. This estimate must, however, be considerably under the mark, as the river deviations will be very much increased in volume by the abandonment of the *Barrage* or dam at Gamboa. The deep cuttings, moreover, are only estimated for at slopes of, and under, 1 to 1; at which there can be no rational anticipation that they will stand. From the monthly accounts of excavation published from time to time it appears that 36,000,000 of cubic metres have been excavated since 1879, leaving 114,000,000 cubic metres, out of the minimum estimate above quoted, to be excavated on July 1st last. The rate of progress for 1886 was very nearly one million cubic metres per month, and this has been increased by about one-sixth during the first six months of 1887. At this rate of progress it would take eight years to complete the excavation. But the true limit of time (apart from the question of the Chagres floods, and the Rio Grande diversion) is found in the Culebra cutting, which, in less than two kilometres of length, is estimated (at 1 to 1 slopes) to contain 25,000,000 cubic metres of rock, sand, and clay. Of this unprecedented volume only about one-tenth, or 2,550,000 cubic metres, have yet been excavated. The largest return made from this cutting in any month hitherto was 122,000 cubic metres in May last; the volume, however, sinking to 50,000 cubic metres for June. At the most rapid rate yet given it would take fifteen years to execute this cutting, if the work were uninterrupted, and if the slopes stand as designed. In the course of fifteen years 40,000,000*l.* will be required to pay the amount of interest due on the money already raised, to say nothing of that required to carry on the works for the period above indicated. The above figures are all taken from the authorised publications of the company.

**A** VERY conspicuous object from the harbour of Queenstown is now the New Roman Catholic Cathedral, which stands almost in the centre of the lines of houses which run along the margin of the bay and line the steep slopes above. It would have been impossible to have chosen a finer site, and the building is by far the most conspicuous object as vessels draw towards the quays from the sea. Un-

fortunately, however, the building is incomplete, and its further progress is at present delayed for want of funds. Externally it is to all appearances nearly complete, except that the tower has yet been carried no further than the height of the roof. The south side of the building is seen from the bay, as it is built along the side of the hill from west to east. The most prominent feature is the southern transept, with a rose window and small side towers and pinnacles. The east end is in the form of an apse, whilst the unfinished tower stands in front of the west end, that is to say, at the south-west corner of the building. We understand that the building is internally also unfinished. It is most unfortunate when a striking and important building in a conspicuous situation is left in a state which is almost worse than not being in existence at all. It says little for the genuine interest of the Irish Roman Catholics in their religion or their country that they allow this work to remain unfinished.

**W**HEN English watering-places are annually overrun it is difficult not to be struck with the way in which those on this side of the water neglect the attractions of the glorious bay of Queenstown, — the Cove of Cork, — and the delightful shores of the Lee from Cork to Haulbowline. The bay is one of the finest boating waters in the world. There are additional attractions in the vessels of all nations which trade there, and in the splendid mail packets to and from America; there are steamers plying on bay and river, and direct railway communication with Cork and Dublin; yet there are scores of sites for houses unoccupied, and an almost total dearth of tourists.

**T**HE effect of the treatment of sewage described in a paper sent to us by Mr. Richard Weaver, C.E., F.C.S., can only be known by trial; but there are certain leading conditions which must be fulfilled in one or other respect in every place, according to circumstances. These are not the same in all, but in most places nothing should be added to the sewage which would prevent it being used beneficially on land, and the same may be said of the solid residue separated from the sewage in tanks by settlement, and the clarification of the effluent water by chemical ingredients; for we take it that, sooner or later, the sewage of most towns must be applied to land before it is finally got rid of and passes beyond the control of the sanitary authorities. The agricultural chemist may form a pretty accurate notion of the probable effect of the "fer-chlor" proposed in this case when its precise nature and composition are stated; and we should advise the inventor to make sure, before he goes any farther, that the new ingredient he proposes to add to the sewage will have no detrimental effect when it comes in contact with the soil, whether it be a light or a stiff soil, and whatever composed of, unless, indeed, the process be intended for exceptional cases only, and we cannot suppose that to be the object of the inventor. If the proposed treatment should turn out satisfactory in this respect, we should say it would prove to be a valuable discovery, for it would probably be effective in deodorising the sewage in its passage through the sewers, if applied at their upper ends; but it would hardly be practicable to apply it, as is suggested in the paper, at the heads of the house-drains. In any case in which these are laid so as not to carry off the sewage cleanly and quickly away from the house, they must perforce continue to give off foul air, until they are taken up and laid properly, for the frequent attention required to deodorise them would be given by but few persons, if any. Corporations and other sanitary authorities, however, can easily deal with the sewers in this way.

**B**Y the fire which broke out at Knole House, Sevenoaks, on Tuesday, the 16th of August, the barn, — one of its oldest features, — and the adjoining stables were destroyed. The barn was a relic of the time of Archbishop Thomas Bouchier (died 1486), who rebuilt most of the house, enclosed the park, and

devised both to his own metropolitan See of Canterbury. His successor, John Morton (died 1500), made some additions. The hall, chapel, chaplain's room, servants' "gaol," and the gate-house are of these two prelates' days. The gate-house is very like to that by Morton, the building archbishop, at Lambeth House. Cranmer, fearful of what the laity should say, exchanged the house for certain lands to the Crown. Thus it passed by favour through various hands, including those of the Protector Somerset; John Dudley, Duke of Northumberland; Cardinal Pole; and the Earl of Leicester. Ultimately Elizabeth bestowed it upon Thomas Sackville, first Earl of Dorset, in whose line it has continued ever since, save for a break during the Usurpation, and an alienation by Richard, third earl, to Alderman Henry Smith, of London, which his nephew redeemed. Lord Dorset, who died suddenly in the council chamber, Whitehall, in 1608, also enlarged the house in the Early Italian or Classic style then in vogue. The water-spouts which he set up throughout the premises bear date 1605. Richard, fifth earl (died 1677) made substantial repairs; his union with the Lady Frances Cranfield, heir to her brother Lionel, the Earl of Middlesex, is recorded by the arms of their two houses upon the garden gates, the dial, and elsewhere. The mansion narrowly escaped from destruction by a fire, which, on the Christmas Day morning, 1817, was discovered in the Venetian chamber, and consumed the state bed that had been originally made for King James II.'s use, together with some valuable pictures and Gobelins tapestry. Its earlier annals begin with Baldwin de Bethune, *temp.* John, and so on to the Marischals, Earls of Pembroke; the Bigods, Earls of Norfolk; and Otho de Grandison, *temp.* Edward I. Viewed from without, the various buildings, in a great diversity of style, cover about five acres, and stand within a magnificently-timbered park extending over some 1,000 acres. Within is a priceless collection of paintings, with some furniture and decorations dating from the sixteenth and seventeenth centuries. Whilst the property itself takes a foremost rank amongst the historic seats of England, the prospect as viewed from River Hill over Western Kent with Penshurst, home of the Sidney's, in the nearer distance between the foreground and the Sussex downs and hills of Hampshire, spreads out unsurpassed in this country.

**W**RRITING to the *Standard*, "F. R. A. S." suggests that to the scientific reports in our daily papers be added a notice of the exact error of Westminster Palace clock at any fixed hour of the preceding day. This error, by the way, is ascertained twice daily. On the 10th of August last the clock was advanced four seconds, having remained untouched since the 29th of March last. In telling us to regulate our own clocks and watches by marking the first note of any hour as it is struck upon Big Ben, "F. R. A. S." forgets one important element of the observation: we must also make allowance for the time that the sound has taken to reach our ears: so his recommendation is of but little practical use.

**A** LOCAL committee invite contributions towards the restoration of the Martyrs' Memorial at Dartford, Kent. This stands in the old burial-ground on the site of an ancient chapel that was dedicated to St. Edmund-the-Martyr. It commemorates the burning at the stake, on July 17th, 1555, in Queen Mary's reign, of Christopher Wad and two of his fellow-townsmen for their adherence to the Protestant faith. A similar movement has been made in respect of the monument to Robert Nelson, author of "Fasts and Festivals of the Church," who was the first person to be interred (1715) in the burial-ground of St. George-the-Martyr, Holborn, next north of the Foundling Hospital, London. The Latin epitaph was composed by Bishop Snelbridge. Mr. Butterfield has examined the monument, and it is estimated that 60*l.* will meet the necessary repairs and provide a suitable railing.

**M**RS. HOLMES, honorary secretary to Lord Meath's Public Gardens Association, wrote recently to the *Times* directing



attention to recent encroachments upon Burton's, *olim* Great or College, Court, Chelsea. Lying between Royal Avenue and St. Leonard's-terrace, this once open space was lately leased to the General commanding the Home District for a soldiers' cricket-ground, to the exclusion, for all practical purposes, of the public. A Treasury grant of 800*l.* was made for preparing the ground; two pavilions have been set up; and, unless the matter be vigorously handled, there is much danger that the ground will soon be quite converted into a private enclosure. It is to be observed that the grove of trees and the Royal Avenue bear, north-west, towards Kensington Palace. The story runs that Queen Anne intended to make a road and avenue from the Soldiers' Hospital, across the Court and the fields beyond, to her home at Kensington. The Court extends over about twelve acres, and was bought with the public funds in 1682.

THERE is an amusing paper in the current number of the *Nineteenth Century*, by the Rev. Dr. Jessop, on the "Trials of a Country Parson," in the course of which he describes a visit he lately paid to a church "to which a very hurricane of a man had been recently appointed, and which he had already set himself about to restore":—

"He knew no more about architecture than I do about Sanscrit, and less about history than I do about chemistry. He had a small army of bricklayers picking and slopping about the sacred edifice, tearing down this and digging up that, and smailing (a good word this) over the other. And this worthy had not even consulted the parish clerk! 'Of course, you have a faculty for this?' I suggested. 'Not I! Faculty, indeed! I have made up my mind to have nothing whatever to do with any officials or professionals of any sort or kind; I am my own architect!' Now, if a man chooses to be his own tailor, nobody will be much the worse, and nobody will much care; but when a man sets himself to 'restore' a church by the light of nature, it is a much more serious matter, and it is almost beyond belief what a brisk and bounding young fellow, with the best intentions and an immeasurable fund of ignorance to fall back upon, can do without any one interfering with him. You tell him that he will get into a scrape, that the bishop will be down upon him, that there are such things as law courts. He smiles the benevolent smile of superior wisdom, and dashes on with heroic valour. If he calls himself a Ritualist, he gets rid of the Jacobean pulpit, the royal arms, or the Ten Commandments, and sets up a construction which he calls a reredos, all tinsel, and putty, and papier-mâché, hurls away the old pews before you know where you are, nails the brasses to the walls, sets up a lectern, and intones the service, keeping well within the channel, from which he firmly banishes all who are not males. As for that gallery at the west end where the singers used to sit for a couple of centuries, and never failed to take their part with conscious pride in their own performances, that is abomination in his eyes,—that must go of course, 'to throw out the belfry arch, you see, and to bring the ringers into closer connexion with the worship of the sanctuary.' 'I love to see the bell-ropes,' said one of these dear well-meaning young clergymen to me. . . . But if an energetic young reformer calls himself an Evangelical he is, if possible, a more dangerous renovator than the other. Then the axes and hammers come in with a vengeance. None of your pagan inscriptions for him, teaching false doctrine and popery. None of your *Orate pro crimine*, none of your crosses and remains of frescoes on his walls; St. Christopher with the Child upon his shoulder wading through the stream, St. Sebastian stuck all over with arrows, or St. Peter with those very objectionable keys. As for the rood-screen, away with it. Are we not kings and priests? If you must have a division between the chancel and the nave, set up the pulpit there, tall, prominent, significant; and if the preacher cannot be heard, then learn the lessons which our grandfathers taught us, and let there be a sounding-board. The serious part of all this passionate meddling with the *status quo ante* is that any young incumbent can come in and play the wildest havoc with our old churches without any one interfering with him. The beneficed clerk is master of the situation, and is frightfully more so now that Church-rates have been abolished than he was before. It is no one's interest to open his mouth: is he not inducted into possession of the sacred building, and is he not, therefore, tenant for life of the freehold? As long as he makes himself liable for all the expenses, he has no right to let him have his way. 'I ain't-a-going to interfere,' says one after another, and in six weeks a church which had upon its windows and its doors, upon its every stone and timber, he marks and evidence which constituted a continuous chronicle, picturing,—not telling,—a tale of the faith and hope, and folly and errors, and

devotion and sorrow, and striving after a higher ideal, and painful groping for more light in the gloom,—a tale that goes back a thousand years; a tale of the rude forefathers of the village world, which still regards the house of God as somehow its own,—in six weeks, I say, all this is as effectually obliterated as if a ton of dynamite had been exploded in one of the vaults, and the genius of smugness had claimed the comminuted fragments as her own."

This, it is needless to remark, is only one side of the picture and of the question, and we only quote it as such. To have one side put with picturesqueness and point is, however, worth something,—provided we always recognise clearly that it is only one side.

IT appears that the southern colonies are making a decided move in favour of exploration of that unknown waste, the Antarctic region of this planet. The Antarctic Committee which has been, according to the *Times*, appointed by the Royal Society of Victoria and Royal Geographical Society of Australia, has memorialised the Premier of Victoria in favour of offering bonuses to stimulate Antarctic research. Bonuses will be given for the conveyance of scientific observers into south latitudes, special bonuses for oil from fish caught south of 60 degrees S., and further ones for passing 70 degrees S. A flying survey of any coast lines not in the Admiralty charts is desired, and the discovery of new waterways and harbours for wintering. We have no doubt that before long we shall hear, however, of a special expedition for the exclusive object of Antarctic research. Grumblers will say that "no practical advantage" is to be derived from it, and no doubt the lives of adventurous men will be sacrificed to the fascination of South Pole exploration as they have been to that of the North Pole; but it is likely to go on for all that, and we wish it good speed. That restlessness of the human spirit, which can never be content till we know all about our globe that is to be known, is one of the things that makes life worth living; and any who may perish in the attempt to increase our stock of knowledge will at least lie in honoured though perhaps unknown graves.

#### THE ARCHITECTURAL ASSOCIATION EXCURSION.

RESUMING our account of the Excursion of the Architectural Association, the first place visited on Wednesday, the 17th inst., was South Wraxall (see prototype illustrations in last week's *Builder*). This is a very interesting manor-house of two styles, Perpendicular and Elizabethan. The house is now, and always has been, in the possession of the family of Long, which emerged into history under the patronage of the Hungerfords of Farleigh, but which has outlived that race, and has achieved distinction on its own account. It

right, there seems little doubt that the son of the founder of the family began the manor-house, which was further enlarged by his great-grandson, Sir Thomas Long, about the year 1500. The means of dating his work are afforded by a heraldic device,—a marshal's loak,—which Sir Thomas was the first of the family to display, he inheriting it, as it were, from his mother. The cognisance once adopted was freely used afterwards, and appears in the work added a hundred years later, when the somewhat straggling Perpendicular in which Sir Thomas worked had given way to the bold Renaissance of his great-grandson, Sir Walter. The chief features due to him are the fine drawing-room and the chimney-pieces of several other rooms. Three of these were illustrated in our last number, and the bold and original nature of the work is evident at a glance. The designers of this and of much other Renaissance work seem to have aimed at effect: their work is strong if not refined. Sometimes it is both; but any way preferable to the tame proprieties of a later date. The drawing-room is a very interesting example of an alteration of existing work. Sir Walter widened the old room by 4 ft. or 5 ft., but retained the old roof and wall plate. In order to do this he left or built a large mass of masonry projecting from one side to carry the plate; this he ornamented with niches and clothed with panelling, thereby converting it into an agreeable feature, and one which lends much interest to the plan of the room. Then, at opposite corners of the apartment, he made great windows of many square-headed lights, he covered the old timbers with a fine plaster ceiling, and, behold, a room such as men love to look upon. Unfortunately, it is a thoroughfare room in two directions, and this mistake in planning, combined with other inconveniences of a similar nature, no doubt led to the disuse of the house as a family residence. Its emptiness, however, enabled the excursionists to sketch and measure without let or hindrance. One drawback an empty house brings with it, and that is, that the garden is neglected. At South Wraxall this is the case, but the flagged paths and the great stone piers (see illustration in last week's *Builder*) show what possibilities there are.

In great contrast to South Wraxall is Kingston House at Bradford-on-Avon (see view in last week's *Builder*). Here we have a fine house occupied, and surrounded by beautifully-kept gardens; but Kingston House excited no interest in comparison. The fact is, Kingston House has been restored. According to the best authority, it has been restored with the utmost care; piece by piece the decayed work was taken out and replaced, the new work being an exact reproduction of the old. But with all this care it fails to attract the architectural sketcher. His aim is to get at the thoughts and ways of his predecessors at first hand, and not through the medium of facsimiles, however exact. Hence he will desert the fine, clean, scraped work,



is said that one of my Lord Hungerford's suite in the beginning of the fifteenth century was a tall fellow called Long Thomas, or according to another authority, Henri le Prenx. This adjective "long," by dint of constant use, was finally adopted as a surname, and Long Thomas became Thomas Long, or Henry Long, according to the other authority. Whichever may be

beautiful though it may be, and content himself with some dirty, chipped affair, whose very dirt and chippiness attest the hand of Time at each glance the sketcher raises towards it.

The town of Bradford-on-Avon itself is very picturesque, owing much of its charm to its situation on the side of a steep hill, and some, perhaps, to the fact that in its early days it



became the home of weavers from the Low Countries. Its most remarkable monument is the celebrated Saxon chapel, which within the last fifteen years has been discovered and rescued from oblivion, and is now carefully attended to and duly appreciated. It is, however, a building which would better grace an account of the doings of an archaeological society than of an excursion of sketchers. As to the church, it may be said of this as of many others, that interest may be extracted from any church dating from Medieval times, even though it offers little for the pencil to note. The other principal features in the town are the Tithe Barn and the Bridge, both of which, as well as the Saxon chapel, we illustrated last week.

At Westwood, where the party went next, they found a church with a beautiful panelled tower and a corner stair-turret carried up, and crowned with a crocketed stone cupola. Inside some fragmentary glass attracted attention, as well as a wooden pulpit, dated 1607, and a very florid altar-rail, or low screen, of the time probably of Charles I. The adjacent manor-house, though retaining little internal work, has a picturesque exterior, and, combined with the recessed windows of the excellent north aisle, or chapel, and the panelled tower, forms a group of great architectural interest.

On Thursday, the first resting-place was Great Chalfield Manor-house, of which we gave an illustration last week. In some respects it recalls South Wraxall, from which it is distant about three miles; but the work here is of a slightly better character, although a little later. Nothing beyond the exterior remains, and since it was illustrated by Walker some part has been pulled down; but the front of the house is left, and so are the ranges of farm buildings, as well as traces of the moat, and of the fine stew-ponds. It is a place well worthy of study, if only for the plan of the whole premises, which may be said to include the church, for it serves few people besides those living in the Manor-house.

Soon after leaving Chalfield an accident occurred to one of the two vehicles conveying the party, whereby the day's arrangements were somewhat upset, Kaevil being omitted altogether, and a shorter time allowed for the remaining buildings. Of these, Steeple Ashton was the first. The village takes its name,—not from its church, which has only a tower,—but from the staple, or market, which formerly existed here. The church (of which we gave a small view last week) is, at first sight, an imposing one, but a closer inspection shows the detail to be very coarse and of unpleasing proportions. The church has had a spire twice, but it fell down twice, and, taking this as an intimation of a Divine objection to such a feature in that village, those concerned decided not to attempt to reconstruct it. Leland gives the popular derivation of the name, and mentions the spire. He says (*cir.* 1536), "It is a praty litle market Towne, and hath a praty Buyldinges. It standithe muche by clothiars. There is in it a very fayre church, buyldyd in the Mynd of Men now lyvyng. The spired Steple of Stone is very fayre and highe, and of that it is cawldyd Steple Asacheton. Robert Longe, clothyar, buyldyd the Northe Isle, Walter Lucas, clothyar, buyldyd the Sowthe Isle, of theyr proper costes."

But far more interesting is the splendid church of Edington. Splendid, at any rate, it once was, for a long period of neglect has rendered a thorough restoration necessary. Last week we gave some illustrations and a short historical account of the edifice, which, on the occasion of the visit of the Association, was described by Mr. J. D. Sedding, who, in a paper which did justice to the beauties of the place, uttered rank heresies in respect of William of Edington's connexion with the building thereof. Certainly the work ascribed to the same man here and at Winchester is very different in character, and apparently in date, and possibly the heresy of to-day may become the true faith of to-morrow; but the time at disposal was limited, and even archaeological disputes sank into the second place in the presence of such beautiful work as there was on every hand. The original structure presents windows of an excellent type, fair canopied niches, supported by exquisitely-carved figures, whose drapery is rendered with the masterly arrangement and the delicacy of execution which mark the period, and which may well be the despair of modern carvers. It

also contains much later work, equally delicate and refined, although belonging to what some people are pleased to call the Pagan style of the Renaissance. The pulpit, reredos, and font-cover are examples, and are hardly less notable than the great tomb to Sir Edward Lewis, who died in 1630. On an altar tomb lie the beautiful figures of Sir Edward and his wife, while above them hovers a cherub offering the crown of life. The cherub hangs from the panelled soffit of the flat canopy, which is supported by columns. The recess is partly screened by curtains, which are drawn back and tied round the columns. Above the canopy rises a tablet carrying the arms, while below the recumbent figures kneel effigies of five children. The panelled ceilings are also Jacobean in date, and though poor in detail every effort will be made to preserve them. Three other important monuments deserve notice, one is the Cheney Chantry, or what remains of it, in the nave; another is a Late Gothic tomb to an unknown ecclesiastic, in the south transept. It is elaborately and richly coloured, and from the rebus which adorns it in various places,—a sprig of bay and a tun, or barrel,—it is supposed to commemorate one John Baynton. A curious feature is that the recumbent figure rests its feet not on an animal, as is usual, but on a barrel. The third monument is one by Chantrey, of which we reproduced a photograph last week. It is to the memory of Sir Simon Richard Brissett Taylor, who died in 1815, and it was erected by his sister, Martha Taylor, who died in 1817. As is always the case with a good building, the time allotted to Edington passed all too quickly, and it was with regret that the party moved away towards Westbury. The church here, it

rose the hills of Monmouthshire and the hazy mountains of Wales,—a vast view, recalling in extent and character the panoramas from Edge Hill seen on the Banbury excursion. Marshfield was next visited. It is a long, straggling, little town, dating principally from the time of William and Mary. When once there, no doubt something may be found to sketch, either at the church, the almshouse, or in the street, but there is nothing of commanding interest. Very different is Cold Ashton, where the church and manor-house abound in useful scraps. The church was built by one Thomas Key, whose rebus, a T and a key, occurs frequently. The pulpit, which is recessed in the wall, has a crocketed canopy over it, and is approached by the same steps that used to lead to the rood-loft. It is figured in Dollman's book. The manor-house dates from early in the seventeenth century; it was probably built by a John Pipwell, who lived there in 1608, and who subsequently sold it to John Gunning, Mayor and Alderman of Bristol, who was alive in 1645. He built the elegant stone gateway in the front, and adorned it with his arms,—three culverins or guns. The house is now a farmhouse, and has been altered somewhat to suit its changed purpose, but a great deal of Jacobean woodwork is left, as well as some plaster ceilings, some of which bear exquisite designs in low relief. The view from the front of the house across the valley of St. Catherine's is very charming, and gives Cold Ashton an advantage over most contemporary houses, for they were usually built down in a hole with little prospect beyond their own beautiful gardens. From Cold Ashton,—Ashton Frigida, as it is called in fourteenth-century documents,—the way lay down the hilly road that winds along the wooded side of St. Catherine's valley to the church and court-house of that name. The house is said to have been built by Prior



must be confessed, did not tend to lessen the regret, for though interesting enough historically, it does not contain much of the food for which the excursionists crave, nor was there much time to do anything more than glance round it.

The last day, Friday, began with the house of Hamswell, said to be a corruption of St. Anne's Well, which is in an adjoining field. Its waters are esteemed very efficacious in diseases of the eyes. The house once belonged to the Whitingtons, and two heraldic creatures, said to be cats, grin out from the ivy over a garden door. There is not much architecture visible through the thick leaves of the ivy, but the front porch is clear. It is late in date, and is surmounted by a broken pediment, in which the parts of the pediment are so small as to be what physiologists call rudimentary organs. The garden is charmingly old-fashioned, the ground sloping away from the house in terraces down to a Dutch canal, along the straight sides of which runs a broad grass walk with an arbour at each end. A very short stay was made here, and then the party went on to Marshfield. Their way led them along the ridge of a hill with a wide view on either side; to the south-east lay the winding valley where St. Catherine's Court House lies hidden, to the west stretched a broad plain, right away to the Severn, beyond which

Cantlow in 1499, but it looks later; and the porch no doubt dates, as generally stated, from the early days of Charles I. It is unusually good in design. The angles are canted, and the canted side contains a niche on the ground-floor, and on the upper floor one light of a mullioned window that makes the circuit of the whole projection. The doorway is round-headed and flanked by columns, while the sides of the porch itself are pierced with an open arcade of three small arches carried on rounded stone balusters. The whole is crowned with an open balustrade. The house stands on the side of a hill, and is surrounded with well-kept gardens. The approach is by a broad gravel sweep and flights of grey, timeworn steps, through an ivy-covered arch on to the level space in front of the porch. The house faces sideways, and beyond it the garden continues in smooth lawns and long lofty terraces, with stone balustrades, backed by a high hedge of trimmed yew, through which a small arch gives a glimpse of further walks. When the present owners came here the place was dismantled and in decay, but through their energy and good taste it is now panelled in keeping with its style, and abounds in nice bits of woodwork, which, though not native to the place, are by this time thoroughly naturalised. The church,



which is reached by part of the same path that leads to the house, is a small structure, very carefully kept up. It has remains of some stained glass which has been worked up into the east window in a very clever way, and matched with new glass hardly distinguishable from the old. The east and west walls are lined with tiles of harmonious colours, and the whole effect is as pleasing as well may be.

This was the last place on the programme, and it formed a pleasant termination to a pleasant week. The party returned to Bath with the vision lingering in their minds of the ivy-clad house, the soft sward of the stately terraces, and the lichen-strewn steps, all embosomed in trees and removed

"Far from the madding crowd's ignoble strife,"

#### THE BRITISH ARCHÆOLOGICAL ASSOCIATION.

CONTINUING our report (see p. 282, *ante*) of the Liverpool Congress of this Association, at the evening meeting on Wednesday, the 17th inst., a paper was read on "Old Liverpool China," by Mr. W. H. Cope, F.S.A., in which the rise and progress of this local trade were detailed, and reference made to the examples in the Mayer collection, presented to the town in 1867.

A second paper followed on the "Manx and Cornish Languages, considered Historically," by the Rev. W. S. Lach-Szymra.

Thursday morning, the 18th, proved to be very wet, and the party was considerably thinned in consequence. Still, a goodly number proceeded by rail to Runcorn, whence carriages in readiness conveyed them to the ruins of Halton Castle, once a place of considerable strength, on an elevated hill of conical form, but now only a mass of broken walls remains, forming a conspicuous feature for many miles, the view from the castle hill being one of great extent and beauty.

A hasty perambulation of the walls was made through the rain, after which the history of the building was related by Messrs. Ed. M. Hance and M. Morton, while Mr. Loftus Brock described the architectural features, and particularly referred to the existence of some walls, now portion of the inner baillium, built of large blocks of stone without mortar, having an archway cut out of a single stone. These may probably be of Roman date. The site was occupied by the Ancient Britons and by the Romans, for whom it was an important outpost to guard the road to Warrington. It was a place of strength in Norman times, and finally ceased to exist at the conclusion of the civil wars, when it was dismantled.

Fine weather rewarded the visitors during the remainder of the day, and progress being resumed, at Warrington the local museum was inspected. There is here an interesting collection of antiquities, mostly acquired from local discoveries by the late Dr. Kendrick, an old Associate. Here are most of the articles discovered at Vilderspool, most probably the *Condote* of the Romans, including a curious mask of clay, called a tragic mask, although its appearance is very much at variance with its name. Here are also portions of a curious encaustic tile pavement, found not long since on the site of the old Friary church, at the junction of Friars' Gate with Friars' Green. A plan of the discoveries then made is also exhibited. The church had a long chancel, 75 ft. long by 24 ft., a very short nave, 27 ft. wide, divided from the former by a narrow space, on which was once, doubtless, one of the slender steeples so common to churches of Friars. There was also a singular transept at the north side, larger than the nave, since it was 64 ft. by 44 ft. wide, divided into a central nave, with two side-aisles. The building has entirely passed away, the ground plan being only preserved by the few relics exhibited and by a series of photographs.

After luncheon Sir J. A. Pictou pointed out two remarkable specimens of black and white houses in the Market Place and elsewhere, after which progress was made along the old Roman road, now occupied for the most part by the main highway to Winwick, where a justly celebrated church was thrown open for inspection. The building stands on high ground, and its tall tower and spire are visible for a considerable distance. It is built of yellow stone and is mainly of the fourteenth century, the arcades of the nave being of different designs on each side,

that on the north being the most elaborate. The chancel is of stately proportions, but very much restored. An inscription around the S.W. angle of the exterior records the death of St. Oswald and his connection with the parish. There is a stone covered with interlaced patterns of Saxon date now placed just clear of the east end of the church. It is the two arms of the upper part of an enormous cross. The patterns are of much beauty and interest. There are no portions of the shaft remaining.

A lengthy drive along the Roman road brought the party to Wigan, where, on arriving at the Municipal Buildings, an address of welcome was read by the Mayor, who afterwards invited the inspection of the two maces of the Corporation, one of which is a handsome work of the reign of Charles II. There are also a fine sword of state and other articles of interest, all of which, with the various charters, were laid out for the party.

The beautiful church of Wigan was visited, and a short stay made there, all too short for its examination. It is a fine building of the fifteenth century, with good details, thoroughly and well restored. The tower is on the north side of the north aisle opening out from the building. Short as the visit was, it seriously curtailed the length of the evening meeting at the Walker Art Gallery, where a paper was read on the Calder stones, by Mr. C. Romilly Allen, F.S.A. (Soot.), Rhind Lecturer.

Friday's proceedings were devoted to a survey of some of the works of Liverpool of today, and had more reference to the realisation of what is going on in the busy world of the town than to works of the past. Still, not a little of antiquarian lore was put before the members. The proceedings commenced by a survey of the site of old Liverpool Castle, which is now in a great measure occupied by the present St. George's Church. The happy idea of marking out the extent of the old building had occurred to Mr. E. W. Cox, and he accordingly carried it out by having the outline of the circular bastions of the walls indicated by white markings on the surface of the modern roadway and pavement, crossed and re-crossed as they are by tramways. The outline was seen to great advantage, and inspected not only by the members of the Congress, but by a great number of citizens, until the lines were obliterated by the ceaseless traffic.

St. Nicholas Church, which stands on the site of the old parish church, was inspected, and the tower and spire of open work, erected early in the century before the period of the Gothic revival, received its meed of praise. It was explained by Mr. Hance.

A visit was then paid to the enormous block of buildings, the Waterloo grain warehouses, where the party was met by the engineer, Mr. A. G. Lyter. The buildings have capacity for the storage of 68,000 tons, the floor space comprising eleven acres. The arrangements for the discharge of cargoes and the distribution of the grain were indicated and explained, and one of the enormous 100-ton cranes was put in motion. The hydraulic pumps are of great power and excellence.

A visit was next paid to the White Star steamer the *Britannic*, which had only arrived in the Alexandra Dock from New York on the previous evening. Here they were received by Captain Parsell, the commander, and Captain Hewett, the marine superintendent. Embarking on the Dock Board's tender, the *Hodgson*, a number of the docks were steamed through, and on being transferred to the *Vigilant* tender a visit was paid to the Cunard steamer, the *Umbria*, which lay in mid-water on the Mersey.

After inspecting this fine vessel, the *Vigilant* took the party to Eastham Ferry, where carriages being in readiness, the party proceeded to Carlett Park, the handsome modern residence of the Rev. W. E. Torr. There is a beautiful little chapel adjoining the mansion, of recent erection, from the design of Mr. Douglas, which was inspected, after which the carriages conveyed the party to Eastham Church. Here Mr. Torr read a paper on the history of the parish, and Mr. Loftus Brock described the architectural features of the building, attention being drawn to the tower and spire, which are of sturdy proportions of fourteenth-century date, and with the peculiarity of having gables at the angles of the spire instead of pinnacles. The old font was also pointed out as being of Saxon date, as is also that of the adjoining church at Bevington. Both have mouldings of early design, and there is no carving on either.

In the evening a *conversazione* was held in the Walker Art Galleries, all of which were thrown open to the visitors, as well as the Pictou Reading-room. The party was received by Sir J. A. Pictou and Miss Pictou, and by members of the Art Committee. A paper was read during the evening on "A Victorian Era in Romano-British History, supported by Coins and Inscriptions," by Mr. Thomas Morgan, F.S.A.

The sun shone brightly on Saturday when the inspection of the Mayer Collection at the Free Public Museum took place. This magnificent gift to the town was made by Mr. Mayer during his lifetime, in 1867, and it fills, with some additions made during recent years, the whole of a large galleried building. There is a good representative collection of ancient Egyptian, Babylonian, Assyrian, and Etruscan antiquities, arranged on the ground floor. The central galleries contain objects of Mediæval times, and those of later date are placed in the topmost gallery, the attention of the visitor being thus directed upwards from the works of earliest date. Mr. Mayer was for many years an active member of the Association, and the visit was not merely one for the gratification of the inspection, but as some sort of tribute to the memory of an old member. Among the earliest exhibits is a small collection of goldsmiths' work of great beauty, mostly Etruscan. There are also two silver vases from Canino; other notable objects are several diptychs of Roman and Byzantine date, a set of toys from the grave of a Roman child, from Cologne, a series of moulds for the production of Samian ware bowls, many examples of Greek and Roman glass, a fine Nola ware black dish, modelled in high relief, and a band of linen 17 ft. long, woven with an elaborate pattern. It came from a mummy, and was found at Memphis. Here is also the Farnese collection of Anglo-Saxon antiquities which Mr. Mayer fortunately purchased after it had been declined by the British Museum. It is admirably arranged, a separate compartment being provided to contain all the articles found in each grave. Among the articles is the celebrated Kingston Fibula, doubtless the finest Saxon brooch in existence. Its all but perfect condition and brightness render it difficult to realise that it is about 1350 years old. Not to speak of the ethnological portion, it may be sufficient to say that the third gallery contains a fine collection of Old English and German wares, encaustic tiles, a splendid display of old Wedgwood ware, Dresden china, and particularly of Old Liverpool pottery.

The members and visitors left the museum and proceeded, by the 11.45 train, to Burscough to inspect the ruins of the priory, and also the excavations now being made by the Earl of Derby to determine the extent of the church in which so many members of the Earl's ancestors were interred. Only two of the piers of a fourteenth-century tower remain, but the excavations have already revealed sufficient to show that the church consisted of an aisleless nave, chancel, and transepts, and that at some later date than the original building a chapel had been built in the angle of the north transept and nave, opening into both of these portions of the church by arches. The party was met by the Earl's agent, who exhibited an early chalice which had been found during the excavations, and Mr. Loftus Brock pointed out a great number of masons' marks which had been laid open to view by the removal of accumulated earth.

Progress was then made for the fine large church of Ormskirk, which was described by the Rector, Sir J. A. Pictou, and Mr. Brock, who referred to the local tradition that the large western tower was erected after the Dissolution to contain bells from Burscough. The tower is evidently built of masonry worked for some other purpose. The church is remarkable for having a tower and spire at the west end of the south aisle, in addition to the tower.

After luncheon at Ormskirk, a visit was paid to the beautiful old church at Halsbury, which was described by the Rev. Canon Blundell and Mr. Brock. It has a tower and spire of fourteenth-century date, the latter springing from an octagonal belfry, as at Ormskirk. The most remarkable feature in the church is its very fine chancel, a work of the close of the fourteenth century, the design, at least of the upper part, having fine window tracery almost Perpendicular in style. There are two elegant



turrets north and south of the chancel arch. The church has recently been admirably restored by Messrs. Paley & Austin.

After inspecting some curious ruins in Canon Blundell's grounds, of fourteenth-century date, a visit was paid to Lydiat Chapel, passing on the way the curious old half-timbered Hall of Lydiat and an old stone cross in the grounds of the new R.C. Church. The chapel, which is in ruins, consists of a pinnacled tower, a south porch, and a nave, there being no defined chancel. There are no windows on the north side. The building is of late fifteenth-century date, and in its state of ruin, with its partial covering of ivy, makes a pretty object in the landscape. The day was now drawing to its close, but the celebrated church of Setton being in the programme a visit was paid to it, although by doing so it was impossible to catch the train back in time to hold the closing evening meeting. The building possesses the finest screen work and carved pews to be found in the country. There is also a curious incised slab dated 1450, and the tower and spire form a portion of an earlier church. The church is dated 1511, but many of the windows are dated 1542 and later years, having been erected by various donors. None of the windows have cusplings to the tracery.

Monday last, the 22nd, was one of the extra days of the Congress, but it was, in its results, the most important of all, for it was devoted principally to determine the age of the walls of Chester, recently said to be no older than the time of James I. or Charles I. A large party proceeded from Liverpool by an early train to Chester, and on arriving there they paid a visit to the ancient Church of St. John, now sadly shorn of its fair proportions by the fall of its lofty tower, until within the last few years one of the most conspicuous objects in the city. The party were surprised to find that no attempt has been made to rebuild the tower, the ruins of the ground-story of which alone remain. On the contrary a curious gabled structure has been erected at the east end, which is in strange contrast with all the ancient work around it. The Rev. S. Cooper Scott conducted the visitors over the building and related its history. After inspecting the grand interior of the church, the ruins of the choir of the Collegiate Church were inspected, and afterwards the Chapter-house, which, like that of Llandaff Cathedral, is a square building on the south side. It is now devoted to the storage of a great many remarkable fragments taken from the ruins, among which none exceed in interest some sepulchral crosses of Saxon date. Proceeding to the Cathedral the Ven. Archdeacon Barber, in the absence of the Dean, received the party, and conducted them over the whole of the building, the window recently completed in the south transept, formerly St. Oswald's Church, being greatly admired.

A paper was subsequently read by Mr. Roach Smith, F.S.A., in which a recent theory with respect to the late date of the walls of the city was criticised, and the reasonableness of the Roman origin was insisted upon. It is known that the walls are built without either mortar or bonding courses of tiles, and analogous instances were pointed out, not only in England but in France. Mr. Loftus Brock followed, and referring to a series of excavations which have been made in various positions, he said that they revealed a uniformity of design wherever the ancient wall had been opened out. The wall consisted of huge blocks of red sandstone, in some cases 5 ft. in length, put together without mortar and presenting tooled patterns on the outer face. A chamfered plinth has been met with. The work is Roman in every position where the excavations have been made. An enormous quantity of carved and moulded stones have been found built into the Roman wall in Roman times. These dispose of two objections that have been made to the early date claimed for the wall,—the first being the absence of mortar. These stones are for some series of earlier building, but none of them show any trace of mortar. If there was none in these there was no need for mortar when put to their second use in the city wall. Again, a part of the latter has a moulded cornice, which has recently been stated to be no earlier than the time of James I. Its counterpart, however, of Roman date has been found built up in the centre of the city wall, showing that the former is Roman also. Before proceeding to a survey of the walls under Mr. Brock's guidance, a large

number of the city charters were inspected, Mr. Barwaker pointing out many curious items of information, his comments being supplemented by Mr. de Gray Birch, F.S.A., the importance of publishing the charters and the curious books of proceedings being strongly urged upon the Corporation. Proceeding to the excavation at the Kaleyard, the wall was found to be of massive blocks resting on a bed of puddled clay and stones, and having a chamfered plinth. Another excavation at the extreme end of the Cathedral close reveals similar construction, and this spot was chosen since the wall has only recently been freed from abutting buildings which have hidden it from soon after the Siege of Chester. Proceeding to the principal excavation, north of the Phoenix Tower, an enormous mass of cornices, &c., were laid out for inspection just as they had been taken out of the wall. The wall itself is of similar construction as already observed. The excavation on the Roodeys was then inspected. Instead of a single row of massive stones resting on a quicksand, as has been recently stated, the huge wall was found to go down to a considerable depth. The excavation has been carried down for 13 ft., and no bottom has been found. The excavation had to be suspended owing to the rising of water.

Sir James Picton, at the last point, summed up the evidence which had been laid before them by Mr. Jones, the City Surveyor, and Mr. Brock, and said that it was impossible to consider the remarkable work they had inspected as anything else than of Roman date. In doing so, he appeared to express the opinion of the meeting. A visit was then paid to a plain Roman arch, the jambs of which are embedded in masonry of Norman date, at the angle of the old castle keep. After which the Museum was visited, and its interesting collection of Roman antiquities inspected. The two Roman columns belonging to the large building found in Bridge-street, about fifteen years ago, were then seen. These remain *in situ*, and possess circular bases, shafts, and large carved capitals.

The party then returned to Liverpool, to proceed on Tuesday to Lancaster, and on Wednesday to Furness Abbey.

Thus has ended a pleasant and agreeable meeting, which has done good service if only in bringing additional information to bear upon the question with respect to the age of the walls of Chester.

#### NOTES FROM OXFORD.

THE University is, at the present time, increasing to a large extent the number of its academical buildings. With one or two exceptions these are all Renaissance in style, forming a pleasing contrast to the, in many places, unsatisfactory detail of the older work.

First may be mentioned the further additions to the Examination Schools, the present building being placed just east of Mr. Jackson's fine block in the High-street, and although forming a separate design, is joined to the larger building by a low wall. It will be used for the "unattached" students of the University, and contains a fine examination-room on the first floor, approached by a wide staircase, besides the usual rooms and offices. The High-street front has three picturesque gables; but perhaps the best "bit" is the charming oriel corbelled out at the south-east angle and looking into the quadrangle of the schools. When this is finished and has acquired the tone of the larger block, it will form, perhaps, the most striking group of modern work in the city.

At Trinity College the President's house, which, with the Chapel, forms the north side of the new quadrangle facing Broad-street, is being covered in. This, as well as the finished eastern block, is in what may be termed the "Kirby Hall" type of Renaissance, and very happy the result seems to be. The stonework of the east block has, like the schools, toned down in a very satisfactory manner, including the stone slates, which are so much seen on both old and new buildings, the old roofs having been chiefly covered with slates from Stonesfield in the neighbourhood, while in the new buildings slates from the Cotswolds have been used.

Brazenose College is also making further additions, the work now being carried out having a considerable frontage to the High-street just west of St. Mary's Church. This, which will be the Principal's House, will form the south side of a new quadrangle, of which

the west side has already been built. A picturesque Common Room, which reminds one of the "Tribunal" at Glastonbury, is being finished internally. At present the Principal's House is scarcely above ground, and demolitions are still going on to make room for the new work, which will form a fine addition to the High-street.

Hertford is rebuilding its hall on the west side of the quad facing the old schools, and this will be in a style harmonising with the present buildings, which date chiefly from the eighteenth century, with additions by Mr. Garbett in 1820.

So far all the work noticed is being carried out from Mr. Jackson's design.

Mr. Champneys's Nonconformist college, to be called Mansfield College, near the parks, and of which drawings were in this year's Academy, is now just above ground, portions of the chapel plinth being in position, but it will doubtless be some little time before the works are sufficiently advanced for the general effect to be properly realised.

Magdalen tower has two of its pinnacles enveloped in scaffolding, as they were in an unsafe condition and required rebuilding. This tower is probably one of the best bits of masonry in Oxford, and does not seem to have been affected by the weather and blackened, like most of the university buildings. The stone used in these, Headington, seems to have been badly chosen, and requires constant attention.

Of lately finished buildings it is hardly necessary to speak, but a day will be well spent amongst the new buildings of the University generally. The most important are Mr. T. G. Jackson's work at the Schools, Trinity, Corpus Christi (a picturesque block nearly opposite Merton Chapel), Brazenose, Lincoln, and Somerville Hall. In George-street is the High School for Boys, with an imposing entrance and picturesque louvre, and on the Banbury-road just beyond St. Giles's Church, the High School for Girls, in the Queen Anne style, and built of brick, both also by Mr. Jackson.

At the end of Broad-street is Mr. Champneys's Indian Institute, with its boldly-treated angle staircase tower. This is only partially completed, it is intended to extend to some considerable distance southward facing the Clarendon building.

The north side of St. John the Baptist's Quad, at Magdalen, is being completed by Messrs. Bodley & Garner, who have also designed the new entrance from High-street and the new quadrangle westward.

In Holywell-street will be found some further additions to New College, by Mr. Champneys, in the Perpendicular style, including a Fellows' house and students' rooms. There are some good windows on the south side facing the grounds.

The neighbourhood of Oxford has been extending rapidly, especially the northern districts, and the general design of the villas is more satisfactory than is generally found, an absence of unmeaning ornament being a noticeable feature in the work. On Headington Hill, so well known for its fine general view of the city, two or three large private residences have been and are being built.

On the left-hand side of the Cowley-road is a very simple but charming block of buildings, known as Nazareth House, and built by Mr. Tasker. It is in brick with stone dressings, having a chapel and sacristy standing on a sub-structure, and a block westward containing rooms for children and the "aged and infirm." The chapel and upper rooms are being approached by a stair in a semi-octagonal turret, which projects from the middle of the south front.

There is also at Cowley a new church of Sts. Mary and John, the north side of the nave being an effective piece of Early Decorated Gothic.

**Competition for a House of Parliament at Buenos Ayres.**—The Parliament of the Argentine Republic has voted the sum of eight million piastres (1,600,000*l.*) for a Parliament House. Invitations are to be issued shortly to the architects of all countries to compete for designs. The two best designs are to receive premiums of 40,000 piastres (8,000*l.*) and 10,000 piastres (2,000*l.*) respectively. The conditions of the competition are to be forwarded immediately to the representatives of the Argentine Republic abroad. Designs and plans must be deposited with the latter by April 1st next. Ominous date!



SIR J. A. PICTON, F.S.A., ON  
ARCHÆOLOGY AT LIVERPOOL.

We extract the following from the inaugural address given by Sir James Picton last week as President of the Liverpool Congress of the British Archaeological Association:—

When the proposal of an Archaeological Congress at Liverpool was first propounded, it was received in some quarters with a smile of incredulity,—almost of contempt. What, it was asked, could there be in common between a city of mushroom growth,—all whose energies are absorbed in ships and cotton, corn, sugar, timber, and tobacco,—with the stately remains and venerable traditions of ancient and Mediæval England?

The question is a natural one, but it is not difficult to answer. More than forty generations have passed since our Anglo-Saxon forefathers first planted the sapling which has borne such goodly fruit; and within this long interval there has been no period which has not been distinguished by events having an important bearing, both locally and nationally, on the progress, fashion, and development of the English character and English institutions. A large portion of these events have left visible memorials behind, and many others lie imbedded in our traditions, laws, manners, and customs, which it is the province of the archaeologist to bring out and illustrate.

In applying these remarks to Liverpool and its neighbourhood, I may observe that, although the visible remains of antiquity are not numerous, some of them are of great interest, and carry us back to periods beyond the reach of historical research. Our Congress is that of an association for the study of archaeology, which, I suppose, is distinguished from the study of paleontology by its limitation to what concerns the human race; but there are cases in which the two departments are continuous, or, rather, overlap each other, and where the events in the one cannot be understood without reference to the changes in the other. This, I think, will be found to be the case in the district with which we have to deal.

The sphere of our inquiries and observations during the present Congress will be found principally, though not exclusively, to lie in the vicinity of the estuary of the Mersey, which has been the vivifying source of the commercial progress and prosperity of the district; and here, at the outset, we are launched upon a field of inquiry which carries us back into the prehistoric ages, where, in the absence of documents, we have to grope our way in the dim twilight of tradition, and to draw our inferences from the visible phenomena presented to our observation. Dogmatism would here be out of place. We have to tread cautiously, and to frame our conclusions with modesty and reserve.

The Mersey has been from the earliest ages the dividing line between two very important districts of England. When the Romans first penetrated into the country, the northern bank was occupied by the Brigantes, and the southern by the Cornavii, two of the most powerful Celtic tribes. Under the Roman dominion, the Mersey separated the two provinces of Maxima Cæsariensis to the north, and Flavia Cæsariensis to the south. During the Saxon period, the northern merged into the province or sub-kingdom of Deira, whilst the southern side formed part of the province of Mercia. The estuary has ever since maintained its character, as indicated by its Saxon name, *Mere-sea*, "the boundary water."

Now, the first thing which strikes us in reference to the history of the estuary is the fact that all the other rivers along the west coast,—the Conway, the Voryd (or Clwyd), the Dee, the Ribble, the Lune,—have Celtic or Cymric names. The Roman geographers, Ptolemy and Antoninus, give these names in a Latinised form. The Mersey is not mentioned by them at all, and it has no Celtic name. Supposing the estuary had at that time existed in its present shape, such an omission would be unaccountable. We are, therefore, drawn to the conclusion that subsequent to, or during the latter part of, the Roman dominion, a serious change must have taken place in the physical features of the locality. These features themselves bear similar testimony. That there has been a considerable depression of the land along the coast is manifest upon very slight investigation. The submarine forests which extend below high-water mark on both sides of

the estuary, with stumps of trees *in situ*, many bearing marks of the axe; the recorded inroads of the sea upon the land which formerly stretched much further to the westward; the fact that a large portion of the peninsula has to be protected from submergence by a costly embankment; with other circumstances which cannot here be detailed, unite to prove that the level of the land has undergone material alterations.

It has hence been inferred that previous to this change the channel of the Mersey formed a freshwater lake, extending from Rumcorm Gap to Seacombe, fed by the waters of the Irwell and the Weaver, the overflow discharging itself through Wallasey Pool and across a wide extent of marshy land into the sea, not far from the present embouchure of the Dee. This seems to be confirmed by the place name, "Walla's-ey," or island, given to the rocky eminence where the church now stands. The depression of the coast, which admitted the sea into the lake, giving a new outlet, such portion of the marshes as were above the sea level would naturally sink up in the course of time, and become dry land.

To what race the earliest inhabitants of the district belonged we have no satisfactory evidence. Such relics as we possess seem to point to the pre-Celtic period, most probably to the neo-lithic age. In the year 1867 an ancient cemetery was discovered at Wavertree, near Olive Mount, in which were found a number of earthenware urns, containing ashes and burned bones. In 1859 a tumulus was opened at Winwick, between Newton and Warrington, from which similar urns were unearthed, containing burned bones and stone implements.

Another relic of the primeval period is the circle of unheaven stones, about four miles from Liverpool, called the "Calderstones," which, though not of large dimensions, is of a very interesting character. The circle stands at the intersecting point of the three townships of Wavertree, Woolton, and Allerton. The name *Calder* is evidently a corruption of Anglo-Saxon *Galdor*, sorcery, enchantment. The rough Teutonic warriors, whose superstitions were of a different character, would be awed by the mysterious Druidical rites associated with the stone circle, and would naturally ascribe them to witchcraft. These stones offer a very remarkable example of the cup and ring sculptures which have so much perplexed the antiquaries to account for and explain.\*

In the dawn of history, during the Celtic occupation, the soil was comparatively barren and the population sparse. There are no visible remains of this period, and the evidence of place names is very restricted. We find two cases of *Ince* (*Ynys*), island; *Bryn*, an eminence; *Llandican*; *Knock-torum*; *Dove* (*dhue*). It is probable that the Saxons on their arrival found the district, to a great extent, waste. Several circumstances seem to lead to this conclusion. The counties of Norfolk and Lancaster are nearly equal in area. When they were divided into hundreds and parishes, probably about the end of the ninth century, some proportionate reference must have been made to the number of inhabitants. Norfolk is divided into thirty-three hundreds and 666 parishes. Lancaster has only six hundreds and sixty-six original parishes.

Again, the frequent occurrence in the names of places of the terms *Moss*,—*Moor*,—*Wood*,—*Carr*,—indicate a large extent of waste or uncultivated land.

There is no record of the date of the Saxon or Angle conquest of this district, but it most probably occurred during the latter part of the sixth century, under Ella, King of the Northumbrians, who reigned from A.D. 560 to 588. The settlers gave to the localities the usual Saxon nomenclature. There are the *tons*, the *hams*, the *burys*, the *leys*, the *ings*, the *worhs*, &c. We have not many remains which can be traced to Anglo-Saxon times. Oswald, who reigned in Northumbria from A.D. 634 to 642, had a palace or stronghold at Winwick, near which he was defeated and slain by Penda, King of Mercia. This is commemorated by a Mediæval inscription on the church of Winwick. King Edward the Confessor possessed a castle at West Derby, about four miles from Liver-

pool, the site of which is still designated the Castle Hill.

The arrival of the Danes, and their settlement in this district on both sides of the estuary, had an important influence on the history of the locality, and forms a very interesting subject of inquiry. Little is said about it in our annals, but, by a careful comparison of the various sources of information, it is possible to put together a connected narrative of the circumstances. The Danes first appeared in English waters A.D. 787, when they harried the Southern coast. After a century of plunder they began to settle in the land, working their way westward and northward from the east coast. In 868, they had partially accomplished the conquest of Mercia, and established their head-quarters at Nottingham. In 877, the Danish fleet went west about, and plundered the coast of Wales. The tide of conquest then set in from the north by sea. The Hebrides, or Western Islands, the Isle of Man, and a considerable portion of the East and North of Ireland were captured by the Northmen. It is probable that the Danish settlements in the estuary of the Mersey date from this period,—about the latter end of the ninth century.

The Saxon Chronicle gives a very graphic narrative of the proceedings of the Danes in this district at that time. Under date A.D. 894, we read that "the Danes in East Anglia made a forced march across the country to reach their brethren in Cheshire." The record states that, having committed their wives, their ships, and their booty to the East Angles, they marched on the stretch day and night till they arrived at a western city in *Wirheal*, that is called *Chester* (*Lega-ceaster*). "There the army could not overtake them ere they arrived within the work. They beset the work without for two days, took all the cattle that was thereabout, slew the men whom they could overtake without the work, and all the corn they either burned or consumed with their horses every evening. That was about a twelvemonth since they first came hither over sea." There is a singular reminiscence of this expedition in the name of *Knutsford*, or *Cnutsford*, in Cheshire. This is evidently of Danish origin; yet it occurs in the midst of a purely Mercian or Anglian district. It lies, however, in the direct track followed by the Danish forces, and, doubtless, commemorates the fording of a small stream, probably in flood, by the army under the command of *Knut*, a Danish chief,—not, of course, the great King *Cnut*, or *Canute*. The next year, A.D. 895, the chronicle informs us, "the Danes went from *Wirheal* into North Wales, for they could not remain, because they were stripped both of the cattle and the corn they had acquired by plunder. They then went again out of North Wales with the booty they had acquired there, and marched over Northumberland and East Anglia, so that the king's army could not reach them till they came into Essex eastward."

About this time a very remarkable woman exercised an important influence in this part of the country. This was Ethelfleda, the "Lady of Mercia," daughter of King Alfred, the wife, and afterwards widow, of Ethelred, Eorldeorman of Mercia. The peninsula of Wirral, in Cheshire, and the district between Chester and Runcorn, on the Mersey, formed a sort of debatable battle-ground between the Saxons, the Danes, and the Welsh, as the Britons began now to be called. At the end of the ninth century, the Britons had been pretty well driven beyond the Dee. The operations of King Edward the elder were ably assisted by his sister Ethelfleda, who restored the city of Chester,—which had remained waste and desolate for three hundred years,—extending its area, and rebuilding the walls.

Ethelfleda, to secure her possessions, erected several fortresses: one at Runcorn on the Mersey; another at Thelwall, near Warrington, to defend the passages over the river; and one at Warburton, in the direct track of the Danish invaders.

The land then had peace for seventy years, but in A.D. 980 we read that the coast of Cheshire was plundered by the Danes; and in 997, for the last time, North Wales was ravaged by a piratical attack. During this period the Danish nomenclature and institutions were becoming established in the district, which constituted an isolated Danish colony, separated from the eastern, midland, and northern Danes by intermediate districts purely Saxon. It is

\* The late Professor Sir James Simpson, of Edinburgh, wrote, in 1865, an article on this subject which will be found in the Transactions of the Historical Society of Lancashire and Cheshire, vol. xvii. He carries back the origin of the Calderstones to a very remote antiquity, ascribing them to a Turanian race, which preceded the advent of the Celts or Cymry.



not difficult to trace their course. They must have arrived by sea and have left their mark in the names given to the salient points along the coast; Orme's Head, Carnarvonshire; Worms Head, Glamorgan; the islands of Bardsey, Ramsey, and Caldey; the Naze; Stackpole; the Skerries Rocks; the Point of Aire; Linney Head; with others. The Isle of Angles-ey and the Isle of Man were both originally called Mona, the modern name having been given to the former by the Danes to distinguish it as the island attached to the Angles. These invaders must have made the estuary of the Mersey their line of disembarkation, and thence have spread from each shore north and south. Evidence of this is manifest from various sources. Had they formed a single column from whatever point they had advanced, they would, like their predecessors the Saxons and Angles, have marked their course by the nomenclature of their settlements. This they have done, but the peculiarity in this case is that the place names are to a great extent duplicated, the same occurring on both sides of the Mersey. The *Thing-wall*,—the hill of counsel, the place of assembly, where the laws were made and promulgated and the armed forces mustered,—has its representatives both in West Derby and Wirral, where the eminences are still to be seen, crowned, one by a windmill the other by a modern mansion. The isolation of this Danish colony will be manifest on a comparison of the place names.

In South Lancashire the Danish names principally occur in the Hundred of West Derby. Going northward, in the Hundred of Leyland they are almost entirely wanting. Amounderness and Lonsdale are Danish; and, as we proceed into Westmoreland and Cumberland, the names of the parishes and villages are to a great extent Danish. Proceeding eastward from Cheshire, we find few or no Danish names in Staffordshire. In East Derbyshire, Nottinghamshire, and Leicestershire, which constituted the main portion of the ancient Danelagh, they are, as might be expected, predominant. The Danish names in Cheshire are principally found in the Wirral peninsula. Within these limits we find the suffix *by*, equivalent to the Saxon *ham*, such as Frankby, Pensby, Helsby, Formby, Whiby; the *dals*, Ainsdale, Skelmersdale, Birkdale; the inlets, Wallasey, Bewsey, Sankey, Aldersey; the eminences, Childwall, Heswall, &c. Many of these Danish names are common to both sides of the Mersey, as Kirkby, Meols, Ness, Roby or Raby, Crosby or Greasby. The Hundreds of West Derby in Lancashire and Wirral in Cheshire are of Danish origin. Derby (*Dyr-by*) is the home of the wild game. Wirral (*Wir-hæl*) is from *Wir*, the sea, and *Halla*, a slope, which describes the district sloping on one side to the Dee, and on the other to the Mersey. The term *Hale*, with a similar significance, is found in place names in Lancashire and elsewhere. The Saxon "Hundred" was converted into the Danish "Wapentake," so called from the mode of acknowledging allegiance to the "Thing," or Court, by touching the spear of the chief, fixed erect as a sign of authority. The Wapentake Courts in West Derby and Wirral were continued down to a recent period. The most visibly prominent of the Danish relics hereabouts is the Great Stone of Thor, about eight miles from Birkenhead and two miles from Thingwall, on an eminence overlooking the Dee. The name of the place, "Thor-stane-ton," corrupted into Thurstaston, is indicative of its origin. It is a huge, isolated rock of red sandstone rising in the middle of a natural amphitheatre of four or five acres, scarped into shape by human hands. It corresponds in every respect with the recorded customs of the heathen Danes in the festivities and sacrifices annually made in honour of the God of Thunder. It is probable, however, that it was never completed. The conversion of the Danes to Christianity followed close upon their settlement in the latter part of the ninth century. The peace of Wedmore, between King Alfred and Guthrum, the Danish monarch, by which the Danes undertook to renounce heathenism and enter the Christian Church, was agreed to in 880. Soon afterwards, we find Christian churches rising up, with Danish names attached, in close proximity to Saxon communities. Such are West Kirkby, and Kirkby-in-Walley (now Wallasey), not far distant from Woodchurch; and, in Lancashire, Kirkby and Ormskirk, not remote from the Saxon Church-town. I have perhaps extended to an unreasonable length

these Danish reminiscences; but they are not generally noticed, and they throw considerable light on the early history of the district.

Of the period between the Norman Conquest and the Reformation, there are many remaining relics of interest to the archaeologist. The soil not being fertile, and the inhabitants few in number, this neighbourhood cannot vie in its ancient remains with the eastern and southern counties; and the rapid rise of manufactures and commerce during the last century has led to the destruction of many.

At the parcelling out of the great Norman fiefs, the peninsula of Wirral was included in the grant to Hugh Lupus, and the Hundred of West Derby fell into the hands of Roger de Poitou, a member of the great family of Montgomerie. Domesday Book has no specific record under the head of "Lancaster-Scire." The southern part is included in "Cestre-Scire," under the heading, "Inter Ripam et Merham." The northern portion forms part of Yorkshire, but the record is incomplete. We obtain from this source a concise but graphic glimpse of the state of this locality about twenty years after the Conquest. We find that the extensive manor of Derbei (West Derby), with six *berewicks* or outlying hamlets, had belonged to King Edward the Confessor, and rendered in farm a rent of "xxvi pounds and ii shillings." Previous to the survey, the grant of Roger de Poitou had been forfeited to the crown, which retained the fief in its own hands. The Hundred of West Derby was granted in fee to forty-eight thanes, all of whom were under a custom to render two *ores* of twenty-four pennies each for each carucate of land. The thanes all bear Saxon names. They were under an obligation, like the *villains*, to maintain the king's houses, and the *halls* and *stands* in the wood. Whoever came not to these as he ought was fined 2s., and afterwards had to come to the work until it was finished. Each of them sent his mowers one day in August to cut the King's corn. If any free man committed theft, or *forestal*, or *heinfare*, he was fined 2s. According to the Domesday record, a considerable portion of this district was dense forest. In West Derby there was a wood six miles by three. In Latham, Melling, Lydiat, Crosby, and Woolton, there were woods from three to six miles long by one and a half to three miles wide. In Cheshire, such names as Woodchurch, Woodside, Birken-head, and Holt Hill, indicate the existence of a large extent of timber. According to the old rhyme,—

'From Birket Wood to Hilberre  
A squirrel might hop from tree to tree.'

Owing to the circumstances of the case and the sparse population, there was no necessity for the means of defence adopted in more fertile districts.

We have no Norman feudal castles in this part of the country. Of Lancaster Castle little remains besides the entrance gateway and the flanking towers. The castle of Liverpool was erected by King John in the early part of the thirteenth century. It consisted of a number of towers or bastions connected by curtain walls, surrounded by a deep fosse cut in the rock. It was demolished about 1721, and St. George's Church erected on the site. The outline of the area is marked by the surrounding streets.

Another fortified mansion called the Tower was erected or fortified by Sir John de Stanley, the founder of the Derby family, in Liverpool, on the margin of the estuary. This was removed in 1819, and its place is now occupied by Tower Buildings. A castle was also erected by King John, at Shotwick, on the Dee, to guard the passage into Wales, which has entirely disappeared.

The ecclesiastical remains in the neighbourhood are not remarkable for stateliness, but are interesting from their associations. The principal monastic establishment is the Priory of Birkenhead, founded about the year 1153 by Hamo de Massie, third Baron of Dunham, for sixteen monks of the Benedictine order. The remains are still standing, and will form an interesting visit during the Congress. Priors also existed in Lancashire at Burscough, Holland, and Windleahaw, but have disappeared, leaving only fragmentary remains.

The churches are numerous, and many of them worth attention. In Wirral, Bebington Church is an interesting admixture of Norman and late Gothic. Woodchurch is an admirable specimen of a village church, carefully maintained and lovingly preserved. West Kirkby,

Heswall, and Eastham will probably also be visited. On the Lancashire side there are several Mediaeval churches worthy of inspection. Sefton is a very complete example of late Gothic unaltered, with some good woodwork and a rood screen. Ormskirk is remarkable for its duplicate steeples, a tower and a spire side by side. Wigan has a fine old parish church with a grand tower. Childwall, Halsall, Aughton, Huyton, and Winwick will probably attract your attention. The latter has a good specimen of a chancel screen. At Lydiat will be seen an ecclesiastical structure, commenced just previous to the dissolution, and never completed.

Of noblemen's mansions, Knowsley Hall, the seat of the Stanleys, Earls of Derby, has many points about it worthy of notice. Old Lathom House, the seat of the heroic defence during the Civil Wars by Charlotte de la Tremouille, Countess of Derby, was taken down about 1724, and the present modern structure erected in its place. Croxteth, the mansion of the Molyneuxs, Earls of Sefton, was erected about the beginning of the eighteenth century. Haigh Hall, near Wigan, the seat of the Earl of Crawford and Balcarres, is a modern mansion, which contained a rich and valuable library of rare and curious works, recently dispersed.

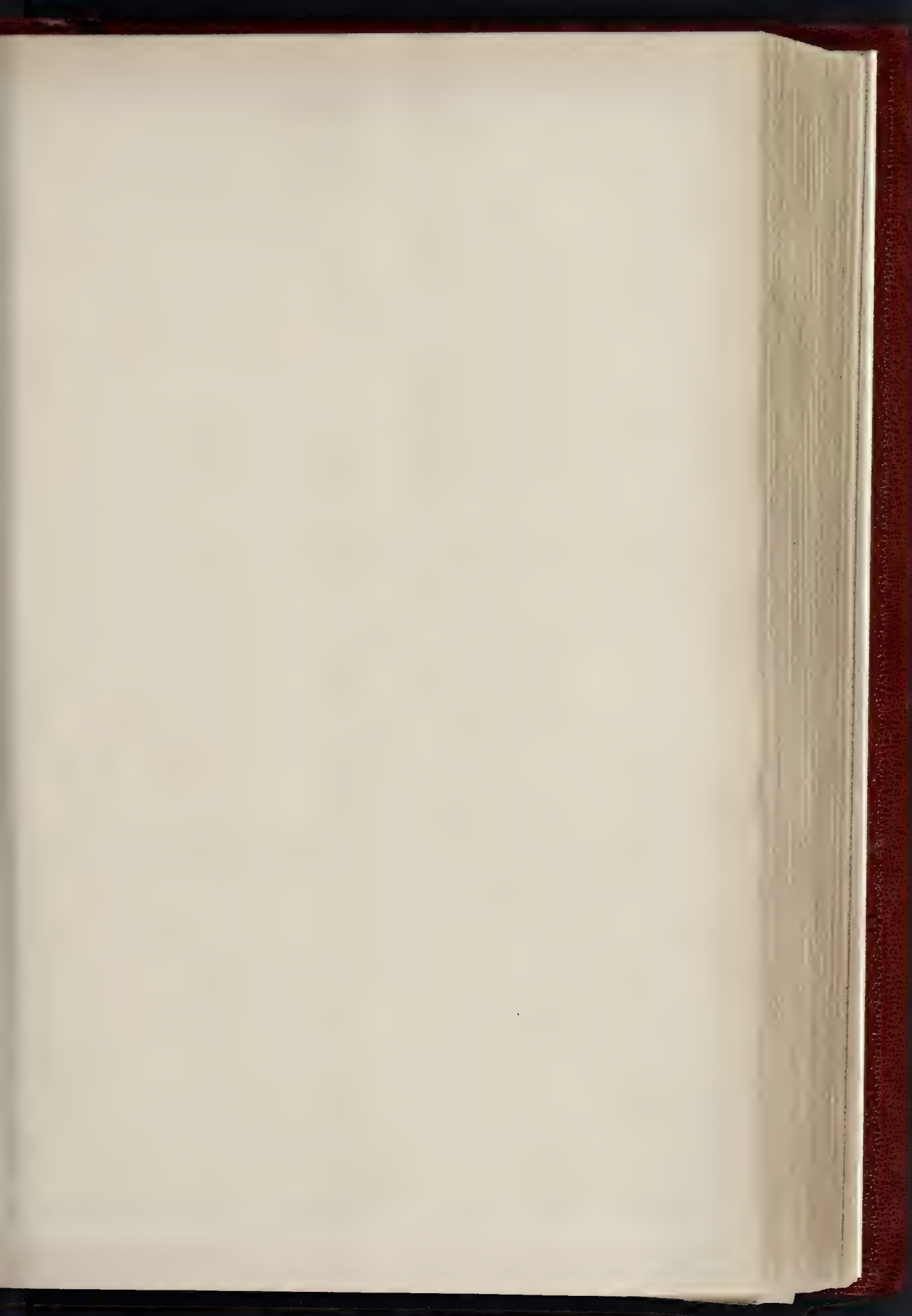
There are many manor houses scattered about this part of the country, which will well repay a visit. In Liverpool there formerly existed two: the Old Hall, within the precincts, which gave its name to Oldhall-street; and Bank Hall, outside the town, of which Bank Hall-street is a reminiscence. Both belonged to the family of Moore, anciently De la More. Bank Hall was a Mediaeval moated building, extending round three sides of a court, with a fine hall. It was removed about 1774. Speke Hall, the ancient seat of the Norreys family,—which will, I trust, be visited by the Congress,—is one of the purest specimens of half-timbered moated houses existing. The Mansion of the "Huthe," belonging to the Irelands, in the same neighbourhood, has little left except the entrance gateway and moat, with a few other fragments which show it to have been an extensive and noble building. Hale Hall, the seat of the Blackburnes, is a quaint brick building, and is worthy of a visit on account of the neat picturesque village attached. Lydiat Hall and Rufford Hall are good specimens of the black and white architecture. Poole Hall, in Wirral, is an interesting example of a Mediaeval mansion in stone. Hooton Hall is a modern building occupying the site of a fine old timbered mansion belonging to the elder branch of the Stanley family. The Hall, which has been unoccupied for some years, has many points worthy of inspection.

The City of Liverpool, to the outward eye, has little to interest the antiquary. There is not a building within its precincts two hundred years old. The scale on which it was originally set out was so circumscribed, its streets and ways were so narrow, and its buildings so mean, that, as commerce developed, the destruction of the whole or a large portion of the original structures became absolutely necessary. I have already mentioned the castle and the tower, both long since dismantled. The only other original building was the Parochial Chapel, now the Parish Church of St. Nicholas, erected in the fourteenth century. This was rebuilt in 1774, in the atrocious style of Batty Langley Gothic, leaving standing the tower and spire. In 1810 the spire unfortunately fell on a Sunday morning, burying in its ruins a large part of the congregation just assembled. In 1819, a new tower was erected, crowned with an open lantern, in a very satisfactory style of architecture.\*

The remainder of Sir James Picton's address mainly dealt with the Municipal History of Liverpool, of which we have spoken in reviewing his two interesting volumes of Memorials of Liverpool.

**Proposed Town-hall, Lewisham.**—A Town-hall is proposed to be erected at Lewisham, estimated cost 8,000l. We hear that Mr. Albert L. Guy has been appointed architect. The building will include shops, offices, large hall to seat 1,000, and two small halls, &c.

\* Imitated, however, from the lantern of the large and fine church at Newcastle, dedicated to the same saint.—Ed.



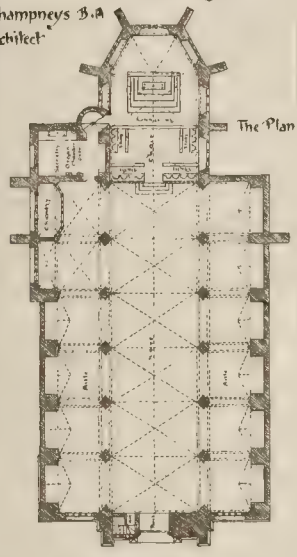




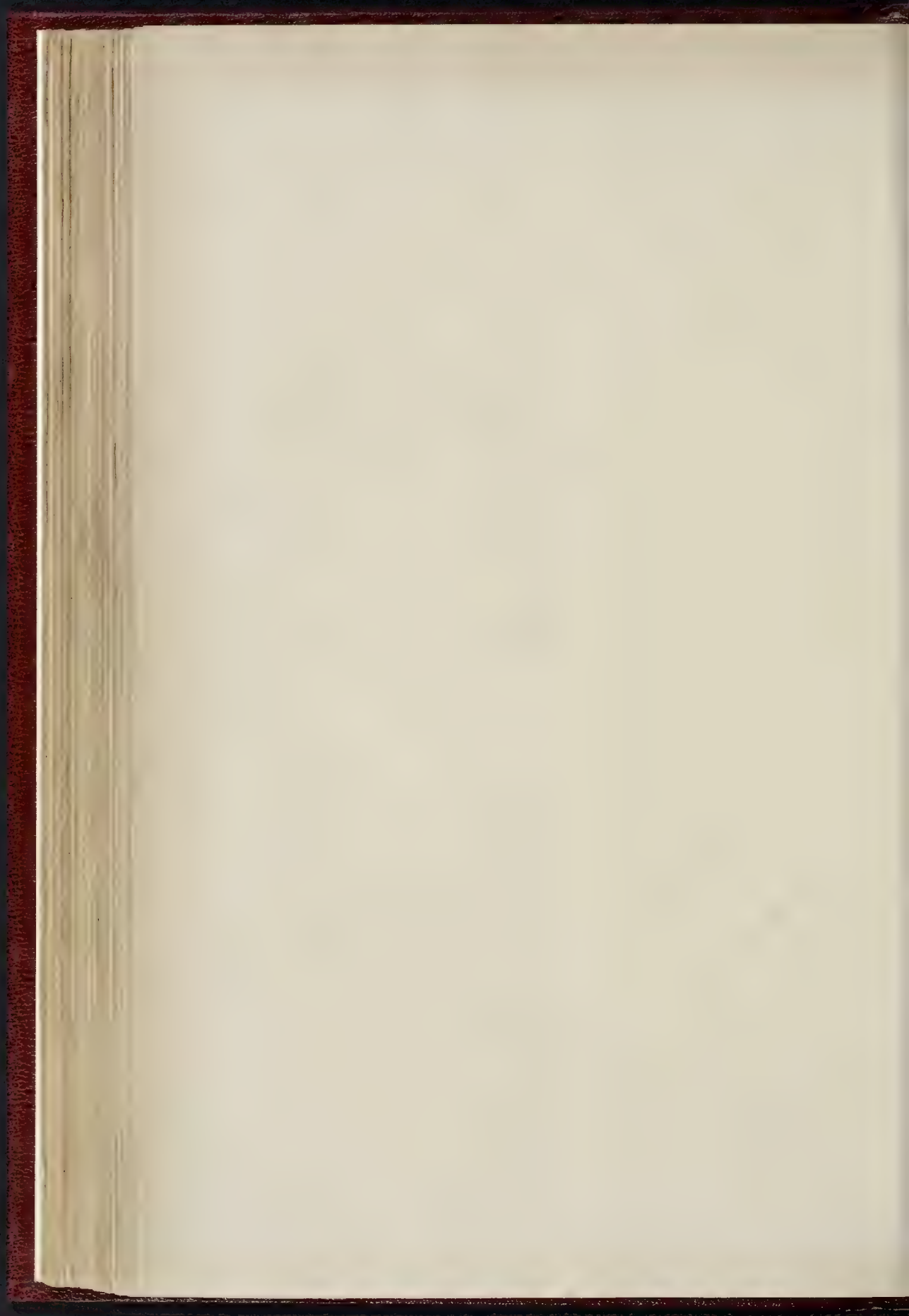


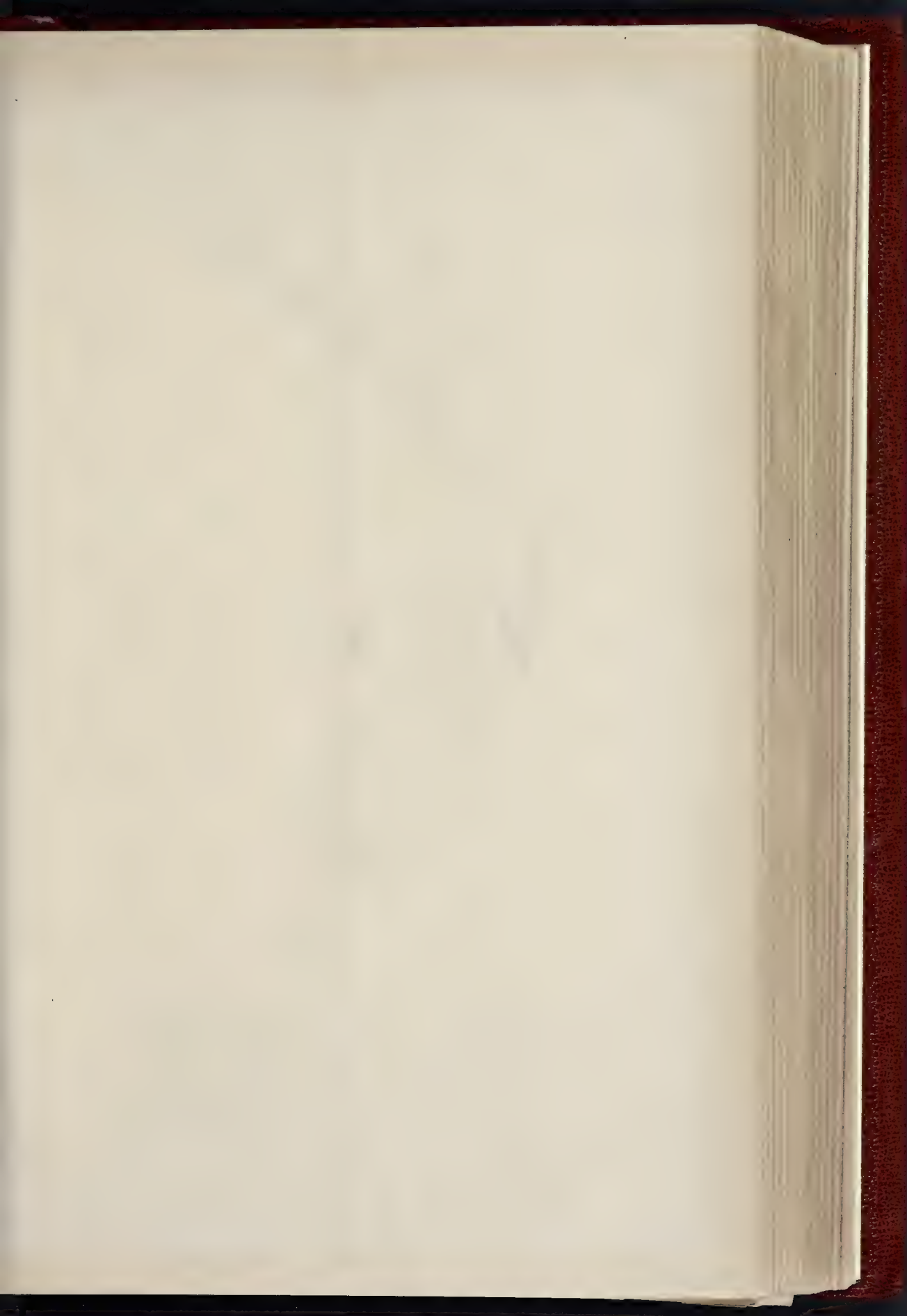
Saint Mary Star of the Sea  
Rastings

Basil Champneys B.A.  
Architect



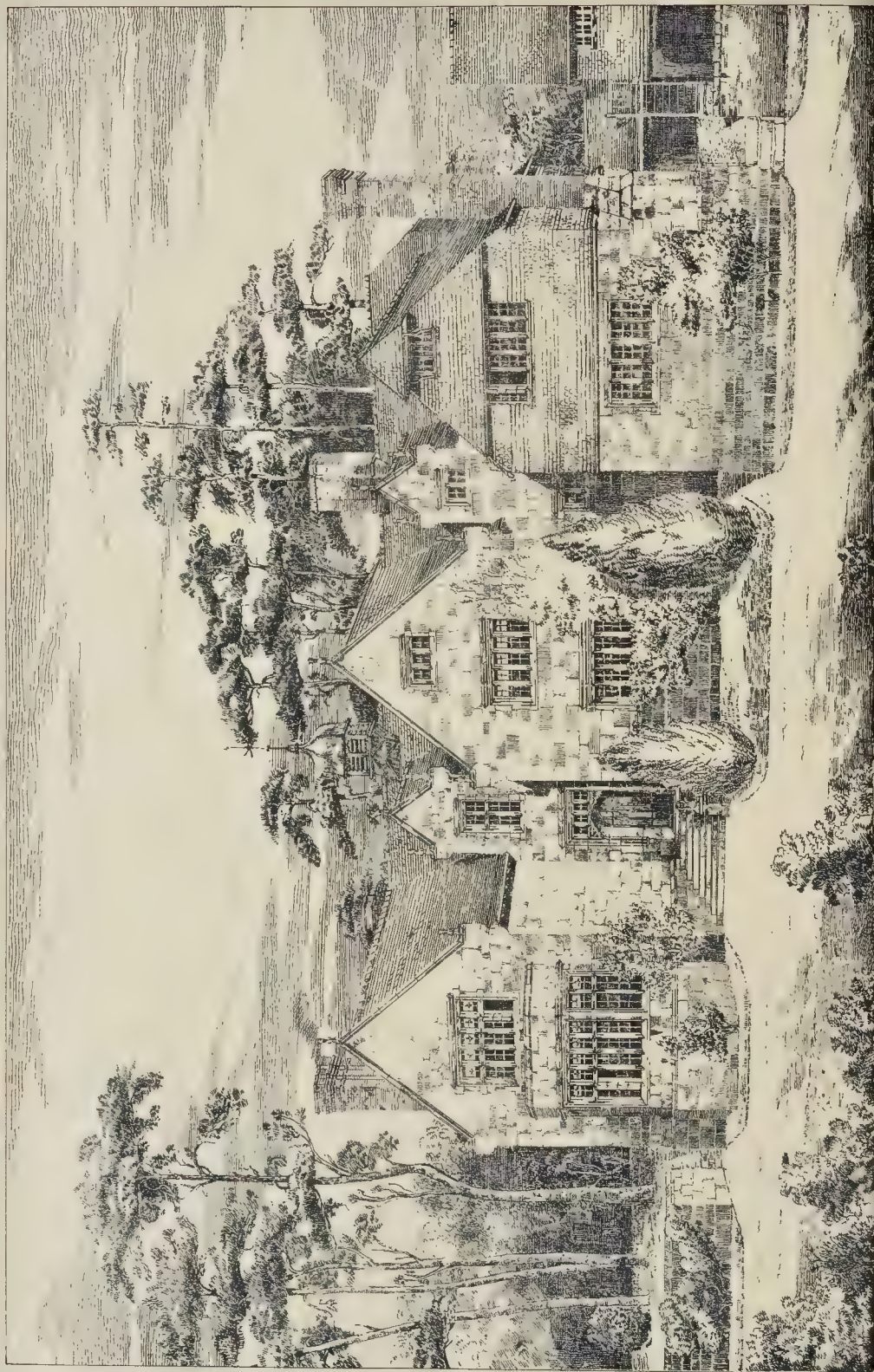


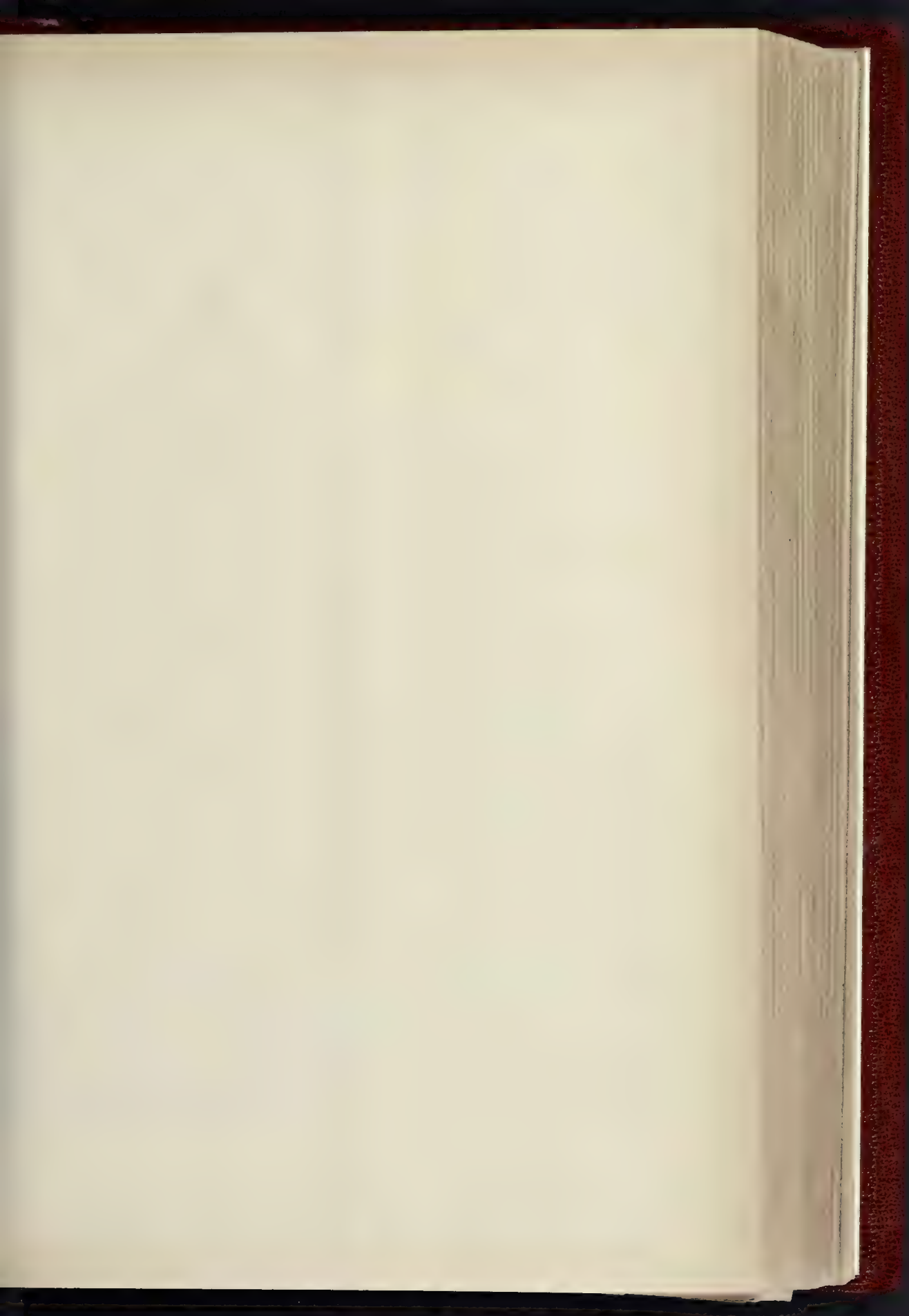






THE BUILDER, AUGUST 27, 1887.









CHURCH OF VAL DE GRACE, PRINCIPAL FACADE.

T. J. Phototype Co. 303, Strand, London.



The Photo Co., 25, Strand, London

LA CHAPELLE DES MORTS, AVIOTH, NEAR MONTMÉDY.





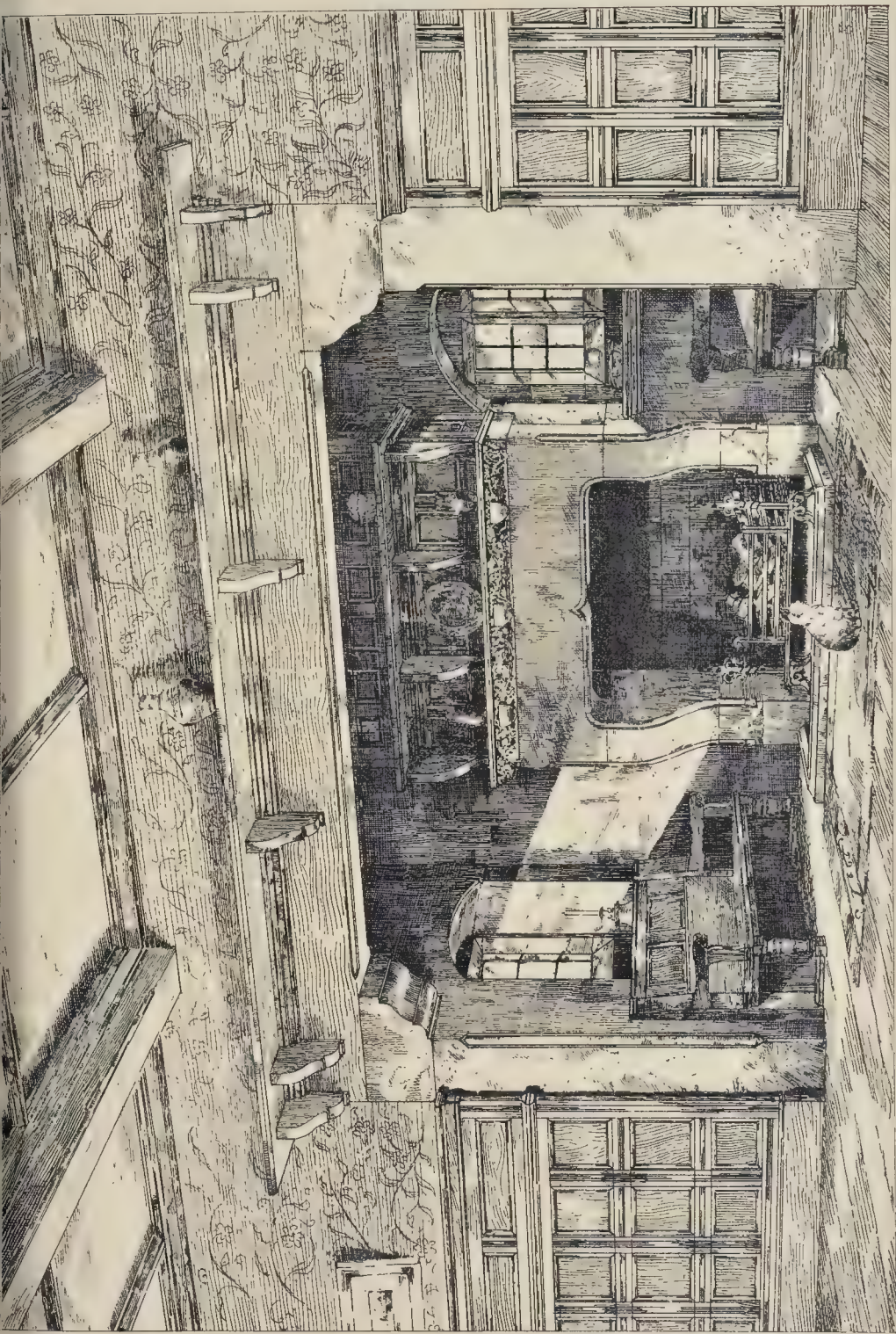


PHOTO LITHO. SURFACE & CO. 22, MARK LANE, LONDON, E.C.

CHIMNEY CORNER IN DINING ROOM, STONELANDS, SUSSEX.—MR. E. W. MOUNTFORD, F.R.I.B.A., ARCHITECT.







Stables, &c., Stonelands, Sussex.—Mr. E. W. Mountford, Architect.

Illustrations.

A CHAPELLE DES MORTS, AT AVIOTH, NEAR MONTMÉDY.

THIS exquisite work of the fourteenth century is to be found at Avioth, a small village in the north-west corner of the department of Meurthe-et-Moselle, four miles from Montmédy, and not far from Sedan. It is situated at the angle of the village church, and near the entrance gateway to the cemetery, and is built upon a kind of raised platform, a title over 3 ft. high from the ground, unfortunately not clearly shown in our illustration, but explained by the annexed plan at P.

originally existed to receive the alms that the bystanders might give for the benefit of souls in purgatory. The *raison d'être* of the raised platform would be clearly seen on the Jour des Morts, when an important mass is celebrated, and the priest, after it is over, descends upon the platform, and there exhorts those assembled to pray for the dead, and finally gives his benediction. The clearstory was originally glazed in order probably to protect the lamp which undoubtedly hung from the apex of the vault, and was kept burning throughout the night, and probably used also at burial celebrations in the cemetery. Thus, this chapel may be regarded as an elaborate "lanterne des morts," so many

protect the living from the fear of ghosts and evil spirits, and to remind them to pray for the dead.

From this simple column it is not difficult to imagine how the idea became elaborated and developed until it attained the beauty and richness of the example at Avioth.

THE CHURCH OF VAL DE GRACE, PARIS.

WE give a view this week of this fine Renaissance church, which was one of the objects specially visited by the members attending the last Congress of French Architects in June of this year. The church was commenced in 1645, from the designs of François Mansard and Lemercier, and (its construction having been interrupted by political troubles), was completed twenty years under Lemuet, Gabriel Ledru, and Duval. The abbey with which it was connected is now transformed into a military hospital. Some further particulars in regard to it will be found in our report of the Congress. (See *Builder*, June 18 of this year, page 898.)

CHURCH OF ST. MARY STAR OF THE SEA, HASTINGS.

THIS church was founded by Mr. Coventry Patmore, by a donation of 5,000*l.*, and built by the Pious Society of Missions.

The material used in the walls is beach pebbles, with irregular layers of tiles. The dressings are of Bath stone. The church is situated in the upper portion of the High-street of old Hastings, in which the west end stands, and as the ground falls considerably towards the east, there are extensive crypts beneath, a portion of which was used as a temporary church during the erection of the superstructure, and is now converted into classrooms. The cost of the whole church was about 11,000*l.*

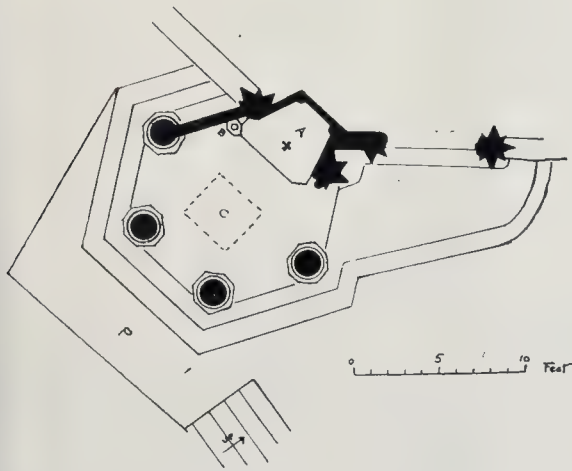
Mr. Basil Champneys is the architect, and Messrs. Bell & Sons, of Saffron Walden, were the contractors.

STONELANDS, SUSSEX.

THIS house, now nearly completed, is the property of Mr. F. Frank, and stands upon the side of a hill, about a mile from the village of West Hoathly, Sussex. Sheltered on the north and east by pine trees, it commands beautiful and extensive views to the south and west.

The outer walls are built entirely of sandstone, quarried upon the estate, and have a 2 in. cavity in the centre and an inner lining of brick. The roofs are covered with Broseley tiles, as is also a portion of the upper story.

Chapelle des Morts  
at Avioth. France



The lower part of the chapel is quite open, and has the altar enclosed in the recess (A), so arranged that, while it shelters the officiating priest from the violence of the wind and rain, it, nevertheless, allows him to be seen by every person assembled. On the left-hand side of the altar is a small corbelled piscina (B), and in the pavement of the centre of the chapel may yet be seen the position (C) occupied by a stone coffer of considerable dimensions, which

examples of which exist in the centre and west of France. Originally, they consisted simply of an isolated column, in the centre of which a lamp was raised some height, and was allowed to show its light for miles round by unglazed openings through the column. They were placed at the entrance of abbeys, monasteries, cemeteries, leper hospitals, charnel houses, &c., but almost invariably near some frequented main road; their use being to



The woodwork in the dining-room, shown in the illustration, is entirely of oak, and the other rooms are of corresponding character.

The wrought ironwork has been made by Messrs. Alfred Newman & Co., and the window casements are by Messrs. Wenham & Waters, of Croydon.

The whole of the contract, including entrance lodge, stables, farm buildings, &c., has been carried out by Mr. James Longley, of Crawley, from the designs and under the superintendence of Mr. Ed. W. Mountford, of Buckingham-street, Strand.

The drawings were in this year's exhibition of the Royal Academy.

#### FURTHER NOTES OF THE SALISBURY MEETING OF THE ROYAL ARCHÆOLOGICAL INSTITUTE.

We have already devoted so much space to the proceedings of this meeting\* that we must now bring our report to a close by some brief notes on such of the buildings and places visited as have not been previously referred to in detail.

First, then, with regard to Stonehenge. General Pitt-Rivers, Mr. Arthur Evans, the Rev. F. Duke, the Rev. Dr. Cox, and the Rev. Prebendary Scarth all took part in discussing the probable date of the circle, but nothing new was advanced. General Pitt-Rivers and Mr. Duke argued in favour of the high antiquity of the structure, the latter gentleman incidentally broaching a theory of his own as to the origin of the word "sarsen," which he did not believe was a corruption of "Saracen," as commonly supposed. Looking at the fine sandstone of which some of these sarsen stones were formed, he believed that their name was derived from the noun *sars* (to be found in old dictionaries, such as Bailey's), which meant a fine sieve, the verb "to sarsen" meaning to sift through a fine sieve. The fineness of the sand of which the stones were composed might have led to the notion, on the part of uneducated natives, that the stones were composed of sand which had been "sarsed." From this it would be an easy transition to "sarsed-un" and ultimately to "sarsen." Mr. Arthur Evans agreed with General Pitt-Rivers that Stonehenge was of pre-Roman date, and spoke of certain resemblances between necklaces and other ornaments found in the barrows round Stonehenge and similar articles discovered at Bologna and other places on the Continent. Dr. Cox favoured the theory that the structure was of post-Roman date, and that it was erected in the fourth century A.D. as a trophy of victory gained by the British tribes in driving away the Romans.

Amesbury [or Ambresbury] Church, visited on the same day, is a very interesting building, which was described by the Rev. Precentor Venables. It is unusually lofty for an aisleless Norman church. The general character of the chancel, transepts, and crossing is Early English, the chancel being much the stately part of the church, which was monastic. The south-western pier of the crossing affords evidence of having been strengthened in consequence of some structural failure. There is a very fine Norman corbel-table. In the chancel are two fine Decorated windows, with reticulated tracery.

Mr. Micklethwaite, in the course of some remarks on the church, adduced reasons for supposing that there was originally a Saxon church on the site, and he called attention to the absence of the screen, which, he stated, was removed when the church was "restored," some years ago, when some one conceived the idea that the screen ought to be removed. Fortunately, it had been carefully preserved in its entirety by Mr. Edwards, a local gentleman, who had, indeed, built a museum for its preservation. It was in very good condition. Mr. Edwards authorised him to say that whenever the vicar and churchwardens saw fit to re-erect it in the church it was at their service.

Mr. Greville Chester said that it was his idea that, according to the Rubric of the Church of England, it was illegal for a chancel to be without a screen. This view was endorsed by other gentlemen, but as the discussion appeared likely to lead to warm controversy it was not pursued. The church was stated to have been restored by Mr. Butterfield. Mr. William Cove

Kemm, of Amesbury, who was present on the occasion of the visit of the Archaeological Institute, has kindly forwarded us an interesting paper\* read by him, in 1876, at the Salisbury meeting of the Wiltshire Archaeological and Natural History Society. To this paper we may refer our readers for a detailed history of the church.

Lake House, visited on the way from Stonehenge, by permission of the owner and resident, the Rev. E. Duke, is a very pleasantly-situated and picturesque residence, of late Elizabethan or early Jacobean date. It is of moderate size, and very suggestive of Shaw House, near Newbury.

Of buildings in Salisbury itself, visited by the Institute, we have already described St. Thomas's Church. We have also to mention in this connexion the interesting Poultry Cross (partially restored some years ago); the "Hall of John Halle," now serving as the principal show-room of a china and glass merchant on the canal, but formerly the hall of a merchant's residence, dating from about 1470. It was very conservatively restored by the elder Pugin, and contains a specimen of his handiwork as a painter. (Referring to Pugin, we may mention that while on one of their carriage excursions near Salisbury the visitors passed a house of very pronounced Gothic character which was said to have been built by Pugin as a residence for himself. It is now called "The Grange"; whether mooted or not we could not learn, but some member of the party said that as built by Pugin it was entered by a draw-bridge). Another interesting building in Salisbury which was visited by the party is what was formerly known as Audley House, an interesting old mansion partly dating from the second half of the fifteenth century. Within the last two or three years it has been acquired for the purpose of a "Church House" for the diocese of Salisbury, and has been very conservatively restored by Messrs. Crickmay & Son. It is admirably adapted for its new purpose, several of its fine rooms being well suited for council meetings, committees, &c., while other rooms serve as offices, libraries, secretaries' rooms, &c.

Downton Church, near Salisbury, was inspected under the guidance of Mr. R. P. Pullan and the Rev. W. D. Hill, the vicar. Mr. Hill, in the course of his paper, said that the size and dignity of the church, and especially of the chancel, were not due to connexion with any monastic establishment. The bishops of Winchester were lords of the manor in Saxon times, and to their care and interest we were probably indebted for the building of the church. In 1382 the church was appropriated to "the Bishop's table" for the maintenance of William of Wykeham's scholars, and in 1385 William of Wykeham (with the licence of the Crown and of Pope Urban VI.) appropriated it to his new College of St. Mary-Winton at Winchester, to which it continues to belong. The church presents three distinct periods of building. The oldest is that of the western part of the nave, in which we have three bays with late Norman arcade and pointed arches. The capitals on the north side are original; those on the south side are mainly modern imitations, in cement, of the old work. Two lofty bays of Transitional character form the eastern extension of the nave. The eastern tower arch is a fine specimen of Early English work, with clustered shafts and rich mouldings. The chancel is of the Decorated period.

While at Downton the party visited the very curious earthworks known as the "Moot," which were explained by General Pitt-Rivers and the occupier, Mr. E. P. Square, F.S.I. They are now very thickly planted with trees, but an old sketch or print is extant, dating from about 180 years ago, showing them devoid of any trees whatever. The curiously graded oval enclosure, forming a sort of elongated amphitheatre, was, it is believed, formerly the place of assembly or moot. During this day's drives, Longford Castle (described in a paper by Mr. J. A. Gutch which we printed a fortnight ago) and Trafalgar, the seat of Earl Nelson, were taken en route, for the purpose of external inspection.

Wardour Castle, visited on the 6th inst., by permission of Lord Arundell of Wardour, is a late specimen of castellated architecture, and the keep is unusually lofty. It received some Renaissance embellishments at the hands of Sir

Matthew Arundell, and some of these, especially, an internal doorway, are in picturesque contrast with the more massive Gothic work above and around them. The old castle suffered much during the Civil Wars. Subsequently the visitors proceeded to the modern house known as Wardour Castle, which was designed by Paine about a century ago. Much of the detail internally is suggestive of the work of the Brothers Adam. Lord Arundell's valuable collection of pictures and *objets d'art* was thrown open to the inspection of the visitors.

Tisbury Church, which was subsequently visited, is a building of some architectural interest. The upper stage of the tower is somewhat curious, and was built about 1200, years ago to replace the spire, which had been destroyed by lightning. Some of the visitors thought it ugly, but Mr. Micklethwaite expressed the hope it would be suffered to remain, as it was a most ingenious piece of construction, lightly built of stone; it was mainly supported by an ingenious framework of timber to relieve the lower stage of the tower (which had been badly crushed by the fall of the spire) from its weight.

The visitors next proceeded to Wilton House, by kind permission of the Earl of Pembroke. The south front was rebuilt by Inigo Jones, and at the same time (according to Mr. Nightingale) the wings of the east side were brought somewhat into harmony with it. The central portion of the east front is very suggestive of the old Examination Schools at Oxford. The so-called "Holbein's Porch" in the gardens, and the graceful Palladian bridge are among the other architectural attractions of the place. The fine collection of pictures and antique sculpture in the house were inspected with much interest.

Wilton Church, hard by, was visited as a notable specimen of a modern church, built mainly on the lines of the Italian Basilican churches. It was built some thirty years ago, at the cost of the first Lord Herbert of Lea, the architects being Messrs. Wyatt & Brandon. It has a lofty campanile, and contains a great deal of old glass and mosaic work brought from Italy. Canon Olivier read a paper fully describing the church.

Heytesbury and Knoke Churches, both of which have been restored by Mr. Butterfield, and Heytesbury House, were also visited.

The last day's excursion was to Rushmore, where the visitors inspected General Pitt-Rivers's excavations at Woodcutts, a Romano-British village, where discoveries of considerable interest have been made.

#### FLAMSTEAD CHURCH, HERTS.

The following is the greater portion of a paper on this church, read by Mr. S. Flint, Clarkson, at the recent meeting of the St. Albans Architectural and Archaeological Society:—

"Tottenhoe stone and flint were used in the original work of the church. Tottenhoe, in Beds, is situated under the slopes from the west side of the table-land, on the eastern edge of which Flamstead is placed. Rough-cast has been applied with much liberality to the external surfaces of the building, covering up both wrought stone work and flint work. Dampness, decay of surfaces, and odd taste are probably responsible for this in about equal proportions. Ashlared buttresses, stone dressings, to openings, and split flint work remain visible in the vestry building. The chancel has wrought stone work to windows and buttresses, and split flint wall surfaces, having been restored about 1890 by the University College, Oxford; the rectory was given to the College by the will of the Rev. Robert Gunsey, incumbent of the church, who died in 1618. The six arches in each of the nave arcades are all carried on octagonal piers. The scale is unusually small, the distance from centre to centre of pier being only 10 ft., and the height between cap and base 5 ft. 10 in. The tower at the west end is just upon 23 ft. square externally at the top. The chancel is 16 ft. 3 in. wide, and of fair length. A tall perpendicular wood-screen, solid for about 4 ft. of its height, and open above, with nine divisions in its width, runs across on the nave side of the chancel arch. Sedilia, piscina, and an external doorway are found in the south wall. In the north wall a door leads into a vestry. At a little above mid height in the lofty room the stone corbels remain which once carried a floor. The sight,

\* See pp. 200, 228, 266, ante.

\* "Notes on Amesbury Church and Abbey."  
† See p. 233, ante.



om explains what looks curious in the arrangement of the windows as seen from outside. A muniment room is found not rarely in a vestry in this way. The history of the church is not clear at this moment in all respects, but has been a good deal altered, and rough and brick patchings now hide some evidences of date. There are, as far as we know, no contemporary documents, with allusion to the church, on which conclusions or guesses might rest. The profiles of the abacus and cap and of the hood-mould of the arch in the east wall of the tower show that there was a Norman tower, and therefore a church of early date. Possibly a good deal of the present tower is of the Norman period, with its openings and added buttresses; how far in Norman we cannot see through the east, &c. A year cannot be named for work, as the archway is filled in with masonry. In the centre of this filling-in is a small archway, only 7 ft. 9 in. between the piers, of Geometrical date, say about 1260. Crumbling of the old tower may have begun in the fourteenth century, and the larger arch may have been filled in as a precaution against further failure. The tower has been helped at various times since by the brick buttresses and iron ties. The nave dates must be dated at about 1195; they are beyond the period of Transition. The most worthy feature in the arcades is the foliage of the caps and responds; the ten caps of piers and four responds are all carved. They are used in design throughout, some of the signs being of much merit. The leaves are of a conventional trefoiled leaves, spreading over the bell of the capitals at different angles, losing some of the stiffness and most of the adherence to the bell which characterise foliage of the Transition, as far as any rate about the year 1175; but the leaves are still hard and somewhat stiff, and are not fully leaved and downward-bending as the leaves in the Lancet. The Lancet window remaining in the north-west corner of the chancel would lead us to believe that a Lancet chancel,—it may be shorter than the present chancel,—was added in to the Lancet nave. The arch now opening from the nave into the tower has been attributed as of Geometrical date (about 1260). The windows, sedilia, and piscina in the chancel have been restored, but they no doubt represent in the main the original work of that part of the building and the chancel arch is the original work, that is, Curvilinear work about 1330. The chancel was either added to or remodelled at that time. The chancel roof may well belong to the same date. It is a high-pitched roof in three bays, with purlins, collars, collar braces, and wind braces, all plain in the extreme. The present steeple is a later addition. A somewhat slightly-sloped set-off may be seen above the wind-brace arches. The upper wall is thinner than the earlier work below. The roof of the tower is a plain low-pitched roof, with strong rafters plainly chamfered only. The carving of the corbels under the wall-pieces is not numerous; some have angels bearing shields, and some grotesques. The principals centre in proper way with the columns of the arcade; but in the aisle roofs the principals disregard the arcade in the most determined way; the aisle roofs are also plain, and have plastered ceilings. The wooden screen between the nave and the chancel is well moulded and fairly carved. There are remains of the old colouring on the division on the north of the central opening, graining and varnish have not been spared in the rest. There are a few old benches in the easternmost bay of the nave, of a simple kind, showing for injuries, neglect, and reparations, the church is much as it was in the sixteenth century; no important structural changes have been made since then. The communion-rail is heavy oak one, supported on turned balusters and twisted, apparently early eighteenth century work. The pulpit was moved to its present position against the north-east respond of the nave, and the (characterless) tall pews were ordered 1 ft. 6 in. about 1859, under the care of the Rev. W. H. Hinde, a benefactor to the parish, who held the living from March, 1858, to June, 1876. The second pier from the east on the north side was roughly dated when the pulpit was placed against it (in the position from which Mr. Hinde moved it), and it has been ingeniously suggested that the signs of rough usage on the opposite pier (south side of nave) may be due to the pulpit being tried there before being put

on the north side. There was a narrow gallery at the west end, which was removed about six years ago; its erection and its removal did little damage, but the erection of the canopy, now removed, over the large pew at the south-east corner of the nave, caused serious damage to the stone respond of the arcade. Making all explanations and allowances, it must still be noted that the building is not in good order; that, in fact, it should be a pleasing example in the eyes of the sentimentalists who delight in unarrested decay and slovenly hacking and patching. The bells are six in number. Five of them have the inscription, "Chandler made me, 1664;" the sixth, "John Waylett, London, fecit. 1729." "Chandler made me" seems to be a favourite inscription of these founders. Their foundry was at Drayton Parslow, Bucks, about midway between Leighton Buzzard and Winslow; and from it were supplied a good many bells for this neighbourhood when the rush of business came at the Restoration. The earliest bell from the foundry now in Hertis is dated 1651; this would be by Anthony, the second of the Chandlers, born 1622. The competition of the great London foundries led to this one being given up in 1723. When Edward Hall, who thus gave up the struggle, died in 1735, he was described in the parish registers as "a poor bell founder." Mr. North, in his "Church Bells of Hertfordshire," suggests that the "four bells and a Sance Bell, in the steeple" in 1552, were probably recast by Chandler in 1664 into the five bells now existing. The font is of Tottenhoe stone, and is said to be the original font, shaped afresh as we see it between thirty and forty years ago. There are two recumbent effigies under the third arch from the chancel on the north side of the nave. A pinnacle runs down on each side, and a cusped crocketed canopy with embattled cornice rises up behind the head of each of the figures; all being nicely designed and well executed. The figures have loose robes, feet supported by dogs, and a scroll runs from dog to dog. I hope the Rev. H. Fowler's careful study of this monument may tend to some identification of the persons commemorated. Its date is evidently about the end of the fourteenth century, when the manor was held by the Beauchamps. The brass on the chancel floor in memory of John Oudeby, some time rector of this church, who died 7th March, 1414, has a good figure under a canopy. The Beauchamps were lords of the manor of Flamstead from 1316 to 1471; and the rectory and right of patronage were till 1487 vested in the lords of the manor. Oudeby was, it is stated on the inscription, Canon in the Collegiate Church of St. Mary in Warwick, in which the Beauchamps took so much interest. The choir of that church is said to have been built by the second Thomas Beauchamp about 1392, and Oudeby, no doubt, did duty in that choir. Of the wonderful Beauchamp chapel he, of course, knew nothing; for the Richard Beauchamp who devised the building of that chapel, and fixed the spot for it during his lifetime, died at Rouen in April, 1439. The foundation was laid in 1443; it was completed in 1464, and consecrated in 1475. The generous interest in buildings, "well, fair and goodly built," of these great nobles seems, however, to have expended itself without Flamstead gaining any thing akin at their hands. The two small brasses of about 1450 represent a man in civil costume and his wife and children. The inscription and four shields have disappeared. The rhyming inscriptions on the stone piers of the nave arcade are so old that they must be noticed. Their dates are 1596, 1597, and 1598. They can hardly be the crowned works of a fraternity of parochial versifiers. No doubt some one person, with a suitable pocket knife, a love for rhyming, and a pride in both, was responsible. Here is a specimen, on the easternmost of the piers on the south side of the nave:—

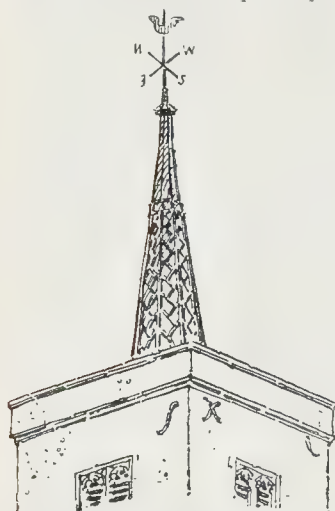
"Within this ylle  
Where bricks are laid  
There lieth buried  
A virgin mayde  
Frauncys Cordall  
Was hir name  
She lived and died  
In godlye fame  
Año. 1597 June VII."

This Frauncys Cordall, who died in 1597, was most likely a sister of the George Cordall, born 1569, eighty-four years old in 1653, whose virtues are recorded in another position. Something should be ascribed also to the Cordalls, John Grigge of Cheverill's End, John Pace, Sir Bartholomew Fovke, and I should be glad to

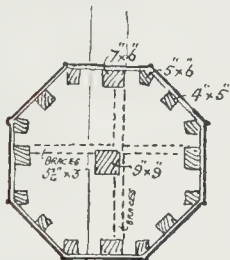
have assistance in ascertaining it. The monument to "Sir Bartholomew Fovke, Knt. [died 1604, aged sixty-nine], who served Kinge Edward, Queene Marye, and was Mr. of the Household to Queene Elizabeth for many yeares, and to King James that now is," is just at this junction of the east and south walls of the chancel. A small figure of a knight in armour is kneeling at a desk. The monument is in alabaster, with little obelisks of red marble, and was erected by "Edward Fovke, gent.," his brother. At the east end of the south aisle is a large monument of black marble, with figures in white,—a bit of solid history, but not a beautiful work. The Thomas Saunders, of Beechwood, commemorated, died in 1693. He was the grandson of the first Saunders who came to the parish. About 1579 Beechwood was in the possession of a Thomas Saunders, son of John Saunders, of Amerham. Anne, the daughter of the Thomas Saunders who died in 1693, is one of the figures in white marble. She is kneeling in the front, away from the figures of the other children who died in her father's lifetime. Anne (born 1670, died 1719) was married to Sir Edward Sebright, of Beaford, co. Worcester, Bart., born 1666, died 1702. The baronetcy dates from 2 Car. I. (1626). The wife of Thomas Saunders and mother of Anne, was Ellen, daughter and heir of Robert Sadler, of Sopwell, St. Albans. Sopwell came to Thomas Saunders in this way: it was sold by him to Sir Harbottle Grimston (died 1683). It has apparently escaped notice hitherto that, at the foot of the monument in the east portion of the north wall of the chancel, is inscribed, "1382, John Flaxman, fecit." The memorial inscription contains the names of six Sebrights, ranging from Sir Edward Sebright, the third baronet, husband of Anne Saunders, died 1702, to Sir Thomas Saunders, who died in 1764, with mention of Dame Henrietta, who did not die till 1772. The monument was executed during Flaxman's seven years' absence in Italy, and when he was twenty-seven years old. Perhaps it was carried out in England from a model sent from Italy. Several funeral monuments were produced in that way from his models,—notably that of Collins in Chichester Cathedral. Faith reclines on the east side of the urn, which is placed in the centre at the top; and Hope with an anchor reclines on the west side. The figures are less than life size, the extreme distance from toe to toe is only 7 ft. 4 in. The effect is conventional enough to us in these years, but there is an engaging earnestness and simplicity which will always make the work worth looking at. Not, of course, that the powers of the greatest designer of sculpture England has produced are fully shown here, for the monument was designed in the early days of mastership, with figures in the round which were never Flaxman's forte, and was probably executed under adverse circumstances. The large Pickford tomb in the north-east portion of the graveyard has less than no interest as a design, but should be noticed as a memorial of the founder of "Pickford and Co.," who started at Markyate-street, in the parish of Flamstead, what was afterwards developed into a great system for conveying goods by road, a couple of generations or more before railways came to the aid of his successors. Thomas Pickford departed this life on the 21st day of September, 1811. We have at Flamstead a good specimen of a method of finishing a church tower, of which there are several examples in the district. A spire is always in idea a high-pitched pyramidal or conical roof covering the whole, or nearly the whole, area of a tower. But this tower has lead gutters inside the parapets, and a lead flat inside the gutters, and in the centre of the lead flat is a spirelet (see sketches) with very steep sides, showing in a general view as a thin finger pointing upwards, contrasting in an agreeable way with the simple square outlines of the good-sized tower. There are no distinctive details by which the date can be settled with certainty. I should be much pleased to receive notes, with reference to accurately dated (or datable) examples, of flat roofs and central spirelets of this sort. The size of the tower at the top is 22 ft. 9 in. by 23 ft. 2 in. externally, and the spirelet is octagonal on plan, and 5 ft. 9 in. across; the sides of the octagon are thus about 2 ft. 6 in. Four of these sides are parallel to the four sides of the tower. Channey in 1700 found "a square tower, wherein is a ring of bells, and a shaft or spire about 20 ft. high, erected upon



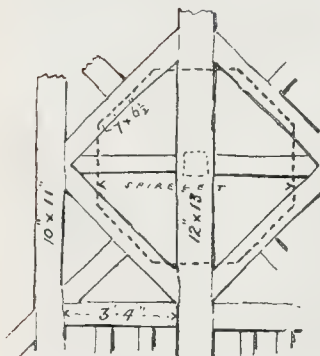
the tower covered with lead,"—the total height to the top of the vane is evidently more nearly 30 ft. than 20 ft. The centre portion of the tower roof is carried by a beam 12 in. by 13 in., running in the centre from north to south, and by beams 10 in. by 11 in., parallel to this beam, and at a distance of 3 ft. 4 in. from it. Bearers 7 in. deep and 6½ in.



Spirelet, Flamstead Church.



Plan at Base of Spirelet.



Plan looking up

wide, put diagonally from the side beams to the central one, form a square placed anglewise in the centre of the tower; and from these diagonally-disposed bearers 7 in. by 6 in. pieces start in the centres of the north, east, south, and west sides of the spirelet, also 5 in. by 6 in. shaped pieces at its angles, and 4 in. by 5 in. bearers in the centres of the other sides of the octagon. The space between the

inclined timbers is thus less than 12 in. at the bottom, and, of course, it is less and less upwards. These 4+8+4=16 pieces, which make out the shape of the spirelet, abut at their upper ends against an upright post 9 in. by 9 in., placed in the exact centre of the tower. This upright post is framed into the 12 in. by 13 in. carrying beam, and runs up to the vane. The tendency to alteration of form by the wind's action is counteracted by raking braces, 5½ in. by 3 in., running parallel to the cardinal side of the octagon, and secured at their ends to the 7 in. by 6 in. bearers which run up the centres of the cardinal sides. As these raking braces pass the central upright, at distances of about 4 ft., something is cut out of each, the braces thus pressing shoulders against the upright. Battens, 5 in. by 1 in., and 2½ in. apart take the lead covering. There are lead rolls at the angles; and lead rolls, making diagonal lines between the pieces of lead for about two-thirds of the height, give an easy variety to the surfaces; above that level the sides of the octagon have become narrow, and single pieces of lead are used. The extreme length of the longest bit of lead in the lower part of the covering is about 2 ft. 10 in. The access to the flat roof of the tower is by a ladder placed in the centre of the bell-chamber, and by a short and narrow door in the north-east side of the spirelet. Additional height would have been convenient, but that would have forced the door into an awkward prominence when seen from the village street, unless the diagonal lines of the rolls had been continued over it. Starting the timbers of the octagon upon a framed curb secured against any change or form, and some additional horizontal bracing at different levels, also a better way of hanging the lead, might be suggested; but, although of course nothing unusual, the general construction is simple and effective. Descriptions and old examples being somewhat rare, I have ventured on a rather minute account of this, stating or implying in going along the reason for each detail.

#### GLASGOW ARCHITECTURAL ASSOCIATION.

A MEMBER sends us the following account of the first sketching excursion made by the members of this Association:—

"During the latter fortnight of July a small party of members of the Glasgow Architectural Association made the first architectural excursion under its auspices, and the results, on the whole, were of such a satisfactory nature that there is little doubt that it will form the first of a series of annual architectural tours. It was ultimately agreed that Cheshire might prove a happy hunting-ground, and to Cheshire it was accordingly decided to go.

To Chester, *via* Liverpool, and on as far south as Nantwich, from thence by a more easterly route to Manchester, and so back to Glasgow, was finally the programme which found most acceptance. The choice of this route was made chiefly on account of the half-timber work in which this county is so rich, and which forms so important a part of the Domestic architecture of England; even in the northern kingdom it is not without its modern followers. On Thursday, the 14th of July, a start was made, our first stoppage being Liverpool. Here we were much delighted with St. George's Hall, both the exterior and interior occupying our best attention.

The drawings for the Liverpool Cathedral and the paintings in the Walker Art Gallery were also examined. Speke Hall, about seven miles from Liverpool, was next visited, and a considerable amount of sketching done by the members. This was our first introduction to real old half-timber work, and during our tour we did not see a finer example. It is built round a quadrangle and surrounded by a moat, and is comparatively early work, its details being generally of a Gothic character, differing in this respect from most of the remaining half-timber we afterwards saw in Chester, which was of a more Classic or Renaissance nature.

Chester was our next place of halt, and we stayed here four days. The thanks of the Association are due to Mr. Lockwood, architect, in Chester, for the kindly interest he took in our procedure and the useful information he gave regarding the places most worthy of our attention; also to his assistant, Mr. Beswick, who went over the ground with us and without whom we should have missed much.

At Chester we measured Stanley House, one of the best examples of timber work, and numerous sketches were made in Bridge Street, Whitefriars, St. John's Church, and the Cathedral. Several of the modern buildings in Chester were also much appreciated. From Chester we went to Nantwich and stayed there for two days. Here there is also some half-timber work, but the parish church is distinctly the most interesting building, and received most of our attention. The octagonal central tower and the stone pulpit and screen are specially admired and, of course, sketched. At Sandbach, which we next visited, there is an interesting half-timber hall, now used as a hotel, a Perpendicular church restored by Sir Gilbert Scott, and two old crosses standing in the Market-place. With Congleton we were disappointed, as there is not much of interest there, but it is a good centre for viewing places of interest in the vicinity.

Asbury Church and Moreton Hall were visited from hence, the latter pleasing us exceedingly. It is now occupied as a farmhouse, and is rapidly falling into disrepair. The hall is approached by a stone bridge leading directly into the courtyard over the moat, which is still filled with clear water supplied by a spring. There are several octagonal bay windows in the courtyard, which rise through two stories; and each side of which is finished with a wooden gable and bargeboard. Some of the tie-beams of the gables are elaborately carved in a very spirited manner. The principal feature of the house is the ball-room, which occupies the third story, and is about 80 ft. long by 10 ft. broad. Along the entire sides of this ball-room is a row of windows filled in with leaded clear glass, the patterns of which are many and varied. From Congleton we walked to Macclesfield, by way of Garswood. Garswood Church is a most interesting Perpendicular example, and is splendidly situated. The wooden roof of this church and the decorations of the beams are specially good. There is also a good half-timber hall here. From Macclesfield, which is quite uninteresting, we went to Adlington to visit the Hall there, but as the occupant was engaged with company, we could not see the interior. Our regret at this was great, as we understand it is one of the sights of the shire. We next proceeded to Bramhall, now being restored under the directions of Mr. Charles Nevill, the proprietor, in a very thorough manner. Mr. Nevill was kind enough to show us over the hall, explaining to us his restorations and the data on which he was proceeding. This hall is a very extensive one, and has somewhat the same arrangement of gables in the front as Speke Hall. Some of the original decorations of the house have been lately discovered, and are very interesting, the colour being specially well preserved. From Bramhall we came on to Manchester, and visited the Exhibition there. Thus finished the first Glasgow Architectural Association tour of any duration, but we hope to make it a permanent part of our programme of work, and thereby increase the usefulness of the Association and the enthusiasm of its members."

**Memorial to the late Hon. Thomas Grosvenor.**—In the secluded churchyard of Northwood, on the border of More Park, Rickmansworth, has just been erected, in Sicilian and Cippolino marbles, a memorial of the late Hon. Thomas Grosvenor. It consists of a pierced and elaborately-carved railing surrounding the grave. Each side is formed into three panels; the centre one has a cross surrounded by Cippolino; on each side of this the panels are delicately pierced. The foot of the memorial contains the inscription-panel, surrounded by highly-worked piercing. The head consists of a pierced cross and the letters A.P.C. within a circle, and two carved scrolls of the vine, carved on both sides, and springing from a chalice at the base. The work was designed by Mr. E. J. Poynter, R.A., and has been executed by Mr. Henry Terry, sculptor, of North Brixton.

**Durleston Head.**—On the 13th inst. the Crown Princess of Germany, with Sir Henry and Lady Ponsonby and others, visited Swanage. The party, on arrival from Cowes, drove through Durleston Park to Durleston Head, where they inspected the pavilion designed by Mr. Reginald Pinder, F.R.I.B.A., and other works now being effected there by Mr. George Burt (ex-Sheriff of London), of Purbeck House, to whom the property belongs.



draw a scale of Gunter's links equivalent to a scale of foot links, sixty-six divisions upon the line D F are transferred to the line D G, which is then subdivided into 100 parts by drawing lines parallel to a line joining the point G with the length of 100 divisions from D, measured in the continuation of the line D F.



## KINGSTON HOUSE, BRADFORD-ON-AVON.

Str., Mr. F. Shum, F.S.A., in his paper on Kingston House, Bradford-on-Avon, read before the Archaeological Institute, and reported on p. 267, *ante*, says that that house was one of three built at the same period, and distinguished by the unique similarity of their style in ornament and general effect. One of these is "Kirkby," in Northamptonshire, the seat of Lord Winchelsea; the second is Claverton, near Bath; and the third, Kingston House. He also says that the older parts of Kirkby House were built in the latter end of the fifteenth century.

If by "Kirkby House" is meant Kirby Hall, once the seat of the Marquis of Winchester, but now a ruin, no part of it is earlier than 1570, in which year John Thorpe says he laid the first stone. Kingston House certainly looks at least thirty years later than this, and resembles Kirby no more than it resembles any other of the numerous houses built between the years 1560 and 1620. Kingston House, in fact, belongs to a different type, for Kirby is built round a court, and Kingston House is a self-contained oblong. The ornamentation, too, of Kingston House is quite different from that of Kirby (which I know well), except that both houses are in the style of the Renaissance.—Yours truly, August 20th, 1887. J. A. G.

## LANDSLIP, DORKING TUNNEL.

SIR,—I had the opportunity of inspecting this tunnel a few days since, and I thought, perhaps, a short report might interest your readers.

On the morning of the accident it was through the tunnel, and to my profound surprise found that a very large portion of the outer wall of the tunnel was removed, consisting of the first course of brickwork, whilst not the slightest attempt had been made to support the centre of the arch, which was dangerously weakened. The whole structure is in a very dangerous state. The portion that has fallen is about 100 yards from the south or Holmwood end of the tunnel. On the right-hand side the brickwork has fallen, leaving a gap of about 27 in.; on the left it is very much larger, extending right across the crown of the arch, and many thousands of tons have come through, forming a huge sand hill.

The wall of the tunnel is built in sections of 12 ft., and the brickwork is of the very worst description, especially the backings or courses. Three of them have no mortar at all, and the bonding is very bad indeed. It is no wonder at this very spot, during the construction of the tunnel, two lives were lost, and the marvel is, not that the tunnel has fallen, but that it has held together so long. Near the mouth of the tunnel the bricks are slipping from the crown of the arch, and practically the tunnel must be rebuilt, or it will simply be a death-trap to some hapless train. How it has been patched and mended is visible on every hand, and deserves the closest attention of the Government Inspector.

SURVEYOR.

## INSCRIPTION AT WELLOW CHURCH.

SIR,—In the *Builder*, date 20th inst., I read on p. 265, last column, in a notice of the Hungerford Chapel at Wellow Church, "For love of Thee and Mary is sake.—Pray for them that this let make." What 'let' might mean no one was able to say. Does not the line mean "Pray for those who had this (chapel) built"? I think the expression "let make" was commonly used in this sense in the fifteenth century. A similar expression, "machen lassen," "to have made," is used in modern German. E. T. S.

\* \* Of course that is the meaning. The Architectural Association Excursion party, to one of whom we are indebted for the notes on places visited, should have been able to make that out among them. We are obliged to our correspondent for calling attention to it.—ED.

## BRANNON'S FIREPROOF CONSTRUCTION.

SIR,—There are three important references in your issue of the 13th inst., in respect to which I am sure the impartiality of justice always observed in the *Builder* will secure me space to make a few brief remarks.

In the third item of "Notes" there is a great misapprehension. Earl Wemyss referred to the special application of my method to the dome of St. Paul's Cathedral, but even there there is not the slightest ground for the suggestion of timber being so treated as to endanger rot. There never was a more thorough ventilation of the timber, nor so complete an insulation of it from the protecting material as well as from all fire danger.

Your correspondent, Mr. Knill Freeman, also asks for information as to the best mode of building to meet the danger of earthquakes. It was for this purpose, as well as to secure safety from fire, that I devoted myself to the development of my monolithic system. In the Essex earthquake, my house was in the line of greatest disturbance, and was

fairly rocked to and fro by it, although I only observed a few of my special precautions in the building. Not the slightest injury ensued, although Patrick's tall chimney-shaft at Harwich, to the north-east, and many chimneys to the south-west, were thrown down. PHILIP BRANNON.

\* \* Earl Wemyss's remarks on the occasion referred to simply amounted to this,—that all buildings ought to be erected on Mr. Brannon's system, because he (Earl Wemyss) was satisfied with it. Such sweeping recommendations are of no practical value whatever. Mr. Brannon's letter would have been more to the point if he had explained exactly how he proposed to cover timber with a concrete, and leave it free for ventilation and inspection. As it is, his letter is a mere assertion of the perfection of his own scheme, which our readers can take for what they think it worth.

## RECENT SALES OF PROPERTY.

## ESTATE EXCHANGE REPORT.

AUGUST 5.	
By GLASIER & SONS. (At Brighton.)	
Brighton—10, Castle-square, copyhold .....	£3,000
AUGUST 16.	
By R. W. MANN & SONS.	
Farnham—The residence called Hat Place, and 10a, St. 37p, freehold .....	3,000
By DEBENTHAM, TEWSON, & CO.	
Highgate—The residence, Highgate Lodge, and Pa. 2r. 11p, freehold .....	4,300
Willesden, Harrow-road—Four freehold unfinished residences .....	2,700
Donnet square—45, Balcombe street, 33 years, ground-rent 10s. ....	530
By E. & H. LUMLEY.	
St. James's-street—2, Bennett-street, freehold .....	3,610
By G. H. MATTHEWS & CO.	
Cornwall—125 shares, of which 111. 9s. 6d. per share is paid, in the Levant Tin Mine .....	1,650
AUGUST 17.	
By MOSS & JAMESON.	
Islington—Improved ground - rents of 43s. per annum, 33 years .....	500
By W. A. BLISSMORE.	
Streatham—72 and 74, Sunninghill-road, 43 years, ground-rent 6s. ....	345
Sussex—Forest-row—Highgate, and 4a, Or. 33p, copyhold .....	850
AUGUST 18.	
By C. P. WHITNEY.	
Clerkenwell—19 and 21, Tysoe-street, 25 years, ground-rent 20s. ....	760
By G. B. HILLIARD & SONS.	
Limehouse—6, Cayley-street, copyhold .....	320
By E. FROST.	
Lambeth—365 and 370, Kennington-road, 99 years, ground-rent 8s. 6d. per ann. ....	255
Peckham—149, Summer-road, 27 years, ground-rent 2s. 10s. ....	170

## Miscellaneous.

The Church of St. Mary-le-Strand.—Mr. Henry Poole, well known as the (Westminster) Abbey Mason, writes to the *Times* to say that in consequence of the parapets and vases of this church having been declared to be dangerous by the report of a surveyor in 1878, Mr. Butterfield at that time requested him to examine them with care for the satisfaction of the late rector, whose leave had been asked for their removal. His report was strongly in favour of their stability. The question of the cornice was not then raised by any one. There was no excuse for speaking of the vases and parapets otherwise than perfectly secure, —as secure against falling, under fair treatment, as they ever had been. After the repairs which this work received from him in 1878 Mr. Poole says he does not understand how the present proceedings can be necessary. "If these vases are to disappear, as the four vases did, some years since, from the angles of the tower, the work becomes one of mutilation. A piece of cornice has now fallen, and the removal which is going on of other vases seems to me to imply a great want of judgment on the part of somebody. The cornice could be examined and repaired without interference with the vases or parapets. It is much easier to kill than to cure. I think the course which is being taken shows panic rather than knowledge of business."

Fountain at Brussels.—One of the ornamental fountains which the English Waterworks Company at Antwerp has presented to the town was unveiled on the 21st inst., in the presence of the local authorities. It is the work of the Belgian sculptor, Jef Lambeaux. It has been placed on the Grande Place, the finest open space in the city. Part of the cost has been met out of Baron Noltebohm's legacy for the embellishment of the public squares of Antwerp. The Brussels Museum has acquired another Rubens, representing Diana and her followers boar-hunting at sunset. The picture is well preserved.—*Times*.

Yorkshire Penny Bank, Sheffield.—The directors of the Yorkshire Penny Bank, having purchased a site in Fargate and New Square street (immediately opposite the site of the proposed Municipal Buildings), invited the following firms of architects to enter into competition for the proposed bank and hotel buildings.—Messrs. Smith & Tweedale, W. H. Thorp, Perkin & Bulmer, Leeds; Mr. Jacobs, Hull; Messrs. Milnes & France, Bradford; Messrs. Flockton & Gibbs and Empell & Smith, Sheffield. The directors decided to give the work to the architect whose design should be chosen, and to pay an honorarium of 25l. to each of the unsuccessful competitors. All the architects, except Messrs. Milnes & France, sent in designs. At the general board meeting held on Friday, August 19th, the plans of Messrs. Perkin & Bulmer were chosen, and they were appointed architects. The building will consist of bank premises, *caf *, and hotel, in the East Gothic style, and will be executed in stone. The cost of the buildings and site will be upwards of 13,000l.

Pulpit, Oxford.—A pulpit of elaborate design has been fixed in St. Barnabas Church executed by Messrs. Heaton, Butler, & Bayne from the design of Mr. A. W. Blomfield. The Church of St. Barnabas is of the Basilica type, and the pulpit is designed with details of Italian type to suit the building. The material used is walnut. The framework is supported on six pedestals, and is spaced out into nine bays, each containing a panel with circle above it; in the circles are represented the nine orders of angels, and below, in the larger panels, figures of St. Clement, St. Ignatius, St. Polycarp, St. Chrysostom, St. Augustine, St. Hippo, St. Leo the Great, St. Gregory the Great, and St. Augustine of Canterbury. The costumes of the figures have been carefully studied, and it is claimed that they are archaeologically correct. The remainder of the pulpit is covered with elaborate decoration in gold upon black ground. The staircase and balustrade are also decorated. The whole is surmounted by a very massive sounding-board, enriched with cresting; on the under surface is a painting of the Pelicans.

The Preservation of Scaffold Ropes.—The American Mechanist states that ropes used for scaffolding purposes, especially in localities where the atmosphere is apt to destroy hemp should be dipped, when dry, in a bath containing 20 grains of sulphate of copper to a litre (1 1/2 pint) of water, and kept in this solution for about four days. The sulphate of copper absorbed tends, it is said, to preserve ropes thus treated from attacks of parasites and rot.

A Coast Guard Station is to be built at Clacton-on-Sea, consisting of an officer's residence and eight residences for the Coast Guardsmen. Mr. W. T. Hook, Clacton-on-Sea, is the contractor for the work.

## PRICES CURRENT OF MATERIALS.

TIMBER.		£.	s.	d.	£.	s.	d.
Greenheart, B.G. ....	ton	6	10	0	7	10	0
Teak, E.I. ....	do	8	10	0	13	0	0
Sesquieu, U.S. ....	foot cube	0	2	0	0	3	0
Ash, Canada ....	do	3	0	0	4	10	0
Birch " ....	do	2	0	0	3	10	0
Elm " ....	do	3	10	0	4	10	0
Fir, Dautic, &c. ....	do	1	10	0	4	0	0
Oak " ....	do	2	10	0	4	10	0
Canada " ....	do	3	0	0	0	0	0
Pine, Canada red " ....	do	2	0	0	3	10	0
" yellow " ....	do	2	0	0	4	0	0
Lath, Dautic " ....	fatbom	3	0	0	8	0	0
St. Petersburg " ....	do	4	0	0	10	0	0
Wainscot, Riga " ....	leg	0	0	0	0	0	0
" Odessa, crown " ....	do	2	10	0	3	0	0
Deal, Finland, 2nd and 3rd, stb. 100 " ....	do	14	0	0	24	0	0
" 4th and 3rd " ....	do	6	10	0	8	10	0
Riga " ....	do	8	10	0	7	0	0
St. Petersburg, 1st yellow " ....	do	8	0	0	13	0	0
" 2nd " ....	do	7	0	0	8	0	0
" white " ....	do	6	10	0	8	10	0
Swedish " ....	do	0	0	0	0	0	0
White Sea " ....	do	0	0	0	0	0	0
Canada, Fir, 1st " ....	do	14	0	0	24	0	0
" 2nd " ....	do	10	0	0	15	0	0
" 3rd, &c. " ....	do	8	0	0	9	0	0
" Spruce, 1st " ....	do	8	0	0	7	0	0
" 2nd and 3rd " ....	do	7	0	0	7	0	0
New Brunswick, &c. " ....	do	5	0	0	6	10	0
Battens, all kinds " ....	do	4	0	0	10	10	0
Flooring, Board, sq. 4 in., prepared, first " ....	do	0	8	0	0	11	0
" second " ....	do	0	6	0	0	7	0
Other qualities " ....	do	0	4	0	0	6	0
Order, Cuba " ....	do	0	13	0	0	0	0
Honduras, &c. " ....	do	0	0	3	0	0	3
Australian " ....	do	0	2	0	0	0	3
Mahogany, Cuba " ....	do	0	4	0	0	0	0
St. Domingo, cargo, storage " ....	do	0	4	0	0	0	0
Mexican " ....	do	0	0	3	0	0	3
Tobacco " ....	do	0	0	3	0	0	0
Honduras " ....	do	0	0	3	0	0	0



Hayward, Tyler, & Co.	150	0	0
Jennings (accepted)	110	0	0



**LONDON.**—For reconstruction of drainage and sanitary work at the Hotel Windsor, Victoria-street. Mr. C. Stanley Peach, architect:—  
J. Simpson & Sons ..... £381 0 0  
Doulton & Co. .... 310 0 0  
Sharp & Co. .... 166 14 4  
Jennings (accepted) ..... 160 0 0  
\* Add for subsequent works, 32l.

**LONDON.**—For alterations, &c., to the White Bear public-house, St. Luke's. Mr. J. Jewhurst, architect:—  
Spencer & Co. .... £520 0 0  
W. Shurmut ..... 499 0 0  
Burch & Co. .... 491 0 0  
Dixon & Co. .... 475 0 0  
Leeks & Hooker ..... 350 0 0

**LONDON.**—For proposed new house and oriel, for St. Saviour's Priory, Great Cambridge-street, Hackney-road. Mr. C. H. M. Mileham, architect. Quantities by Messrs. Gardiner, Son, & Theobald:—  
Boyce ..... £8,830 0 0  
Dove Bros. .... 6,675 0 0  
Williams ..... 6,253 0 0  
Dorey ..... 5,549 0 0  
Grover ..... 5,596 0 0  
Holloway Bros. (accepted) ..... 5,454 0 0  
[Architect's estimate, £4,377.]

**LONDON.**—For the rebuilding of premises, 232, Goswell-road. Mr. E. B. Moore, architect, 89, Lincoln's Inn-fields.  
Brass ..... £1,883 0 0  
Higgs ..... 1,850 0 0  
McCormack ..... 1,885 0 0  
W. Evans (accepted) ..... 1,539 0 0

**LONDON.**—For shop-front and fittings, for Messrs. Barker, Broad-street. Mr. G. Pearson, architect, Warrford-court:—  
Sanders & Sons ..... £303 12 0  
Collis ..... 270 0 0  
Drew & Cadman ..... 269 0 0  
Ward & Lambie (accepted) ..... 263 0 0

**LONDON.**—For new parcels office, alterations to offices, and extension of roof, at London Bridge Station, for the London, Brighton, and South Coast Railway Company. Mr. F. D. Baister, engineer:—  
J. O. Richardson (accepted) ..... £2,369 0 0

**LONDON.**—For pulling down and rebuilding 62, Fore-street, Cripplegate, for Mr. Howard. Mr. E. Power, architect. Quantities by Mr. Mark W. King:—  
Collis & Sons ..... £1,544 0 0  
Gatfield ..... 1,475 0 0  
Raton ..... 1,418 0 0  
Grover ..... 1,400 0 0  
Ramey ..... 1,387 0 0  
Dover ..... 1,245 0 0  
A. & E. Braid ..... 1,189 0 0  
J. O. Richardson (accepted) ..... 1,169 0 0

**LONDON.**—For new warehouse at Kentish Town, for Messrs. Schuppiesser & Son.  
Hillingworth ..... £2,426 0 0  
Fuller & Co. .... 2,168 0 0  
Lister & Co. .... 1,980 0 0  
Wood Bros. .... 1,783 0 0  
Leaver & Sons ..... 1,767 0 0  
Ashford & Co. .... 1,760 0 0  
Gould & Brand ..... 1,559 0 0  
Morris & Luke ..... 1,530 0 0  
Wall Bros. .... 1,484 0 0  
J. O. Richardson ..... 1,369 0 0

**LONDON.**—For repairs and decorations at 14, St. John's Wood Park. Mr. Edward Power, architect:—  
Gatfield ..... £335 0 0  
Birch ..... 319 0 0  
Hancock ..... 302 0 0  
Hughes ..... 287 0 0  
Dover ..... 280 0 0  
J. O. Richardson (accepted) ..... 251 0 0

**LUTON.**—For the erection of farm-house at Nether Crawley, for Mr. J. Crawley, under the superintendence of Mr. W. Eve, Union-court, Old Broad-street:—  
William Dunham & Son ..... £1,480 0 0  
Francis F. White ..... 1,360 0 0  
George Kingham ..... 1,250 0 0  
W. G. Dunham ..... 1,152 0 0  
Richard Lord ..... 1,143 0 0  
J. & A. Long ..... 1,112 0 0  
Daniel Perkins (accepted) ..... 1,073 0 0  
[All of Luton.]

**MAPLEDURHAM.**—For new lodges at Mapledurham, Oxon, for Mr. J. D. Blount. Mr. W. Ravenscroft, architect, Reading:—  
One Lodge. Two Lodges.  
A. W. Dodd, Caversham ..... £378 0 0 ..... £740 0 0  
S. East, Reading ..... 350 0 0 ..... 695 0 0  
J. C. Cook, Reading\* ..... 328 0 0 ..... 840 0 0  
Accepted.

**PAIGNTON.**—For erecting and finishing a shop on the Gorton Estate, for Mr. A. Falk. Mr. S. Woodbridge, jun., architect, High-street, Brentford:—  
C. & E. E. Drew (accepted) ..... £580 0 0  
[No competition.]

**PAIGNTON.**—For erecting and finishing a shop on the Gorton Estate, for Mr. Pethybridge. Mr. S. Woodbridge, jun., architect:—  
C. & E. E. Drew (accepted) ..... £208 0 0  
[No competition.]

**READING.**—For alterations and additions to Trinity Congregational Church, Reading. Mr. W. Ravenscroft, architect, Reading. Quantities supplied by Messrs. Cooper & Sons, Maidenhead:—  
J. C. Cook, Reading (accepted)\* ..... £2,152 0 0  
\* Subject to a few modifications. This was the lowest of nine tenders.

**READING.**—For alterations and additions to Orwell House, for Mr. O. Ridley. Mr. W. Ravenscroft, architect, Reading:—  
Wheeler Bros., Reading (accepted) ..... £750 0 0

**READING.**—For alterations to premises, Broad-street, Reading, for Messrs. Walstead, Son, & Co. Mr. W. Ravenscroft, architect, Reading. Quantities supplied by Messrs. Cooper & Sons, Maidenhead:—  
J. Bottrill ..... £398 10 0  
W. H. Simpson ..... 376 0 0  
J. H. Margrett ..... 341 1 0  
S. East (accepted) ..... 323 0 0  
[All of Reading.]

**SANDHURST.**—For new porch and vestry to Sandhurst Church, Berks. Mr. W. Ravenscroft, architect, Reading:—  
Wheeler Bros., Reading\* ..... £200 0 0 ..... £200 0 0  
\* Accepted.

**SOUTHWARK.**—For new street sewer, &c., Lavington-street, Southwark, for the Ecclesiastical Commissioners. Messrs. E. B. Grantham & Son, engineers, Northumberland-avenue, Reading, Chesterton-road (accepted) ..... £2,083 0 0

**STEPNEY.**—For constructing strong room to the Stepney Branch of the London and South-Western Bank (Limited). Messrs. Thos. & Wm. Stone, architects, Great Winchester-street:—  
W. Grogan ..... £474 0 0  
J. T. Robey ..... 394 0 0  
Godfrey & Latta (accepted) ..... 340 0 0  
Atterton & Latta (accepted) ..... 319 0 0

**STOKE NEWINGTON.**—For erecting house in Green-lanes, for Mr. A. Meers. Mr. J. Groom, architect. Quantities supplied:—  
Grover & Son ..... £2,358 ..... A. 2333  
Simpson & Co. .... 2,386 ..... 330  
Lawrence & Sons ..... 2,579 ..... 268  
Matlock Bros. .... 2,778 ..... 372  
Jackson & Todd ..... 2,770 ..... 230  
Eaton & Burton ..... 2,717 ..... 316  
H. L. Holloway ..... 2,430 ..... 318  
A.—Deduct if Portland cement facing in lieu of Portland stone.

**STREATHAM.**—For proposed public hall and drill-room at Streatham. Mr. Edward Power, architect. Quantities by Mr. Mark W. King:—  
J. Dover ..... £6,200 0 0  
J. Smith & Son ..... 5,547 0 0  
G. J. Smith ..... 5,590 0 0  
J. C. Bowyer ..... 5,435 0 0  
J. T. Chappell ..... 5,425 0 0  
Kirk Eron ..... 5,330 0 0  
Ingram ..... 5,311 0 0  
R. J. Humphries ..... 5,195 0 0  
D. Brown & Co. .... 5,125 0 0  
W. M. Dabbs ..... 5,072 0 0  
A. M. Deacon & Co. .... 5,025 0 0  
G. Stevenson ..... 5,004 0 0  
A. & E. Braid ..... 4,975 0 0  
H. Gatfield ..... 4,953 0 0  
H. Ockenden ..... 4,895 0 0  
Newton & Idle ..... 4,837 0 0  
J. O. Richardson ..... 4,580 0 0

**TUNBRIDGE (Kent).**—For the reconstruction of Great Bridge, Tunbridge. Mr. F. W. Ruck, County Surveyor. Quantities by Messrs. Ruck, Son, & Smith:—  
Contract No. 1.—Builder's Work.

J. D. Ridley, Middlebrough ..... £3,900 0 0 ..... 2336 0 0  
H. Young & Co., Pimlico ..... 3,185 0 0 ..... 350 0 0  
Jas. Farrow, Maidstone ..... 2,354 19 3 ..... 459 1 5  
Turner (Limited), Watford ..... 2,287 0 0 ..... 550 0 0  
Ball & Gammon, Strood ..... 1,870 0 0 ..... 337 15 0  
Punnett & Sons, Tunbridge ..... 1,877 10 2 ..... 409 14 5  
Geo. E. Wallis, Harnham\* ..... 1,773 0 0 ..... 373 0 0  
A.—Separate estimates for footpaths, &c.

\* Accepted.  
Contract No. 2.—Ironwork.  
John Ellis, Reading ..... £2,313 10 4  
Drury & Biggleston, Canterbury ..... 2,198 0 0  
Phoenix Foundry, Derby ..... 2,079 0 0  
H. Young & Co., Pimlico ..... 1,730 0 0  
James Farrow, Maidstone ..... 1,724 0 0  
R. Moreland & Son, London ..... 1,724 0 0  
George E. Wallis, Maidstone ..... 1,648 0 0  
Balls & Garrett, Maidstone ..... 1,610 0 0  
T. D. Ridley, Middlebrough ..... 1,560 0 0  
Weeks & Son, Maidstone ..... 1,556 14 8  
Turner (Limited), Watford ..... 1,500 0 0  
Matthew T. Shaw & Co. .... 1,469 0 0  
Ball & Gammon, Strood ..... 1,425 0 0  
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### Recent Excavations in the Acropolis.



FEW weeks past we regretted the long delay of the second part of Dr. Rhomades's work illustrating the now-famous Acropolis excavations. This second part makes a tardy, but still welcome, appearance. It is now possible to take something like a systematic survey of the discoveries, and to point out their exceptional value for the re-construction of the history of Athenian art. No discovery at all comparable has been made within the last few years; indeed, we may say not since the German excavations at Olympia. The Pergamene marbles, sensational beauty though they are, and of great mythological interest, only confirmed what we already knew of the florid, overwrought character of the later Asiatic schools. But in the history of Athenian art there has always hitherto been a void that ached inexpressibly. We had our Parthenon marbles, but we knew next to nothing of the art that led up to them. This was the more tantalising, the more unendurable, because literary tradition respecting the early masters of Athens was not wanting; we knew of the existence of Antenor, Amphiprotos, Endoios, Hegias, Kalamis, and of the subject of some of their works, but only by precarious conjecture could we picture their style. The famous *stèle* of Aristion, signed by Aristoteles, was, indeed, the *locus classicus*, and from it, with marvellous ingenuity, a canon of opinion as to Attic characteristics was built up,—a canon now shown to be, in the main, correct. It is true we have not even yet discovered any statue inscribed with the name of a known sculptor; we have a number of bases inscribed, and a number of statues baseless, but as yet no combination has been effected; but the statues found are so many, so clearly marked in type, so manifestly the work of artists swayed by the impulse of a school, that we may safely base our conception of pre-Pheidian art henceforth on the material they afford us.

We can only give a brief summary of some of the chief points of interest connected with them, and we must refer our readers who desire closer detail not only to the work of M. Rhomades, but also,—preferably as regards the discussion of style,—to an article in the last

number of the *Hellenic Journal*, by Mr. E. A. Gardner.

We must begin with a disappointing fact. The statues uniformly represent a draped female figure; but this figure we are unhappily unable to name. We cannot even say if she is a goddess or a human being. Inscriptions were found with the statues containing dedications to Athene. It was, perhaps, at first natural to suppose that Athene herself was represented, but there is positively no evidence for this theory: in fact, much against it, for the statues have no analogy with any known Athene type. The nearest analogy is undoubtedly the frequently-recurring type of the woman goddess, whose wide-spread early worship, specialised later with the cults of Athene, Aphrodite, Artemis, and whose closest affinity is to Aphrodite. But there is no necessity to suppose the statues represent a goddess at all; they may be the images of priestesses or even of worshippers.

We have not space to go in detail through the long series, we must select certain striking examples. Unmistakably the earliest in style, though possibly not in date, for there may have been intentional archaism, is the curious figure given in plate x. This is a good instance of a xoanon, or sacred wooden figure copied in stone. The lower part of the statue is practically a board with drapery indicated on it. This quaint, flat lady is own cousin to the well-known Nicaandre figure found at Delos, but the Attic xoanon is a distinct advance on the Delian. Not only is the drapery plainly indicated, but the face is well modelled, the hair elaborately dressed, and the right hand advanced with a lively speaking gesture. The lower part of the arm in this and many other of the statues is inserted by means of a socket, thus of course the trouble of turning the elbow is avoided.

This xoanon lady is unique among the statues, the remainder are worked with a constantly increasing naturalism. Broadly speaking, they are characterised by massive elaborate drapery disposed with but little regard to the figure beneath, but very beautiful from the careful symmetrical arrangement of the folds; very frequently the under-chiton is of fine, wavy, crinkled material; while the over-dress falls in thick, parallel masses. The hair is usually disposed in stiff waves round the forehead and formal curls front and back. Some of the figures wear a wreath. Many of the statues have a very noticeable appendage to the head, consisting of a straight spike of bronze set upright in the crown. M. Kabbadias (the discoverer of the statues) thinks these spikes served to support a disk, probably of wood, which protected the statues from rain. As they were richly coloured,

some such form of umbrella would be very desirable. Mr. Ernest Gardner in his paper ingeniously suggests a very probable analogy. It has often been a puzzle how the terra-cotta figurines keep their strangely-shaped hats on. These hats have no crown. They are practically flat plates, rising to a point above. They have no visible attachment, and only a hair-pin run through the head (for the hair is too flatly dressed) could keep them on. Ladies of all times will suffer strange torments at the shrine of the becoming, but this seems going a little too far. Moreover, these impossible hats are worn by figures already veiled, and therefore needing no head-gear. Mr. Gardner suggests that they are merely a "survival, a reminiscence of the disk that used to protect statues in the open air reproduced in figurines which needed no such protection." The suggestion is an interesting one from the point of view of the terra cottas, because it is another link in the chain of evidence that goes to prove that these figurines were always, even in their most naturalistic days, tinged with ritual reminiscence. But this is by the way.

This is, perhaps, the right place to speak of the elaborate colouring of the statues. They have done no greater service than clearing up the fog that has hitherto rested on the question of colouring as applied to Greek sculpture. As yet no coloured reproductions of the statues have appeared, and, as our own study is based on the phototypes, which are alone at present accessible, we think it wisest to quote the testimony of Mr. Gardner, who speaks from personal observation. He resumes as follows,—"Colour is never applied in mass to a broad flat surface; thus neither the flesh nor the whole surface of the drapery are tinted, but they are left in the pure whiteness of the marble, relieved only with painted details and ornaments. The only exceptions are the hair, which was always of a uniform reddish-brown colour, and occasionally the under-garment; but this was only painted over its whole surface when but a small part of it showed, so that the extent of the colour was not limited. Thus in one case it is dark green, in another dark purple, but in neither case does much of its extent show. In other cases, besides the borders in the places already referred to we sometimes find the whole surface dotted with stars or other ornaments. The wreath\* also is generally painted. The commonest designs are the meander and the palmetto. The colours most used are dark green and dark purple; red and blue are also found. In the nude parts we find red applied to

\* Mr. Gardner says "stephane," an absurd hybrid of Greek and English. Why cannot he use an English word when he is writing in English, or else quote the Greek word in its proper form?

\* Les Musées d'Athènes en Reproduction Phototypique de Rhomades Frères. Fouilles de l'Acropole. Athènes: Karl Wiberg, Londres: H. Grevel, 2nd livraison, 1887.



the lips and the iris of the eye; the eyebrows, the outlines of the eyelids, and the iris and the pupil are sometimes coloured with dark pigment." We have had coloured fragments before, but no instance in which we could judge of the effect of a coloured statue as a whole. Mr. Gardner unhesitatingly pronounces this effect to be pleasing,—the colouring is so applied "as in no way to obscure the modelling or to hide the texture of the marble,"—it is, in fact, as Mr. Ruskin would say, "entirely honest," and there results from it no displeasure to the understanding, but rather, to the eye, "a richness and harmony of effect that plain white marble would not possess. There is not the slightest tendency to the revolt of modern taste, such as is felt when we see a completely coloured cast; for it is the suspicion of inferior material and the hiding of true surface that most offends us. From the Acropolis statues these objections are entirely removed; in them the colouring adds to the effect of the sculpture, but takes nothing from it."

So far, we have said nothing of the expression in the faces of the statues, and yet it is for their expressiveness that they are chiefly remarkable,—that they are, with one or two exceptions, most distinctively Attic. We have reserved this Attic expressiveness for special consideration in relation to one statue by far the most advanced and the finest of them all (plate xiv). Most of the series owe their expression to the more or less frozen "archaic smile," but this lady smiles her own smile. The mouth is quite naturally moulded, and even the hair is no longer tortured and frizzed, but parted simply in the middle and falling in waves to either side. No archaeologist as he looks at this head can refrain from suggesting the name of Kalamis,—Kalamis, of whom we know so much by literary testimony, and simply nothing from monuments. The earth will possibly never give back to us a statue inscribed with his name; but till it does we may be allowed to fancy this Acropolis statue to be an example of that nameless charm which fascinated the ancient Greek and every other art critic. When Lucian fashioned his perfectly lovely woman he gave her the forehead, head, hair, the perfect eyebrows, and the soft moisture of the eyes of the Cnidian Aphrodite of Praxiteles; her wrist and delicate finger she would borrow from Alcamenes, neck, and mouth, and nose from Phedias, but when all was put together she yet lacked something that only Kalamis could give, "modesty and a sweet, grave, unconscious smile," and a certain seamliness of vesture (*τὸ πρὸς τῇ εὐπρέπειᾳ καὶ ἀναισθησίᾳ καὶ τῇ ἐν τῇ αἰσθητικῇ τῇ ἀναισθησίᾳ*). It is the charm that some old-fashioned portraits have, and a very few old-fashioned people, a certain "subdued and refined gracefulness," very rare and very haunting.

For the dating of the series of statues as a whole we are happily not left in doubt. The inscriptions are, from the forms of the letters, from about 525—500 B.C. The whole series of statues were found within a very limited area, stretching from the north-east of the Propylæa to the Erechtheum, close under the Acropolis wall. It is a fortunate accident that with them was found a quantity of refuse used in making the wall. The conclusion seems to be pretty safe that the statues were buried during the building of the wall. The deposit consists of three strata, each separated from the other by layers of wall refuse. From this regular disposition M. Kabbadias concludes that what happened was as follows: When the Persians laid waste Athens, they burned the temple of Athene, knocked down the votive statues set upon it, upset the pedestals, and did all the sacrilegious damage they could in a short space of time. When the Athenians came back to their desolate city they resolved to restore the temples of the gods with even greater magnificence. But the votive statues, being merely votive, they did not concern themselves about. They used them as material for levelling the surface of the Acropolis. It is possible that, though they did not regard them as sufficiently important to be restored and re-set up, they may have desired by

burying them to preserve them from further desecration. The importance of these speculations is that if they are correct they fix the limits of the dating of the statues in one direction. If the statues were buried on the return of the Athenians after the Persian invasion, and if the rubbish layers belong to the Acropolis wall then rebuilt, they are none of them less than B.C. 480. Happily, with this dating, both inscriptions and *a-priori* conceptions of style are at one.

#### NOTES ON THE WALLS OF CHESTER.

BY SIR JAS. A. PICTON, F.S.A.



WING to the differences of opinion expressed on an inspection of the walls of Chester by the Royal Archaeological Institute in 1886, it was thought desirable by some members of the British Archaeological Association, at their recent Liverpool Congress, to have as thorough an investigation of the walls as time and circumstances would permit. Accordingly a subscription was entered into to defray the expense of excavating. This was done by consent of the Mayor and Corporation, under the advice and inspection of the City Surveyor, and on the 23rd of August a visit was paid by a considerable number of members and friends.

The following notes were taken on the spot, without any preconceived theory to maintain, or any previous inferences to establish.

The first excavation was made in what are called the Kale yards, at a point a little south-east of the cathedral, which here very closely approaches the wall. There can be no doubt that here the wall is built on the old Roman lines, since there is hardly room for any deviation, owing to the rapid declivity of the land. Here a trench along the wall was sunk to a depth of 12 ft. to 15 ft. below the surface. The lower portion of the wall, which commenced at the bottom of the trench, was rubble work set in mortar or clay,—it is difficult to say which,—in thin layers. This was carried up about 5 ft. Then commenced courses of solid hewn stone in blocks 1 ft. to 1 ft. 3 in. deep, well squared, put together without mortar. This portion started about 6 ft. or 7 ft. below the ground level outside. This stone is of good quality, but a little above the ground-level the wall changes into coursed ashlar of inferior stone, much decayed on the surface.

The next observations were made in a large and deep trench sunk in a timber-yard outside the walls, a little south of the Phoenix tower. Here a large quantity of Roman remains were found loose, consisting of small altars or votive stones, portions of moulded cornices, &c. One flat stone with a memorial inscription was found imbedded in the wall. The solid hewn stone courses here go down to the bottom of the trench without any rubble substructure.

The third excavation was sunk along the east end of the north wall, with very interesting results. The same solid squared substructure was found, with several loose relics of moulded work. Here a peculiarity was observed. From the summit of the Roman wall a little above the surface, the wall was double, with an interval between. This was pronounced to be Mediaeval work of uncertain date.

Observations were then taken on the north wall, skirting the narrow valley formerly the fosse, but now occupied by the Shropshire Canal. Along this wall runs the cornice or string course so often referred to. Owing to the precipitous nature of the site it was impossible to gain access to the outside of the wall. Excavations were unnecessary, as the wall stands on the sandstone rock which is here scarped down perpendicularly. The general opinion appeared to be that the greater part of the wall, including the string or cornice, is of Roman origin, with repairs and insertions of subsequent date.

Passing by the water tower, and following the western wall southwards, we arrive at probably the most interesting point in the survey. The Roodee, a grassy plain, now the racecourse, was in the olden time covered with water, and the city wall was carried along the coast line, which here presents a somewhat

precipitous face of clay and soil. Here, outside the wall, lie courses of stones of great weight and magnitude. At the former inspection in 1886, it was argued with considerable plausibility that these stones had been laid here to protect the foot of the wall, and prevent a landslide of the bank, and that the city wall retains its original position; but the excavation, carried down about 15 ft. below the surface, presented a very different state of things. It was found that these large stones were merely the upper courses of a strong and massive wall built with square ashlar and carried down to the bottom of the trench. No one could doubt for a moment that this is Roman work of an early period and of excellent quality. What might be the thickness of the wall it is impossible to ascertain without excavations which were unauthorised.

The actual city wall, of Mediaeval origin, is not carried up in the plane of the Roman wall, but is set back about 8 ft. to 12 ft. To a minor extent this is the case in other portions of the walls, indicating that at some period, we know not when, the alignment of the walls had been laid out afresh.

Excavations were thus made on the east, north, and west sides of the city walls. Along the south side, abutting on the river, excavations were needless and impracticable.

Without entering into any hazardous speculations, a few inferences may be drawn which appear to be fully sustained.

First, as to the superior quality of the Roman work, both in materials and workmanship.

This was admitted by all who examined it. Whilst the Mediaeval facing of the walls is weathered and crumbled so as to require continual repair, the Roman stones which have lain exposed to the weather probably 1,500 years, are as sharp and perfect as when they were quarried, and those built into the walls retain their sharp angles and close joints.

Remark may naturally be made on the absence of tile courses, and of the stones being laid without mortar. The Romans had several distinct methods of constructive masonry, the most solid being that of squared stones called by Vitruvius *Isodorum*, or *Sara quadrata*, which was employed where strength and massiveness were required. The large stones, possessing stability by their own weight, required little or no cement. The Pont du Gard, one of the finest Roman works extant, has no mortar in the joints. In one of the excavations at Chester a large lump of concrete was found of extreme hardness, consisting of lime, sand, and pounded tile.

Another question arises as to the comparative site and extent of the *enceinte* of the city walls.

Few cities exhibit in their plan more decided evidences of the original Roman castrum than Chester. Comparing it with the details given in the work of Hyginus, "De Castrametatione," written in the reign of Trajan, we find the oblong rectangular plan; the Via Prætorii intersecting the city in its length, crossed by the Via Principalis, with the Prætorium in the centre, now the site of St. Peter's Church. This area can easily be traced, extending from the north wall and fosse southwards to the castle mound and river Dee, and from the existing east wall westward to St. Nicholas-street. This on the western side does not correspond with the existing wall, showing a considerable extension westward, throwing the arrangement out of the symmetry always maintained in the Roman castrametation.

It has been supposed that this extension took place at the beginning of the tenth century, at the time when the city, after lying waste for more than three hundred years, was rehabilitated by Ethelreda, the Lady of Mercia, but the recent excavations have entirely invalidated his theory. The lower portion of the wall across the Roodee is of the most pronounced Roman character, as noted above. The probability is that the Roodee, having been originally a shallow lake formed by a bend in the river, gradually silted up and shrank away from the walls, and that this extra-mural plot was made use of to enlarge the city on the west side. This part of the city has always been very sparsely built on



and now consists principally of grass-fields, with a few public buildings. This view is confirmed by a recent excavation in the doodee, which brought to light a wall, apparently a sea-wall or quay of the olden time. The general result appears to be that the foundations of the walls were built by the Romans, and that a portion of the superstructure still exists, mixed with work of a later period. The Roman work is easily distinguished by the superior quality of the stone. The walls above ground are, for the most part, post-Roman of various ages. After the irresistible evidence of the excavations it is to be hoped that the question is now set at rest.

## NOTES.

**A**MONGST the legislative business on which the Parliamentary session is to be congratulated, there is one which is noteworthy from an industrial point of view, and that is, the issue of a report of the Committee on Forestry, which, though short, is very much to the purpose. It appears that, although the word "forest" does not convey to the modern Britisher the same impression that it did to our forefathers, there are still 27,210,000 acres of woodland in these islands, some belonging to the State, but the majority, private property. Timber is timber, and is therefore comparatively well looked after, generally speaking, as being worth more or less money; but possibly no department of agriculture is so deficient in any systematic knowledge or treatment as that of our trees, and the science of forestry is evidently limited to very few. The State, indeed, appears to be the most deficient tree-planting in the whole country, and a lamentable account of the Deputy-Surveyor of the New Forest, England's grandest possession of its kind, is a proof that the State is no more to be trusted than anybody else in the conservation of its property. There are 40,000 acres lying worthless and unprofitable, because by the Act of 1877 no planting may be done there. Large enclosures of beautiful oaks are over-ripe and doing actual harm, because the same Act forbids their removal. Now, it must be remembered that this same Act was passed by a body of worthy gentlemen who knew nothing about arboriculture, and consequently thought really desirous of preserving the forest, defeated their own object from sheer ignorance. The appointment of a Forestry Board and School, such as is recommended in the present report, would prevent all this. We are one of the few countries which never attempt to take care of their woods; and though it is true that the age of wood is very much, though not entirely, superseded by iron and steel, very valuable additions may be made to English acreage, not only by looking after and improving the trees that still remain, but by re-clothing our bare hills in Ireland and Scotland, if the recommendations of the Committee be attended to in good time.

**T**HE scheme of the Charity Commission for the administration of the funds of the British Institution is now published. The most satisfactory feature about it seems to be in the steps which have been taken to ensure periodical publicity for the doings of the Trust. The statements as to what is intended to be done are rather vague; they only amount to this, that the Trust shall establish scholarships, to be called "British Institution Scholarships," of such annual value as they shall think fit, between the amounts of 50l. and 100l., towards the encouragement of the study of art; which scholarships shall be awarded as the result of examination "or otherwise, as the trustees think fit." No scholarship is to be awarded to any candidate whose circumstances are not, in the opinion of the trustees, such as to render him or her a fit object of such benefit." This seems a most extraordinary clause to append to a scholarship attainable by merit. It is generally supposed that when a scholarship can only be obtained by working hard to surpass others, this question rights itself, as

only those to whom pecuniary assistance is of importance will go through the necessary trouble to obtain it. Here, according to the wording of the scheme, we shall have men incited to give proof of their proficiency first and then furnish proof of their poverty afterwards,—a most invidious kind of requirement, which will certainly be likely to keep out of the field people who are much hampered with that troublesome quality called self-respect. There is not a hint as to the nature of the manner in which the holders of scholarships are to apply the assistance beyond the cloudy statement that it is for the encouragement of the study of art. The representative trustees who are to administer according to the terms of this remarkably unbusiness-like document, are to be appointed as follows:—One by the Science and Art Department of the Committee of Council on Education for England and Wales; three by the President and Council of the Royal Academy of Arts; one by each of the following bodies,—the Royal Scottish Academy, the Royal Hibernian Academy, the Royal Institute of Painters in Water Colours, the Hebdomadal Council of the University of Oxford, the Council of the Senate of the University of Cambridge, the Senate of the University of London, and the Council of University College, London. This is in more ways than one an unsatisfactory list. The University bodies referred to in connexion with Oxford, Cambridge, and London, have no special claim to understand how art is to be taught or learned; their representatives will in all probability be merely persons with æsthetic "fads" of some kind or other. The Royal Institute of British Architects is, as usual in documents of this kind, entirely ignored, and we presume architecture, which, more than any art, requires means in order to travel and study it fully, is to be practically ignored as well as its representatives. The Institute of Painters in Water Colours, we understand, have declined to appoint a representative; and under the circumstances, we can hardly be surprised at their decision.

**T**HERE has been some mournful correspondence in the *Times* last week in regard to the modernisation and spoliation of Venice. One correspondent anticipates that the steam-launches will soon entirely drive off the gondolas; another writes that this consummation must be still far distant, inasmuch as the smaller side canals, with their low bridges, will not afford passage for the steam-launches. Both correspondents mourn over the disfigurement of the palaces by advertisements and of the canals by ugly iron bridges. Here we are entirely with them, for just the same reason that we object to ugly iron bridges on the Thames, and to vulgar and disfiguring advertisements on the buildings of any city,—of course *à fortiori* when the architecture to be disfigured is in itself of exceptional interest and beauty; but otherwise the principle is the same in London as in Venice. But where we cannot agree with the mourners is in the idea that it is the duty and the interest of the Venetians to keep their ancient city *in statu quo*, to erect no new buildings and to make no attempt at reviving or stimulating commercial prosperity, in order that Venice may remain as a picturesque spectacle for visitors. We have no right to require of the inhabitants of any old city that they should be content to reduce themselves to the condition of the custodians of a museum of art and archeology. We question very much even the argument that it is to their interest to keep it so, in order to attract the foreigner and his gold. It is never to the interest of any community to remain in a fossilised state. Let not the reader imagine for a moment that we are indifferent to the disappearance of the ancient charm of Venice. To our natural feelings and associations this gradual dragging down of the old poetic places of the earth into the light of common day is a thing to grieve over from the very soul; it is the extinction of an interest which can never be replaced. But it is inevitable, except under conditions which we have no right to wish for. Human society,

with its living interests, is more, after all, than even old buildings. Better see Venice the seat of an energetic and active community, than a decayed society accepting alms as the showman of its decaying buildings. Only, let the modern Venetians endeavour to carry out their improvements in a manner worthy of the beauty of their ancient city. That, at least, may fairly be required of them, in their own interests as well as in those of the rest of Europe.

**A**RATHER peculiar railway-rates difficulty has arisen through the opening of the Hull and Barnsley Railway. In order to make the position of affairs understood, it should be stated that, prior to the opening of the new line, the rate for coal to Hull from all South Yorkshire collieries within a certain radius was 3s. 1d. per ton, nearly the whole district being served by the North-Eastern Railway. A speedy effect of the competition was a reduction of 3d. per ton in the rate, a similar concession being afterwards made in the case of the West Yorkshire collieries situated on these two lines, which had previously been subject to rates varying from 2s. 3d. to 2s. 11d., according to their position. Other benefits have resulted to the collieries served by these rival lines, in rebates for use of wagons, &c., and, so far, the competition between the two companies would appear to be advantageous to the Yorkshire coal business. But it will be seen that, as is frequently the case, the benefit is obtained at some one else's expense. Many of the collieries on the Lancashire and Yorkshire Railway, who formerly had a share of the Hull coal trade, are now rendered almost powerless to compete, as they are unable to get reductions in their rates corresponding to those of their more fortunately-situated neighbours, and the same applies to those collieries from which coal is conveyed to Hull by water. The competition between the two companies is doubtless restricted to their own systems, and they would probably combine to keep up the rates on traffic coming to them from lines having no direct connexion with Hull. Be this as it may, the result is a fair illustration of the saying that "one man's meat is another's poison," some of the coal-owners being so handicapped by the benefits resulting to others from this battle of railway rates that they are quite in despair. In the meantime, the railway companies serving the Kent district are certainly losers in the new competition for the fruit traffic, to which we alluded some weeks back. The vessels chartered by the fruit-growers now run from Sandwich to London and back three times a week; and the hop-growers, in spite of the concessions they obtained last season, are about to avail themselves of this means of transit, and expect to effect a considerable saving by it. The success of this venture will naturally stimulate the efforts of those who advocate the extension and improvement of our waterways with a view to reducing transit charges.

**W**E print in another column a letter from a correspondent in the neighbourhood of Bath, which is worth the attention of those who feel concerned in promoting the proper carrying out of sanitary legislation. Our correspondent, Mr. Abercromby Wilson, it appears, has repeatedly drawn the attention of the Rural Sanitary Authority of the Bath district to the offensive state of a ditch which runs close past his and other dwelling-houses, and which removes, among other pleasant matters, the refuse of a brewery. He complains that not only has the Sanitary Authority (?) omitted to take any action in the matter, but that when another resident offered to obtain at his own cost the opinion and report of a competent sanitary engineer, the proposal was received only with ridicule. We should like to know whether the Rural Sanitary Authority in question can state another side to the case which would alter the aspect of it. On the face of it as it stands, it appears that the Sanitary Authority in question is neglecting an obvious duty.



A WORK of some importance has just been completed at Kinsale, viz., a large quay on the west side of the harbour, running almost the length of the town. It is faced throughout with concrete, and has landing-places and a pier-head. It undoubtedly adds very considerably to the advantages of Kinsale as a port of discharge. But though the Bay of Kinsale, if we may thus describe the estuary of the Bandon river on which it lies, is as fine a harbour as could be desired, it is irretrievably handicapped by its proximity to the still more magnificent harbour of Queenstown. It is not an hour's sail from the one to the other, and thus practically all the merchant shipping goes either to Queenstown, or, still higher, to Cork. The mainstay of Kinsale is the mackerel fishing in the spring, when scores of craft lie in the bay and make it their headquarters for the season's fishing. But the quay in question is larger than is necessary for the discharge of fish, a good deal of which is taken off the boats at sea by steam carriers. There is also a tendency in the fishing-boats to go westward, where a good deal of the fishing itself is prosecuted. The opening of the new fishing schools at Baltimore, united to this tendency, is thus likely to decrease the traffic at Kinsale. The useful and important work to which we have alluded is thus not likely to be of the use for which its size and character fit it, and we fear that the future prospects of Kinsale, whether as a fishing or a general port, are not very bright.

WE have more than once drawn attention to the re-organisation of the publications of the German Archaeological Institute, by which the centre of gravity of the Association is shifted from Rome to Berlin. The change was clear gain to archaeology, at the same time it obviously somewhat left the Italian element of the Institute out in the cold. This has acted as a stimulus to local effort, and it is now proposed to form an Italian society with the title "Istituto Archeologico Italiano." The scheme was broached some time ago in a letter by Signor Ruggero Bonghi to *La Cultura*, and it has since received the adhesion of many noted Italian archaeologists, e.g., Fiorelli, the Director of Antiquities; Compareschi, Gozzadini, and others. The Roman archaeological harvest is certainly plentiful, and will no doubt supply material for a new archaeological periodical, but to the outsider, ignorant of local obstacles to co-operation, and burdened with subscriptions to countless *Bulletini*, *Mittheilungen*, *Notizie*, *Musei*, &c., the prospect of this new departure has its gloomy side.

AT the last meeting of the *Archäologische Gesellschaft*, at Berlin, a report of the final completion of the Olympia Museum was laid before the members. The King and Queen of Greece have given the new building the formal sanction of their presence. It stands on the slope of the hill *Druva*, on a terrace naturally formed. Its plan comprises a large central hall, two stories high, two side halls, and four corner rooms. The central hall is approached by a good-sized entrance-hall, with staircases to a clearstory gallery. The building is just large enough to allow of the pediment groups being set up in their natural disposition along the side walls. They are arranged according to the scheme proposed by Dr. Curtius, but Dr. Treu's variant scheme can be studied on the cast model placed for the purpose near at hand. It has been decided not to place the *Niké of Ptoonios* at its full elevation. The reason is not apparent, as the height given by the clearstory gallery is amply sufficient. The metopes are placed in one of the lateral halls, plaster casts of those found in the earlier French expedition, and now in the Louvre, are added to complete the series. Of course, the chief interest of the ordinary visitor centres in the little room which enshrines the *Hermes*. Up to the present time those who have made the pilgrimage to Olympia have seen the god lying flat on his back,—or rudely propped up. It was long undecided whether he should be placed on a new pedestal or whether the old original base should be mended up. We are glad to find this latter

course has been adopted. Still more satisfactory is it to learn that, spite of the current reports to the contrary, the statue has nowise suffered from exposure. The faint traces of red on the hair are still visible. Our account of the Museum is taken from a letter by Mr. Alfred Emerson to the *American Journal of Archaeology*, and from a report of the Berlin meeting in the *Berliner Philologische Wochenschrift* of August 20.

WE recently drew attention to the remarkable series of marble statues found last spring on the Acropolis and just published in the second number of the *Musées d'Athènes*. We perforce passed over in silence a bronze statuette discovered in the same site and of even greater interest, because unique of its kind. Descriptions of this remarkable monument had reached England, but neither photographs nor drawings were procurable, the only accessible reproduction at the time being a rough woodcut in a Greek local paper. We are glad to find that in this month's issue of the *Εφημερίς Αρχαιολογική* full justice is done to this most curious and, in its archaic fashion, beautiful statuette. In *πλάτ* 4 the figure is reproduced in its two side views, and Dr. Staes accompanies the plate with a full description. The statuette was found immediately opposite the north entrance of the Erechtheum. It is about 15 in. high, and represents the goddess *Athene* wearing her *egis*. The great point of interest about it is its very peculiar technique. It is almost flat, and, in fact, consists not of a figure worked in the round, but of two plaques of gilt bronze in very low relief, nailed together; it seems possible that between the two plates there may have been a piece of wood, to which they were nailed, and which has, of course, decayed. Portions of the figure,—e.g., the feet and right arm,—are worked almost in the round. The right side represents the figure, though not the face, almost three-quarters round; it is the best preserved, and the most carefully worked; probably it was intended to be most clearly seen. On the left side the *egis* hangs much further down than on the right. The face on both sides is absolutely in profile. The whole figure is slim and graceful. The goddess is represented as advancing probably to meet a worshipper; her right hand may have held a phiale. It is difficult to say what purpose the figure served. There is a hole at the top of the head and several other traces of attachment which seem to point to the conclusion that it was nailed to some piece of furniture. No specimen of similar technique is known in any other European museum.

IF we may credit all that has been written on the subject lately, yet another Dagon of our youth is marked for overthrow. Returning from his missionary labours in China, the Abbé Larrieu has published a pamphlet (Paris: Leroux) to show that the Great Wall of China not only does not, but never did, exist. We were diligently taught how, in the year 214 B.C., Che-Hwang-te, of the Tsin Dynasty, "first universal emperor" of Cathay, began his project for everlastingly resisting attack by the hordes of the Heung-noo. Countless maps delineate his vast wall, some 1,300 miles in length, bounding the northern confines of Kan-suh, Shen-se, and Pe-che-le, and running from the province of Kan-suh to Tin-yeo, on the Gulf of Lias-long. We call to mind many an illustration of its towers and intermediate curtains as they gradually disappear in direct course over the distant mountains and valleys. We are now told that all this embellishment is due to one Martini, a Jesuit priest, who visited China in 1650. His accounts have been copied by one writer after another. The Abbé avers that his precursor quite misinterpreted the signification of what the natives, in their ignorance of another tongue, called their *Wan-li-chang*,—the wall of a myriad li, or miles. He opines that the imperial scheme for a northern barrier, whilst certainly begun, has never yet been accomplished. Here and there along the line exist certain walls, but these, he contends, are

either village fortifications or, at most, for use only as barriers in the particular defiles where they stand. The towers remain, he admits; but these, we are now told by the Abbé, were never connected together by solid masonry of any kind, are far asunder, and are constructed of earth, faced in some instances with brick. On the other hand, one or two correspondents of the daily papers write to say that they, as well as Mr. William Simpson, have not only seen some miles of the wall, but have sketched and measured it.

A NEW archway has just been built in lieu of the wooden gate which opened into King's Bench-walk, Inner Temple, from out of Tudor-street. It stands on the spot which we once hoped would be chosen for the re-erection of the stones of Temple Bar. The roadway here passes between Nos. 6 and 7, King's Bench-walk, whereof the outer walls have in part been rebuilt. Mr. Arthur Cates's design has been executed in Portland stone, under the direction of Mr. W. Oldrieve. It comprises a Palladian arch, between a side doorway and a two-storied tower, intended for a keeper's lodge, octagonal on plan. To secure free way to the lodge door the north-eastern corner of No. 7, in the Walk, has been played off. On the keystone's outer side is carved "1887." Over the side door-way is a panel carrying the ancient cognisance of the Templars in their humility, which is now commonly represented by the Pegasus, in a cinque-foil, of the Inner Temple. The carving is supported by two small shields bearing the coat-arms of the late and present Treasurers of that Honourable Society. Were the octagonal tower repeated on the northern side we should have a gateway somewhat like that, perhaps designed by Thorpe, on the great north road at Burghley House, by Stamford.

AT a meeting held on Wednesday, 24th August, in the Brixton Hall, a committee was appointed to urge upon the Lambeth Vestry and the Metropolitan Board of Works the importance of securing Raleigh House grounds as a park for the people. This finely-timbered pleasure-land, about 12½ acres in extent, was bought in at a recent auction for 39,000*l*. It is understood that it may be purchased for 40,000*l*., one half of which the Board of Works would be asked to contribute. The old property,—being a traditional home of Sir Walter Raleigh and situated in what was then known as Allington Hundred,—lies adjacent to Raleigh Hall, upon the northern slope of Tulse Hill. The river Effra, now flowing as a sewer, ran through the grounds, and a subterranean passage communicated with another old mansion upon the opposite side of the highway. Raleigh may justly be claimed among the worthies of Surrey: his memory is associated with West Horsley (where, in the south aisle of St. Mary's Church, it is said, his head lies with his son Carew); with Mitcham, where he sold his house for 2,500*l*. on proceeding to Guiana; and with Beddington. At Beddington Park, once the seat of the Carews, the orange-tree was first cultivated in England, the plants being grown from some seeds carried thither by Raleigh to his kinsman, Sir Francis Carew. We learn that a neighbouring and much more extensive estate, that of Brookwell, or rather Brookwell, Hall, is likely to be soon in the market, but this could only be rescued from the builders at a price of say about 100,000*l*. Meanwhile an effort is being made to secure, for Vauxhall, the Carron House and Lawn estates, which the freeholder, Mr. Cobeldick, has consented to sell for 47,500*l*.

MR. JAMES EMERSON, of Northallerton, has bought, for 80,000*l*., the remainder of Lord Ailesbury's Yorkshire estates. This portion consists of the Whorlton-in-Cleveland Castle and Swainsby property, in the Stokesley Union, North Riding. It embraces twenty farms with homesteads, and covers in all nearly 5,900 acres, whereof one-half is moorland. The rental is calculated at about 3,000*l*. a year. The whole estates have thus been disposed of.



by the trustees for a total sum of 532,000*l*. Whorlton Castle formerly belonged to the Barons Meinell, and is believed to have been rebuilt *temp.* Richard II. Over the main entrance are the arms of D'Arcy, Grey, and Meinell; but even in Camden's time the castle was old and in ruins. In the northern chapel (all of the older church of Holy Cross is a highly-ornamented canopy, beneath which is the oaken effigy of a knight, cross-legged. This is believed to be the monument of Sir Nicholas de Meinell, who, *temp.* Edward I., held the manor by fee of giving to the archbishop of Canterbury a drinking-cup for use by his grace on the day of his consecration. In King Charles I.'s reign the barony of Bruce of Whorlton was bestowed (August 1st, 1641) upon Thomas Bruce, third Lord Bruce of Kinloss and first Earl of Elgin. For services in the royal cause his son Robert was created Earl of Ailesbury, in the peerage of England, March 18th, 1664. He was ancestor to the Marquesses of Ailesbury.

WE lately had occasion to examine a variety of prints illustrating Inigo Jones's Church of St. Paul, Covent-garden, as it appeared before and after the fire of about ninety years since. The drawings comprise those by Hollar, John Sellar, C. Campbell (a full set, to scale), T. Malton (May 21, 1774), A. Pugin (plan, to scale, November 1, 1823), J. Maurer, Hogarth, &c. All of these, though one of Hogarth's imperfectly delineate the eastern end of the church as resting upon a platform or base, which is mounted from north, south, and east by flights of steps that are made within the area of the stylobate. Hogarth's print, being "Rich's Glory," shows a range of steps between the two inner columns, only, of the pediment, which is plainly an error. The steps, the two eastern doorways, and, within our own memory, the railing, have been removed. Whilst the roadway at Covent-garden is practically horizontal, the fall being 7 in., southwards, across the whole width of the church, the church's present condition here gives some idea of the effect that would result from removing the steps now at the western front of St. Martin's-in-the-Fields.

THE Metropolitan Board of Works seem anxious to do all they can to prove (what required very little proof) their utter unfitness to meddle with London architecturally. Their proposition for treating the central space adjoining Piccadilly-circus, about which a question was asked in the House of Commons by Mr. De Lisle (who seems to be a member who may do good service in regard to artistic matters), is simply idiotic. Here is a fine open space obtained in a crowded and central position, and the Board propose to block the traffic and shut out the possibility of a fine architectural *place* by putting in the centre a shapeless block of shops, presenting no architectural form, meaning, or beauty of any kind. If, as asserted in an evening paper, this is the scheme of the new Architect to the Board, Mr. Blashill ought to have known better, and we fear that his undoubted capacity for the office in a practical sense is not supported by the degree of architectural taste and feeling which are desirable in an official who may have so much power over the architectural treatment of new sites in London. Mr. Alan de Tatton Egerton, who answered Mr. De Lisle's question, said that though several schemes for dealing with the space had been before a Committee of the Board, no decision had been arrived at.

WE quote the following ominous paragraph from the *St. Albans Times*—

"THE ASSEY.—An ugly crack is visible above the eastern arch of the tower, both on its eastern and western face. It appears to the non-professional eye as though the south-east pier were sinking again. Possibly the alterations to the south transept have weakened it, or it may be that the increased weight in the tower is beginning to tell. It will be remembered that some years since additions of great weight were placed in the bell-chamber, and again, after the weight fell from the chiming apparatus, a new floor was added to the belfry, and a great many loads of gravel were placed between that floor and the old one. Or can it be that the

new cracks are wanted to prove the necessity of some other startling innovations in the way of 'restoration'! Experience teaches that when one part of the church approaches completion, some other part is found to be in a dangerous state and to urgently need attention! There seems to be only one opinion with regard to the wretched substitutes for the old turrets on the south transept, and that is that they are exceptionally ugly. It is to be trusted that whatever is done to secure the safety of the tower no attempt will be made to alter the character of the grandest Norman structure in England."

We are glad to observe that all the local papers are not under the thumb of Lord Grimthorpe. The tower is not perhaps truly called "the grandest Norman structure in England"; architecturally there are others that are finer objects; but it is unquestionably the most historically interesting and valuable. We have no doubt, however, that Lord Grimthorpe would be delighted to find an excuse to pull it down and set up a new tower designed by some clerk of works who would be willing to take his money and allow him to call himself the architect of it, unless something is done to tie his hands or those of the legal custodians of the building who have let him loose upon it.

#### LETTER FROM PARIS.

The monument which a committee has proposed to erect by subscription to Sergeant Bobillot, who was killed in the Tonkin war, has given occasion for a competition which was decided during last month. Only nineteen sculptors responded to the invitation of the Committee, to whom the City authorities had lent one of the rooms of the Hôtel de Ville for the exhibition of the drawings. The small number of competitors and the weakness and want of originality of most of the designs are results not in favour of the principle of public competition in cases of this kind. The leading sculptors do not care about spending their talents on the chances of a competition, and the juries, to say truth, are often far too much swayed by private interests or partialities. In this case great surprise has been felt and expressed that the design by M. Choppin should have been passed over. This sculptor was associated in the matter with M. Constant Bernard, Secretary of the Société Centrale des Architectes, who designed the pedestal, and the whole work was generally pronounced the best realisation of the character of monument required. But the jury, in which the political element was rather predominant, decided otherwise, and gave the prize to M. Auguste Paris, the author of the mediocre allegory of "1789," which was bought by the Municipal Council from this year's *Salon*. The statue by M. Paris, a commonplace affair, is to be cast in bronze and erected on the Boulevard Voltaire, on a pedestal of which the principal face shows, among palms and laurels, a sabre, leaves of paper, and a pen, in recognition of the fact that the young sergeant formerly belonged to the Parisian press.

At the École des Beaux Arts, the competition in construction has closed without any "première médaille" being awarded. The second-class medals have been awarded to M. Vallat, pupil of Douillard; M. Emery, pupil of M. Pascal; and M. Jost, pupil of M. André.

The competition for the painted decoration for the Mairie of the Sixth Arrondissement will be closed on the 30th of November.

There are to be placed, opposite the principal façade of the Hôtel de Ville, on two of the pedestals formed in the boundary-wall, two statues in bronze, of which we have already spoken, representing Art and Science; the first, which figured in this year's *Salon*, being by M. Marquette, the second by M. Blanchard. Artistic merits apart, it is generally agreed that the municipal palace would be better without these seated figures, which do not harmonise with the general style of the building. It is with these statues as with the lamps which have been placed on other pedestals in a similar manner; their outlines cut across the lines of the façade in an unfortunate manner. The Parisian building authorities, who formerly placed these adjuncts there at the suggestion of Viollet-le-Duc, are now regretting it, and are rather disposed to make a clean sweep of them: certainly no one would complain. If one is bent on reproducing an ancient building on its old lines, it does not answer to embellish

it afterwards with statues and ornaments which are out of keeping with the harmony of the structure, and Ballu made a mistake in adding to a façade in so pure and elegant a style a series of adjuncts the uselessness of which is daily more obvious.

Internally, the sculptural decorations of the immense Galerie des Fêtes is being pushed on in preparation for the balls and entertainments of the winter. The decorative portion of the ceiling is executed by M. Corboz. Many sculptors, among whom may be named MM. Moreau-Vauthier, Granet, Berthet, Perrin, Croisy, and Marioton, are completing their models of caryatides and seated figures to go along the coxes and around the spaces which are intended for pictorial decoration. On its part, and before separating for the vacation, the artistic committee of the Hôtel de Ville, of which we spoke in our last, has commissioned the two architects, MM. Deperthes and Formigé, to prepare, with the assistance of M. Lavastre, a general project of decoration, comprising this same gallery, the Salle des Caryatides and the neighbouring rooms, as well as the grand staircase, of which the ceiling has already been painted by the lamented Baudry. This same committee has resolved to utilise, in some of the reception-rooms, some of the fine tapestries belonging to the Municipality. Among the finest of these are "The Passage of the Granicus," and the "Entry of Alexander into Babylon," executed after the designs of Lebrun; two absolutely priceless fabrics, entitled "Les Chasses de Maximilian"; and lastly, the tapestries called "De St. Gervais," which had been improperly sold, twelve years ago, for the benefit of the church of that name, and the restitution of which to the Municipality was the occasion of a curious lawsuit, about which the art journals of that date were much interested.

*Apocops* of tapestries, the special museum of the Gobelins has been enriched recently by the acquisition of the Egyptian tapestries found in 1885 by M. Maspéro at Panopolis, near Thebes, where the first Coptic Christians of Egypt were buried. These very ancient pieces of work, which have been lately purchased by the State, are of great interest. Certainly, neither perfection of drawing nor variety of colouring can be looked for in these ancient examples, nor do they display the art and science of modern tapestry work, but in solidity and excellence of manufacture they show that modern industry has added nothing to this class of manufacture.

M. de Ronchaud, whose death we recently announced, has not been replaced at the head of the national museums, but there is talk of giving the appointment to the actual Directeur des Beaux Arts, M. Kaempfen, who has for many years been well known as an art-critic under the name of "Xavier Feyermet." In the meantime the void is filled, as far as the Louvre is concerned, by Admiral Paris, curator of the Musée de Marine, who has very naturally profited by the occasion to enlarge his own special department; but this provisional appointment is not likely to be permanent, and the worthy Admiral, whatever his technical knowledge in his own branch of work, is hardly equal to the situation of curator of a great art museum, a post which requires special faculties and special experience.

At the Gare St. Lazare the officials are now installed in the new pavilion at the angle of the Rue de Rome, and all the houses situated between the street and the Place du Havre are now in course of demolition to make room for the grand court, towards which M. Lisch is to erect a new façade, terminated, at the angle of the Rue d'Amsterdam, by a pavilion similar to that of the Rue de Rome. The result of this arrangement of the buildings will be to get rid of the stairs leading to the Salles d'Attente, which are such an inconvenience to passengers for Normandy, Brittany, and England.

The works for the new Bourse du Commerce, delayed for a long time by difficulties in regard to existing rights on the site, are now being actually pushed forward. The plans having been long completed, there is nothing more to wait for. The principal front facing the Rue du Louvre will have a pediment adorned with the arms of the city; above this will be a group of sculpture symbolising Commerce and Industry; on the ground-floor will be the police offices and the postal and telegraph offices. On the first and second floor will be 250 offices intended for general business, and having intercommunication by wrought-iron galleries. As the new Bourse



occupies the site of the old Halle au Blé, it is hoped that the architect, M. Blondel, will take steps, in conjunction with the Municipal Administration, to save the fountain called "De la Halle au Blé," near that edifice, which is the last remnant of the Hôtel de Soisson demolished in 1748, and was designed by Jean Bullant for Catherine de Medicis.

At the Exhibition works, the foundations of the Palais des Beaux-Arts and that for the "Arts Libéraux" are in preparation. These two edifices, which are similar in plan and arrangement, will each have a grand central nave surrounded by a gallery, and each will have a dome 55 mètres in height. Between these two buildings is to be formed the central garden on the Champ de Mars, in the middle of which will be a monumental fountain with three basins one over the other, surmounted by a statue of France standing on the prow of a ship and holding in her right hand a torch which at night will be lighted by electricity. Beside her will be figures representing Science, Art, Industry, and Agriculture; at her feet, seated amid reeds, will be a figure representing the Seine, while Triton and Nereid figures disposed along the lower basin will represent the principal rivers of France. The piers of the Eiffel Tower have risen to a height of 15 mètres, and we are officially assured that it is to attain to 30 mètres by the 1st of January, and that it will be completely finished before the end of 1888.

In connexion with the Exhibition, definite arrangements have been officially made in regard to the work of the committees whose business it will be to organise the lectures on literature, art, history, archaeology, science, political economy, sanitation, public works, in short, upon everything that can be made the subject of a lecture, during the progress of the Exhibition. In the section of fine arts, the organisation of these lectures will be entrusted to MM. Bailly, Bonnat, Chaplain, Claretie, Masseuet, Louis Gosse, Gounod, Eug. Guillaume, and Meissonnier. In the section of history and archaeology, the managers will be MM. Gaston Boissier, Duruy, Fustel de Coulanges, Maspéro, Georges Perrot, Rambaud, Reinach, and Albert Sorel. The choice is an excellent one, and a set of lectures on these subjects, under the organisation of such a committee, will probably have a real value for learned visitors. An attraction of a different kind is to be furnished by two well-known artists, M. Alfred Stevens and M. Gervex, who have obtained authorisation from the Government to instal, on a part of the Tuileries site, an immense panoramic decoration, the cartoons for which are already finished, and which will consist of a kind of illustration of the period from 1789 to the present day, including portraits of more than 1,800 persons celebrated in politics, art, science, the army, &c.

Contrary to general expectation, it is the old Théâtre Lyrique, lately become the "Théâtre de Paris," which seems destined to receive the homeless company of the Opéra Comique, till the rebuilding of their own house. This theatre, which the Municipality seemed disposed to let to the State, rather than the Galté, is situated on the Place du Châtelet,—that is to say, a long way from the boulevards and from the fashionable quarter of Paris,—a circumstance not in favour of the success of the enterprise. Like the Du Châtelet Théâtre, which faces it, the Théâtre de Paris is the work of M. Davioud. It was inaugurated in 1862, burned in 1871 during the Commune, and rebuilt in 1872 by the same architect. The exterior façade is richly decorated in the style of the Italian Renaissance. The salle, which is decorated with paintings by M. Theodore Maillot, contains 1,600 seats,—a little less than the Opéra Comique; but its acoustic properties are excellent, and its means of egress are ample for public safety.

Now that the metropolitan railway seems, in spite of the vast petition movement organised in Paris in favour of it, to be adjourned to the Greek Kalends, public opinion is a good deal occupied about a scheme, not likely to be realised for a good many years to come, which would, however, exercise an immense influence on the commercial power of the capital. We refer to the maritime canal which the Engineer of the "Ponts et Chaussées" Department, M. Bouquet de la Grye, proposes to establish between Clichy and Rouen, for a total length of more than 185 kilometres, and which, with a minimum depth of 6 mètres, would permit all

the shipping which now stops at Rouen to come right up to Paris. The cost is estimated at 130,000,000 francs. The Municipality is greatly in favour of it, and, indeed, there is a large section among the deputies who are prepared to claim the condition of "urgency" from the Government for it.

The Conseil Général of the Seine is about to vote also for work of considerable importance, to render navigable that portion of the Marne known as the *boucle de la Marne*. This will be a very useful improvement, the total cost of which will be about 1,400,000 francs. It will be of great service to the whole of the country to the east of Paris, and will also have the advantage, with a regular service of steamboats, of permitting tourists to visit the beautiful country traversed by this tributary of the Seine.

The ninth exhibition of the "Union Centrale des Arts Décoratifs," though not yet completely organised, is likely to prove of special interest, as it will be at once retrospective and international, thanks to the co-operation of the museum authorities of Berlin, Vienna, Brussels, Buda-Pesth, and South Kensington. The tasteful decoration of the nave of the Palais d'Industrie contrasts agreeably with the vulgarity of the industrial exhibitions which take place there annually. The pavilions for special exhibits, distributed among the trees of the garden, have a picturesque effect and great variety of construction, and the first-floor galleries, reserved for foreign exhibits and for those of the Union Centrale, are connected with the ground-floor by two staircases,—too grand for the occasion, perhaps, but the design and decorations of which are highly creditable to those who are responsible for them.

The death is announced of the painter, Eugène Médard, who has died from the effects of a painful malady, at the age of thirty-eight. He had studied successively under Léon Cogniet and with M. Gérôme, obtained a medal of the third class, 1879, and one of the second class in 1886. He made a speciality of battle pictures, and had exhibited in the Salon of 1886 a "Combat dans un Village," and the "Bataille de Buzenval," which was purchased by the State. These were his last exhibited works.

We may end with a piece of good news for archaeologists.\* The Château d'Anet, which is one of the architectural wonders of the Renaissance, is, it appears, to be rebuilt after the plans of Philibert Delorme. After the death of Diane de Poitiers, for whom Henry II. had it built in 1548, the château passed into the hands of different proprietors. At the Revolution it was confiscated, and sold in 1798 for 3,200,000 francs. Nothing of its past glory really remains save some ruins, a fine gateway, some sculptures by Jean Goujon, and the remains of a staircase. The ancient gateway of the interior court of the château has been rebuilt in the court of the École des Beaux-Arts.

#### BUCKINGHAM PALACE AND THE QUEEN'S JUBILEE.

On the 13th of July, 1837, her Majesty first entered into residence at Buckingham Palace. Ten years later, the St. James's Park front, 360 ft. in length, was added by Blore to the three sides of Nash's fabric. Sir Robert Peel had represented to the Government that the then existing accommodation proved inadequate to the requirements of an increasing royal family. So the eastern railings were set forward, and the Marble Arch, which cost 80,000*l.*, and had been modelled after that of Septimius Severus at Rome, was in 1851 removed to Cumberland Gate. Blore's estimate of 150,000*l.* for the new works included certain rearrangements in the northern and southern wings, new kitchens, &c. The southern ball-room was added afterwards. John Nash's palace was erected during the reign of George IV., and completed *temp.* his successor. It is said to have been never occupied by the Queen's immediate predecessor on the throne. The original Buckingham,—or, to speak more

correctly, Buckinghamshire, House was built in 1703, from the designs of Captain Wynde or Wynne, pupil and executor of Inigo Jones, and architect of Newcastle, or Powis, House, Lincoln's Inn-fields.

A print of 1819 in our possession corresponds with the description of the house given by Hatton. It was built of red brick, in three floors; and had two wings, of two floors and attic story, with which it was connected by circular arcades. The principal elevation had nine windows to each course, with two ranges of four pilasters, of the Corinthian and Tuscan orders, the latter being above. The wings, serving for servants' lodgings and for the kitchen and laundry respectively, were, as also the arcades, fronted with pilasters of the Tuscan, Doric, and Ionic orders. This house, eulogised by De Foe in his "Journey through England," had been erected on the site of Arlington (Goring) House, the town residence of George and his son Charles (Goring), Earls of Norwich, which, in 1648, had been allotted to Speaker Lenthall. On September 21, 1674, it was, as Evelyn tells us, consumed by fire. Lord Arlington's property here passed to his daughter and heir, Isabella, Duchess of Grafton. She first let it to William, fourth earl and first duke of Devonshire, and subsequently sold it to the Duke of Buckinghamshire and Normanby.

Having its main entrance towards the south, Goring House stood over the south-eastern corner of the Mulberry Garden, which is at this date represented by part of the palace grounds, wherein a garden-party was lately given by the Queen. Emulating the example of Henri Quatre, whose enthusiasm had been fired by Oliver de Serres's work, 1599, upon silk-worm rearing, James I. issued a circular to all provincial authorities, requiring them to provide for the planting of mulberry trees in various parts of the realm. To such encouragement of home manufacture of silk the king was further moved by a desire "to draw his people from idleness and the enormities thereof." He set about this project, on his own account, by walling in rather more than four acres of St. James's Park, close by the course of the Tyburn. Charge of the plantation, together with a sum of 950*l.*, and an annual subsidy of 120*l.* for expenses, was committed to William Stallenge, Comptroller of Customs, and a successful rearer of silkworms in a venture of his own. In 1629, Lord Ashlon was appointed Keeper. He sold his office for 408*l.* to George Goring, and with it, apparently, the site of Goring House. At the sale of Crown lands during the Civil War the garden was bought by Anthony Dean, of St. Martin-in-the-Fields parish, a prosperous shipwright at Harwich and Woolwich. Dean sold his lot to one Chipp, who retained it throughout the Commonwealth. It was during Chipp's possession that the Mulberry Garden was resorted to by pleasure-seekers whom Cromwell had ousted from Spring Garden. Henceforth, by name of Colby's Mulberry Garden, it became for a while the most favourite haunt of the kind in town. Its vast popularity, coupled with the perhaps not always perfectly correct deportment of the visitors, is fully vindicated by the comedies and other light literature of the period. Here Sir Charles Sedley found name and inspiration for the comedy he dedicated to one of the garden's chief votaries,—*la belle Stewart*;—and hither came many a prototype of Shadwell's *Misadames Striker and Ericks*. Evelyn has sighed for us at the ladies' addition to ronge; so, leaving Pepys to enjoy the *olla podrida* prepared for his party by my lord of Sandwich's cook, and Dryden to Mistress Anne Reeve's good company, we will turn to some matters that are less familiarly known.

In the year 1666, Lord Arlington had taken Goring House. He dates hence, on June 1, 1672, an interesting account of the engagement in Southwold Bay (28 May). At the death of Charles Goring without male issue in 1670, the gardens were demised at a yearly rent of 1*l.* to Lord Arlington. Within a year or so they ceased to be visited by the public. By a conveyance dated November 22, 1681, he buys the site of his house and the adjoining grounds from Sir Thomas Grosvenor, Bart., for 3,500*l.* Westwards thereof lay an orchard and kitchen-garden that had been in tenure by the rich Hugh Audley. In 1689, Arlington House was

\* Circular to Sheriffs, Deputy-Lieutenants, &c., Harl. MS. 728.

† Edward (Bennet), Baron Arlington, 1683; advanced Viscount Thetford and Earl of Arlington 1672.



from the Duchess of Grafton by John Sheffield, Duke of the County of Buckingham. In his plans for rebuilding, he largely consulted the convenience and comfort of his beloved and third wife, Katharine Darnley, widow to James (Annesley), third Earl of Anglesey, and daughter of Katharine Sedley, King James II. The Duke died on February 24, 1721; his widow, who set great store by her royal descent, on April 8, 1743. Their only surviving son Edmund, died at Florence, October 30, 1735, devising to his mother all his Yorkshire estates. They were inherited by her grandson Constantine Phipps, at Lord Mulgrave. This Constantine was married to Lady Katharine Annesley, a daughter of the Duchess by her former marriage, by her union with William Phipps in 1718. Constantine Phipps, elevated Baron Mulgrave, September 3, 1767, had married (1743) Molly, eldest daughter of John Lord Hervey,—"Youth's youngest daughter, sweet Lepel."

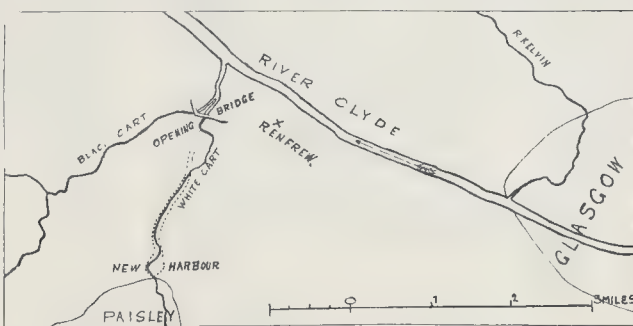
We are thus brought to an important, and we believe novel, chapter in the history of Buckingham House. By an indenture of June 1, 1741, the Duchess conveys it in trust to Thomas Mulcald, Zachary Chambers, and George Springer. This indenture recites, by the way, that by letters patent of September 28th, 1736, Charles II., the king had let, for ninety-nine years, running from St. John the Baptist's day, that piece of land called the Mulberry garden in the parish of St. Martin-in-the-fields. Reserving her own life benefit therein, she assigns the property upon such trusts as she shall by deed or will determine. By a deed of even date with the indenture she appoints it in trust for Lord Hervey's benefit; and in the event of his not, within six months of her decease, formally signifying acceptance of the limitation, she appoints it to her executors for four years from her death, on trust, in favour of such persons as she should direct. After the said four years, and after Lord Hervey's death, in case he should accept such limitation, the lease and premises were to go for default to her residuary legatees, in trust; and for default, then in trust to the person ultimately entitled to her personal estate. By her will, dated February 15, 1742, the Duchess devises all her personal estate to Constantine Phipps, and bequeaths her leasehold estates in Yorkshire in trust to him and his heirs. It is commonly stated that Hervey did not care to take possession. This statement hardly coincides with an "answer," sworn April 3, 1744, by Constantine for self and for his wife, then an infant, in certain Chancery proceedings (Sheffield v. Earl of Orrey) instituted against them and the executors of the Duchess's will to obtain possession of the house. The answer clearly sets forth that very soon after her death Lord Hervey did take possession thereof, and continued in possession until his death on August 5, 1743. The Sheffield of the suit is Charles Herbert, to whom, being then "under the tuition of Mons. Brézy, de Utrecht," the Duke, by his will of August 9, 1716, left the house, failing lawful issue. Herbert, a natural son of the Duke, took the name of Sheffield, in terms of clause 11 of his father's will. Lord Hardwicke's decision of December 4, 1745, was in his favour on all points. He was created a baronet on the 1st of March, 1756. In the Suffolk Papers may be read a letter (August 1, 1723) to Mrs. Howard, wherein the Duchess rehearses the terms in which she is disposed to part with the house to the then Prince and Princess of Wales. The negotiations fell through, but in 1761 the house was bought for £1,000, of Sir Charles Sheffield, and settled upon Queen Charlotte, by the name of "The Queen's House," in lieu of Somerset (or Denham) House, in the Strand.

We may add that the effigy of "La Belle Stewart" (Duchess of Richmond), made by a Mrs. Goldsmith, together with those of the Duchess of Buckinghamshire and her son, are still preserved amongst the "wax figures" at Vestminster. The bodies of the two latter rest in the Duke's tomb in Henry VII.'s Chapel. Pope's epitaph for the Duchess was never inscribed on the monument; that by the Duke or himself is a memorable composition, and has occasioned a considerable amount of theological discussion. The lines are altered somewhat from their wording as originally composed. In clause 13 of his will they stood as follows:—"Pro rege saepe, pro republica semper." Dubius, sed non improbus vixi / Incertus

morior, sed intarbatas / Humanum est necire & errare / Christum advenor, Deo confido / Omnipotenti benevolentissimo / Eas entium miserere mei!"

#### RIVER CART NAVIGATION WORKS.

This undertaking, for which an Act was got last year and the contract operations of which are now in active progress, furnishes a practical and convenient example of that canal-making for inland ship navigation purposes which has of late been engaging so much attention all over the world. A work, comparatively speaking, of very moderate compass longitudinally, it is yet essentially typical in its conditions and aims, and may indeed in some sort be called the Mersey and Manchester scheme on a greatly reduced scale, and with certain differences in principle, of course. The Cart,—or, to be more precise, the "White Cart,"—falls into the Clyde near Renfrew, six miles below Glasgow, after having passed the town of Paisley three miles inland, and subsequently received the Black Cart as a tributary. The latter branch is not



Map showing Bearings of Paisley Ship Canal.

navigable in any practical sense. Over these three miles below Paisley the course of the White Cart is through an alluvial deposit of low general elevation and very nearly flat, the channel itself being tidal as high as the town. In spring tides and during floods the Cart in this its lower section has always been navigable in a kind of way for very small craft, even back to remote times. The inhabitants of Paisley, which is a place of some antiquity, long ago recognised the possibilities of their river, and in 1786 they actually set to work on the original channel, and in a rough and ready way deepened it to about 7 feet ordinary spring tides. Some further trifling repair work was done in 1836: and in 1853, agitation again coming to a head, estimates were taken for works to provide a uniform high-water depth of 12 ft. But nothing was done. Two years ago this perennial speculation on the lasting good to be derived from a purposeful enlargement of the river's course once more assumed the acute stage, and so much enthusiasm was aroused that nothing short of a scope of work which would give access to ocean-going ships, and equip the town for setting up as a kind of humble rival to Glasgow, could now satisfy the revived enterprise of the magistrates and merchants of Paisley. The necessary Act was promptly procured, and six months ago ground was broken. Paisley is a populous town of swift and steady growth, with a large and increasing share of many varied industries. It has even cultivated the building of steamers (small ones necessarily) on the banks of its puddle of a stream; and if once made a seaport *de facto*, it is expected that vessels of almost the highest class will be built on the newly-made banks, while, at the same time, the town will figure as an independent emporium, in direct touch with all the great ports of the world. If the Paisley experiment succeeds, many towns of similar geographical position and promise will no doubt be found likewise engaged in operations for bringing the neighbouring deep-sea tide to their own doors. The channel of the Cart has hitherto been less than 90 ft. wide on the surface, with variable depth, and a liability to shoal at points; the banks unkempt, destitute of trees, and presenting, particularly at times of fallen tide, an aspect the most unlovely it

is possible to conceive. One fortunate feature, however, in view of an adaptation to ship-canal purposes consisted in the absence of important crossings, the requirements of one bridge only, and that an opening bridge, having to be met all the way from Paisley to the Clyde outlet. With the exception of a now cut to clear an awkward bend of the original course, the works keep to the line of the river, which otherwise is a fairly straight one. Part of the requisite widening elsewhere is got by shaving away the left or west bank, but in following the natural trend of the stream much the larger portion comes off the other side. The finished result will be a channel with little of curve in it, 180 ft. wide at the surface, and possessing a centre depth of 18 ft. at high water. A towing-path, 20 ft. wide, will follow the right margin of the work from the Clyde outfall up to the new Paisley Harbour, the site for which has been chosen at a point which just stops short of the houses of the town. This harbour, a rough oval in shape, is formed by exaggerating the nominal breadth of the channel to a maximum width of 340 ft. at the widest section, and it is flanked on the west

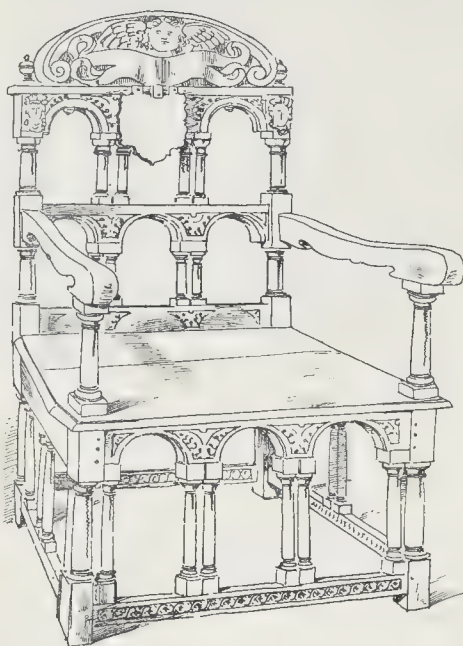
side by 820 ft. of strong quay wall, and on the east by 1,100 ft. of the same. Operations under the contract will terminate immediately above the new harbour in a sunken weir, preserving the upper and untouched portions of the stream *in statu quo*. Borings over the course of the river show that the materials to be got rid of by excavation, dredging, and blasting, consist largely of sand and gravel, with some boulder clay; also a good deal of sandstone rock in the upper reach. The quay walls of the harbour are faced with a 24 ft. height of granolithic blocks, springing from a concrete base, 2 ft. thick, the interior consisting of concrete rubble. No locks of any kind enter into the plan of the works, and in this highly-important respect the new harbour of Paisley will offer an access from the ocean quite as unimpeded as that afforded by the older neighbouring harbour of Glasgow. Operations have been in progress since the beginning of the year, and the contractors have already made conspicuous mark on that portion of the removable strata situated above low-water line. It is expected that full completion will be reached by the autumn of 1889. Messrs. Miller & Bell, Glasgow, are the engineers; Mr. John Kyle, resident works engineer; and the contractors are Messrs. Mitchell & Ireland.

**The Pharmaceutical Society's New Building** in Bloomsbury-square, for the Pharmaceutical Society of Great Britain (Messrs. Lansdowne & Harris, architects), is now rapidly drawing towards completion. With regard to the sanitary arrangements and the ventilation, Messrs. Robert Boyle & Son's system is being applied throughout. Boyle's patent heating tubes are also used for warming the fresh-air supply to the large Examination Hall.

**Civil and Mechanical Engineers' Society.**—We are asked to mention that the offices of this society have been removed to No. 6, Queen Anne's-gate, Westminster, and that in future the meetings will be held at that address.

**Royal Victoria Hall and Coffee Tavern.**—The above hall, formerly the Victoria Theatre, Waterloo-road, has been closed during the last three months for thorough re-decoration and renovation, and has now been opened.





"DRAKE'S" CHAIR.



THE "PORTESCUE" CHAIR.

Chairs in the Bodleian Library, Oxford.

## TWO CHAIRS FROM THE BODLEIAN LIBRARY.

The two chairs here given are in what is known as the "Picture Gallery" in the Bodleian Library.

The earlier of the two is a fine specimen of carved work, and is called the "Portescue" chair, and "probably formed a part of the furniture of 'Saldon House,' Mursley, Bucks, the seat of Sir John Portescue, the friend of Sir Thomas Bodley, and the Chancellor of the Exchequer in the time of Queen Elizabeth" (vide card attached to chair). The total height of the back from the seat is 2 ft. 8½ in., and 1 ft. 9½ in. in breadth. The seat itself increases to about 2 ft. in the front and is 1 ft. 3½ in. from the floor.

The second chair, or "Drake's," was made out of some of the wood from the ship which took Drake round the world. There is a curious inscription written on the brass shield in Latin on one side and English on the other. The latter runs as follows:—

"To this great ship which round the world has run,  
And match'd in race the chariot of the sun,  
The Pythagorean ship (for it may claim  
Without presumption so deserved a name),  
By knowledge once, and transformation now,  
In her new shape this sacred port allow.  
Drake and his ship could not have wail'd from Fate  
A happier station or more blest estate,  
For, lo! a seat of endless bliss is given  
To her in Oxford, and to him in Heaven."

ABRAHAM COWLEY, 1662.  
Sent to the University of Oxford by order of John Davis, Esq., the King's Commissioner at Deptford."

The total height of the chair is 3 ft. 10½ in., the back being 1 ft. 8½ in. in breadth, and the seat 1 ft. 11 in. in front between the arms, and 1 ft. 8½ in. in depth. The back leans back slightly, and realises to some extent the last line but one of the inscription, being very comfortable to sit in.

**West Malling.**—A stained-glass window, to commemorate Her Majesty's Jubilee, has recently been placed in Addington Church, West Malling, by the parishioners. The window is of two lights, and contains figures of SS. Alphege and Frances, surmounted by architectural canopies, and was designed and executed by Messrs. Warrington & Co., of Fitzroy-square.

## OPENING OF THE ACTON DRAINAGE WORKS.

THESE works of sewage disposal, designed by Mr. William Nicholson Lailey, Surveyor to the Acton Local Board, were formally opened on Thursday in last week by Mr. William Roebuck, C.E., Chairman of the Board, in presence of a large company of gentlemen interested in the treatment of sewage.

Several months ago a detailed account was given in the *Builder* of some experiments in the treatment of sewage under the ferrous-carbon system, which is promoted by the International Sewage Purifying Company. The Acton Board has entered into a provisional agreement for seven years with this Company to treat the sewage of the parish at the new sewage works, occupying a site of five acres and a half in the vicinity of the town. It should be explained that Acton is at present allowed to use as a sewage outlet an old water-course (Stamford Brook), which now forms a sewer of the Metropolitan system; but this privilege only extends to the sewage of houses built before a certain date; and the drainage scheme now constructed has only to deal with the sewage of houses erected after that specified date. None of these latter houses have been connected with the new system, but the work will now be gradually proceeded with. In order to demonstrate the method of the new process, described as the magnetic-ferrous-carbon system of treating sewage, the Stamford Brook was tapped and the sewage allowed to flow into the works. The surroundings of the works are so admirably laid out with well-stocked flower-beds and carefully-gravelled paths, and the buildings, which include a commodious house for the resident superintendent, are so compactly arranged and pleasant in appearance, that the visitor at the first approach can scarcely resist the impression that he is not within the precincts of some wealthy-endowed benevolent institution. Some of the substantial details of the works have already been given in the *Builder*, but it may be here mentioned that in most similar schemes there are two levels for the sewers,—a high and a low. The high level sewer conveys the sewage from the high land in the north and north-west and

north-eastern districts of the parish; and the low-level sewer conveys the sewage from the South Acton district. The sewage is discharged into a channel extending along one side of the precipitating-tanks, of which there are five, three with a capacity each of 133,282 gallons, and two of 72,150 gallons. The low-level sewage is pumped into this channel from a well 36 ft. deep by means of two non-condensing engines, 35-horse-power, erected by Mr. James Watt (late Boulton & Watt), Soho Works, Birmingham. Running parallel with this sewage channel is a small narrow upper channel, which receives the chemicals from the mixing-room, and which, by means of a series of equidistant arms or spouts, delivers the chemicals, the compound sewage salt, and the ferrous-carbon in the form of a slurry or thickish black liquid into the lower channel at various stages of the progress of the sewage towards the precipitating-tanks. It was interesting to notice the crude sewage as it passed along this open channel rapidly undergoing chemical change. A great portion of the organic matter is here coagulated with the chemicals, carrying away all the matter in suspension, and the grosser portion of the company's solution still in the shape of ferrous iron. This coagulation is due to the presence of the compound salts, which consist of certain proportions of sulphate of alumina, sulphate of calcium, and sulphate of magnesia. After the coagulation takes place, then the ferrous salts come into play, defeating the organic matter in solution. The magnetic ferrous carbon impregnates the fluid portion of the sewage, preventing decomposition. The treated sewage is then allowed to stand in the tank about three hours. The mode in which sewage is here passed into the tank is worthy of observation. The experience of the Company has led them to the belief it is better that the coagulation once formed should not be broken up, and consequently the treated sewage is passed into the tank with as little agitation as possible. With that object in view, Mr. Lailey devised a shoot, the lower end resting on a flushing-platform, so that the sewage slips down it at an easy incline, inasmuch as the platform rises with the sewage in the tank. This shoot also prevents the incoming sewage from stirring up the sludge as soon as it is













med, which sometimes happens when the dge is allowed to fall freely into the tank. e purified effluent water is drawn from the k by means of a floating suction, which aw the effluent from the surface without urbing the sludge at the bottom of the tank. ough the precipitated effluent is of a reddish e, due to the presence of iron, it would not, is contended, be detrimental to any stream o which it may flow, but the company assert at, for the production of a bright pure effluent, tering through their prepared beds is neces- y. Accordingly, one of the small tanks has n converted into a filtering bed, composed the following layers,—4-in. agricultural in-pipes, packed close together, with shingle id in between them; 4 in. of pea gravel; n. of sand; then a layer of 10 in., composed 5 in. of magnetic spongy carbon and 5 in. sand and gravel, thoroughly mixed together. ove this is a layer of sand 9 in. in thickness, d on the top of the filter is spread 1 in. of coarse agnetic spongy carbon. The liquid sludge is rept into a well, from which it is afterwards upped into a rotary agitator capable of contain- g 11,000 gallons, for the purpose of a further ixture with the company's chemicals, and so nsuring the impossibility of putrefaction taking ace in the sludge after being pressed. Sludge as hitherto been made by the addition of ten fifteen per cent. of lime, without which it ould not press in the ordinary press. The mpany contend that by their chemicals they ain all the original manurial properties of e sludge which are driven off by the lime, hich liberates the ammonia and renders the ophosphoric acid insoluble, and, therefore, of no se for plant life. The pressing plant cons- ts of two of Drake & Muirhead's (Maidstone) atent filter presses consisting of thirty ambers of 3 ft. internal diameter by 14 in. ick. The sludge is forced direct into the resses, without the employment of compressed r, by specially designed duplex steam pumping gines, which are automatic in their action, he cakes when pressed fall into wagons, which n on rails to the grinding-room, where they re ground into a powder, which is put into rgs and sold as manure.

Mr. William Swaker ably superintended the rrying out of the whole of the details of these rks.

**The Lambeth New Workhouse Build- ings.**—An extensive block of new buildings is ow in progress in Prince's-road, Lambeth, for e Guardians of the Parish of Lambeth. The ildings are being erected on the site of the ld Workhouse, the greater portion of which as been taken down, and are chiefly intended s a test-house for able-bodied paupers, the ruardians having decided that in future the resent Workhouse off Lower Kennington-road hall in the main be appropriated to the aged nd infirm. Including the eastern portion of e old building, which has not been removed, he structure will have a frontage to Prince's- ead of about 300 ft. in length, and, being rried to a depth of 184 ft., will occupy a round area of upwards of 55,000 ft. The Prince's-road frontage contains a deep basem- nt and three floors, the blocks in the rear containing one floor only. On the ground floor e of the block fronting Prince's-road are the inmates' day rooms,—six in number,—three for men on the west side, and also three for women on the east side, the master's offices eing in the centre. All the upper floors will contain the dormitories. The one-story blocks at the rear will contain several work- shops, oakum room, and hand-mill house on the male side; whilst on the female side is the laundry block. At the extreme rear in the centre is the inmates' dining-room, an apartment, 50 ft. by 30 ft.; a floor above this eing appropriated for the chapel. The basement of the front block contains the male and female receiving wards and officers' rooms, and stores; and also a number of work-shops. An open area in the centre, enclosed by the several blocks, contains six yards for the use of the male and female inmates, these yards being appropriated to the paupers, who are intended to be specially classified according to character and physique. Mr. T. W. Aldwinckle, of East India-avenue, E.C., is the architect; and Mr. W. Smith, of the Eldon Works, Harleyford-road, is the contractor. Mr. W. Chutter is clerk of the works. The estimated cost of the buildings is 20,000l.

THE INSTITUTION OF CIVIL ENGINEERS.

SUBJECTS FOR PAPERS.—SESSION 1887-88.

THE Council of the Institution of Civil Engineers invites original communications on the subjects included in the following list, as well as on any other questions of professional interest. For approved papers the Council has the power to award premiums, arising out of special funds bequeathed for the purpose, the particulars of which are as under:

1. The Telford Fund, left "in trust, the interest to be expended in annual premiums, under the direction of the Council." This bequest (with accumulations of dividends) produces 230l. annually.
  2. The Manby Donation, of the value of about 10l. a year, given "to form a fund for an annual premium or premiums for papers read at the meetings."
  3. The Miller Fund, bequeathed by the testator "for the purpose of forming a fund for providing premiums or prizes for the students of the said Institution, upon the principle of the 'Telford Fund.'" This fund (with accumulations of dividends) realises 150l. per annum. Out of this fund the Council has established a scholarship,—called "The Miller Scholarship of the Institution of Civil Engineers," and is prepared to award one such scholarship, not exceeding 40l. in value, each year, and tenable for three years.
  4. The Howard Bequest, directed by the testator to be applied "for the purpose of presenting personally a prize or medal to the author of a treatise on any of the uses or properties of iron, or to the inventor of some new and valuable process relating thereto, such author or inventor being a Member, Graduate, or Associate of the said Institution." The annual income amounts to nearly 16l. It has been arranged to award this prize every five years, commencing from 1877. The next award will therefore be made in 1892.
- The Council will not make any award unless a communication of adequate merit is received, but will give more than one premium if there are several deserving memoirs on the same subject. In the adjudication of the premiums, no distinction will be made between essays received from members of the Institution or strangers, whether natives or foreigners, except in the cases of the Miller and the Howard bequests, which are limited by the donors.

List.

1. The Utilisation of Unused Sources of Power in Nature,—such as the Tides, the Radiant Heat of the Sun, &c.
2. Tacheometry, or Rapid Surveying.
3. The distinguishing qualities of Clay to make good Puddle.
4. Colonial Woods suitable for Engineering purposes.
5. The Influence of Sea-Water upon Portland-Cement Mortar and Concrete.
6. The Wind-Pressure upon Structures, as influenced by (1) their superficial area; (2) the form or position of the exposed surfaces; (3) the shelter of adjacent bodies; and (4) the dynamic action of sudden gusts upon elastic structures.
7. The Working-Strength of Iron and Steel as affected by (1) the amplitude; (2) the frequency; and (3) the time-rate of the stress-variations.
8. Description of any new or peculiar form of Mountain Railways for very steep gradients.
9. Recent Irrigation-Works in California.
10. Machinery and Arrangements for Distilling Water by Multiple Effect.
11. The effect of different Qualities of Water on the condition and duration of Cast-iron Pipes.
12. On the Sale of Water by Measure.
13. Uniformity in system (international) of Const. Lighting by lighthouses, light-vessels, and their auxiliaries, automatic light buoys and buoys.
14. Recent Improvements in Cable Tramways.
15. The Present Position of the Manufacture of Steel,—its defects, and suggestions for its improvement.
16. The action upon Basic Steel of (1) Chromium; (2) Aluminium; and (3) Tungsten.
17. The Use and Testing of Open-hearth Steel for Boiler-making.
18. The Production of Aluminium and its Alloys, with their Properties and Uses.
19. Manganese in its application to Metallurgy.
20. Improvements in Zinc-Smelting.
21. The Application of Steel Castings and of Steel Forgings to the Construction of Ordnance and of Projectiles.
22. Rapid-Firing Guns.
23. On Forging by Hydraulic Pressure.
24. The most recent types of (1) Mail Steamers; (2) Cargo Steamers; and (3) War-ships.
25. On the Use of Liquid Fuel for Steam-Boilers and other Industrial purposes.
26. The Independent Testing of different types of Steam-Engines, including Triple-Expansion and Quad-rupte-Expansion Engines.
27. The Construction of the Working Parts of Steam-Engines, in relation to the high pressures and temperatures now becoming general.
28. The practical limit to the Working-Pressure of Steam in Marine Boilers.
29. Auxiliary Engines Connected with the Modern Marine Engine.
30. On Speed Indicators for Locomotives.
31. The Construction and Efficiency of Steam-Turbines.
32. The Transmission of Steam underground in the United States, with the results obtained.
33. Hydraulic Pumps for Working at High Pressures.
34. The Relative Economy of various modes of distrib- uting Power over large Areas.
35. Descriptions of Hydraulic Rams and of Turbines, with actual quantitative results.
36. The means of governing and economizing high- pressure fluid in Hydraulic Cranes, Engines, &c.
37. Tools used in the Building of Iron and Steel Ships, and in the Construction of Boilers.
38. Type-Composing and Distributing Machines.

39. On Natural Gas, and its applications to the Industrial Arts.

40. Compressed Oil-Gas, and its applications.
41. On the Spontaneous Combustion of Coal in Ships.
42. Appliances for the rapid Shipment of Coals, with a comparison of different methods.
43. Electro-Motors: their theory, construction, effi- ciency, and power.
44. The Construction and Maintenance of Secondary Batteries.
45. The Distribution of Electricity for the Lighting of Towns.
46. The application of Electricity to the Working of Street Tramways.
47. The application of Electricity to Smelting and Metallurgical Operations.
48. Means of Insuring the Safety of Blasts in Explosive Atmospheres.
49. Contributions to the Bibliography of special branches of Engineering.

PREMIUMS AWARDED, SESSION 1886-87.

The Council of the Institution of Civil Engineers has awarded the following premiums:—

The Howard Quinquennial Prize to John Percy, M.D., F.R.S., Hon. M.Inst.C.E., in recognition of his researches on the Uses and Properties of Iron.

For Papers Read and Discussed at the Ordinary Meetings.

A Telford Medal and a Telford Premium to Alexander Blackie William Kennedy, F.R.S., M.Inst.C.E., for his paper on "The Use and Equipment of Engineering Labora- tories."

A Telford Medal and a Telford Premium to John Hopkinson, Jun., M.A., D.Sc., F.R.S., M.Inst.C.E., for his paper on "The Electric Lighthouses of Macquarie and of Tino."

A Telford Medal and a Telford Premium to Colonel Bardsley Maitland, R.A., C.B., Assoc. M.Inst.C.E., for his paper on "The Treatment of Gun-Steel."

A Telford Medal and a Telford Premium to William Willocks, M.Inst.C.E., for his paper on "Irrigation in Lower Egypt."

A Watt Medal and a Telford Premium to Edward Arnot Clowen, for his paper on "Printing-Machinery." A Telford Premium to William Joseph Dibdin, F.C.S., F.R.C. for his paper on "Sewage-Sludge and its Disposal."

A Telford Premium to William Sam Crisp, Assoc. M.Inst.C.E., for his paper on "Filter-Presses for the Treatment of Sewage-Sludge."

A Telford Premium to John James Webster, M.Inst.C.E., for his paper on "Dredging Operations and Appliances."

A Telford Premium to John Kyle, M.Inst.C.E., for his paper on "The Colombo Harbour Works, Ceylon."

The Manby Premium to Lewis Henry Ransome, Stud. Inst. C.E., for his paper on "The Conversion of Timber by Circular-saws and by Band-saws in the Pine-growing districts of the United States."

For Papers printed in the Proceedings without being Discussed.

A Telford Medal and a Telford Premium to John George Gamble, M.A., M.Inst.C.E., for his paper on "Water Supply in the Cape Colony."

A Watt Medal and a Telford Premium to William Innes East, Wh.Sc., Assoc. M.Inst.C.E., for his paper on "Setting out the Curves of Wheel-Teeth."

A Telford Premium to Joseph Hetherington, for his paper on "On Utilising Waste Air in Filter-Pressing, with some results of Pressing Sewage-Sludge at Chiswick."

A Telford Premium to Killingsworth William Hedges, M.Inst.C.E., for his paper on "Central Station Electric Lighting."

A Telford Premium to Charles John Wood, M.Inst. C.E., for his paper on "The Molten Reservoir, Cape Town."

A Telford Premium to Alexander Leslie, F.R.S.E., M.Inst.C.E., for his paper on "Salmon-Ladders in Scot- land."

A Telford Premium to David Alan Stevenson, B.Sc., F.R.S.E., M.Inst.C.E., for his paper on "Alia Craig Lighthouse and Fog-Signals."

For Papers read at the Supplemental Meetings of Students.

The Miller Scholarship to John Goodman, Wh.Sc., Stud. Inst. C.E., for his paper on "Recent Researches in Friction." Part II.

A Miller Prize to Sidney Herbert Wells, Wh.Sc., Stud. Inst. C.E., for his paper on "The Propelling Machinery of Modern War-ships."

A Miller Prize to Robert Francis Hayward, Stud. Inst. C.E., and a Miller Prize to John Platt, Stud. Inst. C.E., for their joint paper, "Experiments on Iron and Steel in Tension, Torsion, and Shear."

A Miller Prize to Ernest William Moir, Stud. Inst. C.E., for his paper, "Hydraulic Appliances at the Forth Bridge Works."

A Miller Prize to Alfred John Hill, Wh.Sc., Stud. Inst. C.E., for his paper on "The Use of Cast-Steel in Locomotive Construction."

A Miller Prize to Alfred Chatterton, B.Sc., Stud. Inst. C.E., for his paper on "Flour Mills and their Machinery."

A Miller Prize to Edward Carstensen de Segundo, Stud. Inst. C.E., for his paper, "Experiments on Steam- engine Economy."

Scottish Building Grants.—In terms of a Parliamentary Return relating to the sums annually voted during the past ten years to the four Scottish Universities and to the Royal Observatory and Royal Botanic Garden, Edinburgh, the expenditure for new works, embracing the purchase of sites, includes the items follow- ing:—Aberdeen, 5,167l.; Edinburgh, four grants in aid of, 20,000l. each; St. Andrew's, 879l.; Observatory, 1,033l.; and the Botanic Garden, 2,381l. The last-named amount does not include certain expenditure upon Inver- leith House and the Edinburgh Arboretum.

- \* Has previously received a Telford Premium.
- † Has previously received a Telford Medal and a Telford Premium.
- ‡ Has previously received a Manby Premium.
- § Has previously received a Miller Prize.





"Charity": Design for Stained Glass. Small Reproduction from Working Drawing to show Arrangement of the Constructional Bars.

## Illustrations.

### "CHARITY."

CARTOON FOR STAINED GLASS WINDOW.

**T**HE unusual form of this window demanded a somewhat unusual character of design.

Given a window with a clear space of nearly 14 ft. high, over 9 ft. wide, and a single subject to fill it, a more or less pictorial treatment seemed desirable, subject to constructional considerations.

The space required not less than two upright bars, and, as an important centre figure was essential to the theme, it was necessary to avoid a centre upright.

These being the conditions, a design was adopted in which the architectural features were calculated to supply the place of the usual mullions, the upright bars being employed to emphasise the most important upright architectural lines, many of the horizontal bars answering a corresponding purpose. (See the accompanying small illustration from the working drawing.)

The composition divides itself mainly into three groups, one or two figures only crossing the upright bars so as to connect the parts into one subject.

The curtain behind the portico is deep blue, upon which the centre figure is relieved in

draperies of varied rubies. Otherwise the colours are nearly confined to the draperies, which, for the most part, stand either in close relation with each other, or directly on the greenish and greyish whites of the architecture.

The allegorical group which occupies the head of the window is treated as statuary in whites, like the architecture.

HENRY HOLIDAY.

### JESUS COLLEGE, CAMBRIDGE.

THE view shows in the foreground the new buildings which have of late years been carried out, and in the distance the ancient parts of the College (which have been altered and restored), together with the block of chambers built in 1870 under Mr. Waterhouse. The chief object of the erection of the new buildings has been to increase the accommodation for undergraduates, a large number of them having been obliged to reside outside the College in default of a sufficient number of sets of rooms being available for them within it. It was also necessary under the revised statutes to provide residences for two married Fellows as disciplinary officers of the College, as well as tutors.

The general character of the buildings follows that of its founder, Alcock, Bishop of Ely, to whom Henry VII. granted the Charter

of Foundation on June 12th, 1497, some two years after the site had been acquired and the buildings begun. There were then existing on the site the almost ruinous buildings of the decayed nunnery, which in A.D. 1133 had been founded and dedicated to St. Mary and St. Rhadegund. Mr. J. Willis Clark, in his valuable work "The Architectural History of the University of Cambridge," gives a very interesting account of the several buildings, both conventual and collegiate, together with many notes and sketches by the late Professor Willis. It will therefore, suffice to say that the conventual plan has evidently much influenced that of the founder of the college.

Bishop Alcock restored the choir, tower, and transepts of the former conventual church, and used it as his College Chapel; after removing the two side chapels dedicated to St. Catherine and to St. Margaret some few years later (about 1510) the ruined nave was reconstructed at the expense of Sir John Roysley (Bishop Alcock died Oct. 1, 1500), partly as an ante-chapel and partly for residential purposes; and there have been found enclosed in these walls remains of the pillars and arches, and of other architectural features of the twelfth and thirteenth centuries, which were then standing in a state of ruin, thus preserving to our day the several steps of the architectural history of the church. The side aisles of the nave were, however, altogether removed, excepting some fragments in the present Master's Lodge, but by this means the area of the cloister court (on the north side of the church) was enlarged. The old refectory stood on the north side of the cloister court, and on its site Bishop Alcock built his college dining-hall. Thus we find the unique plan (for a college) of a cloistered quadrangle. This cloister is now modernised, but the drawing shows the ancient design of the windows (from Logan) as they are proposed one day to be restored. The buildings on the east and west sides of the cloister court (including the library) are Bishop Alcock's work, with additions and extensions of 1503 (Lady Catherine Bray), 1638, 1718, and 1822.

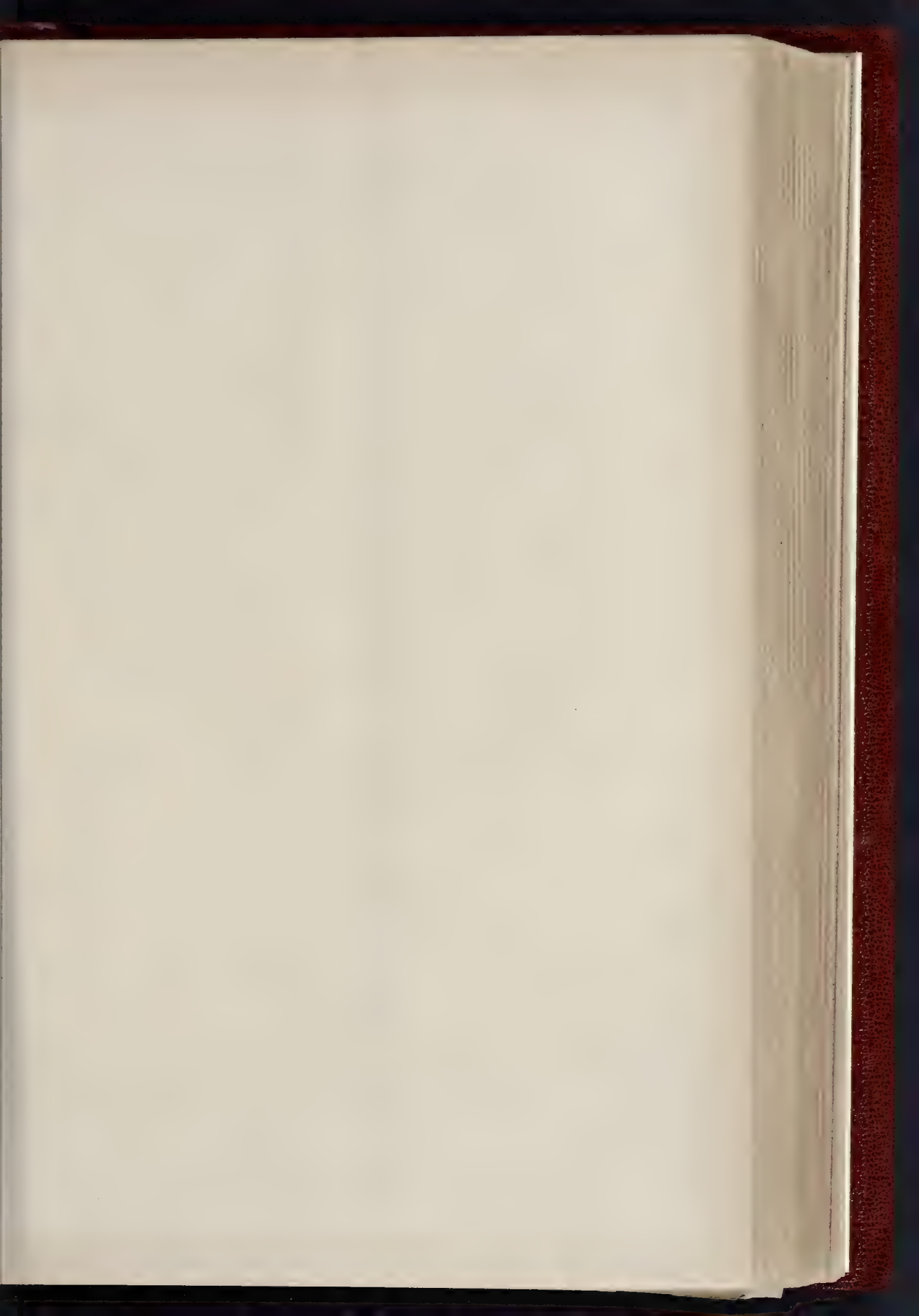
The chapel, it should be noted, was ably restored by Pugin, and the restorations have been continued under Messrs. Bodley & Garner, whose plans are now under consideration for the necessary alterations involved in the re-arrangement of the fittings, by extending the choir, as in conventual days, across the tower into the nave, with screens across the transepts.

The newly-erected buildings are from the designs of Mr. R. Herbert Carpenter & Mr. Benj. Ingelow, who have also carried out the restoration of the old buildings forming the west side of the new court. The style and materials are both regulated so as to harmonise with Alcock's work, which had certain peculiarities of its own; as, for instance, the stepped parapets, which may be seen on his gate-tower and on the gables of the hall. The heads of his windows arc, as a rule, without cusping, but there are some exceptions, as, for instance, in the oriel of the hall, and this was felt to be sufficient authority for so treating the window-heads of the new block, while the more general type of ancient window (of which some few are fortunately preserved) was adhered to in the old wing, in place of the square sashed openings which had usurped their places in all portions except those which were not generally visible! This treatment has also been carried out in the alterations of the Master's Lodge. The low, flat pitch of the roof is also a characteristic of the founder's work. He used for the walls a very poor quality of bricks, such as is now not to be obtained, and it was therefore decided to use for the new buildings the red Haverhill bricks with dressings of Ancaster stone.

There are provided in the new block thirty-six sets of rooms for undergraduates, a lecture-room, servants' rooms, &c. The tutors' houses are treated in a more simple style with the same materials.

A new entrance-gateway has been formed in Jesus-lane, with a porter's lodge and inner gateway near to the court. This new court, formerly a part of Jesus-close, has been laid out and planted, as well as the new gardens, under the directions of the Rev. E. H. Morgan, tutor and dean of the College (whose residence is in the foreground on the left of the picture).

The College has a very large close on three sides, planted with magnificent old trees extending to the river Cam. At some time, if need be, the court will be completed by extending the





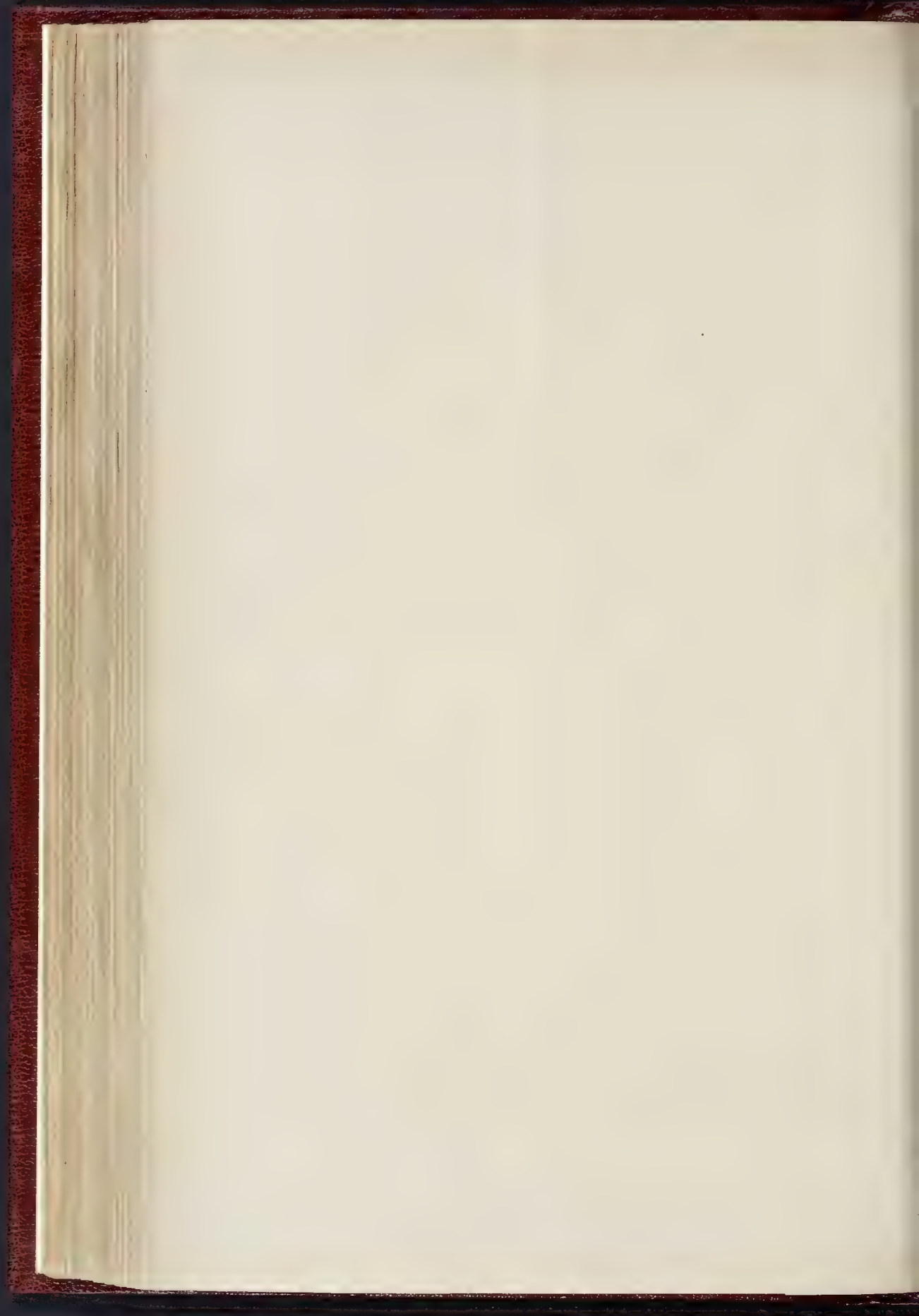


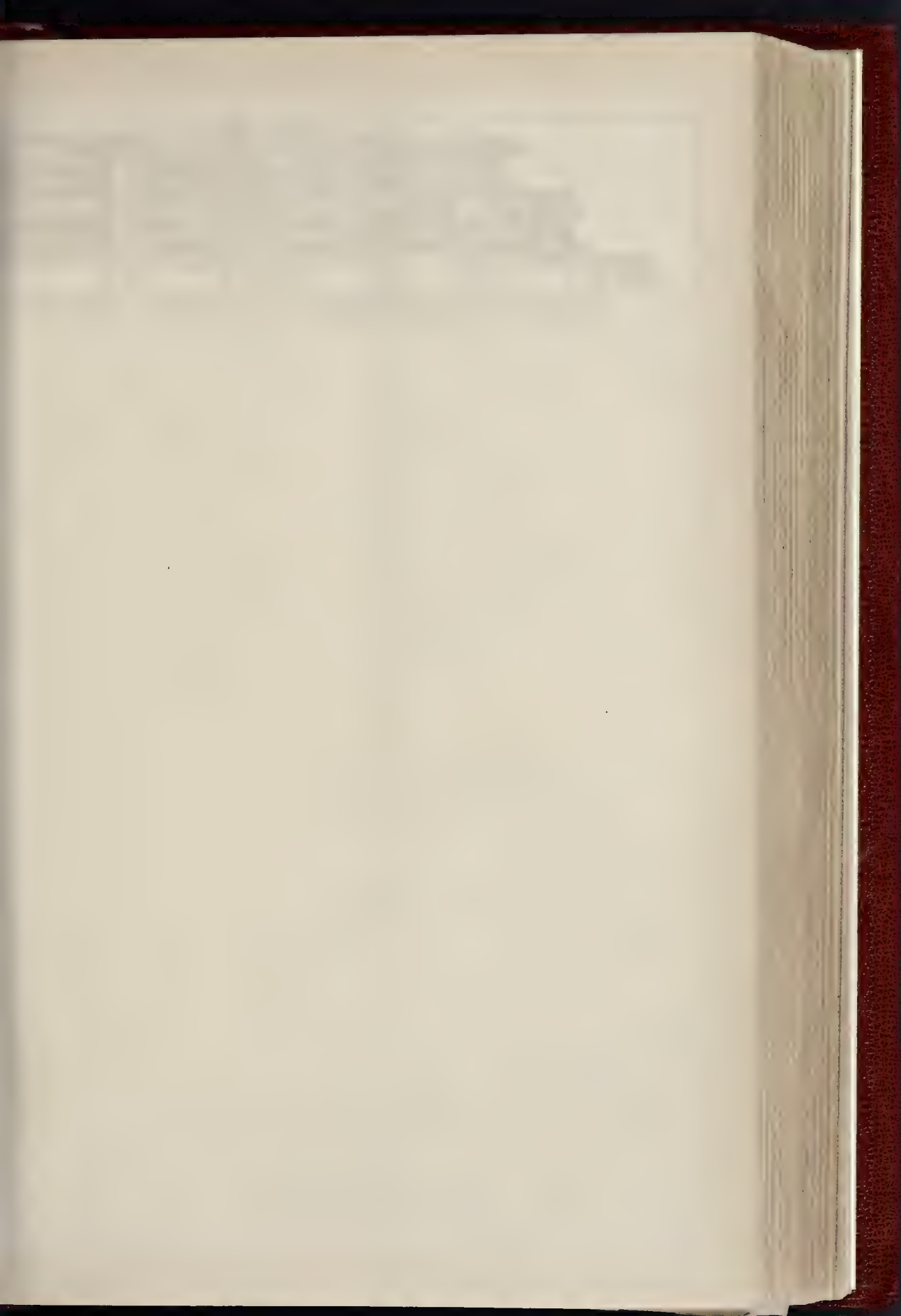
ADDITIONS TO JESUS COLLEGE.



NEW BUILDING FOR THE UNIVERSITY OF CALIFORNIA, 1887. BY MESSRS. CARPENTER & INGELOW, ARCHITECTS.





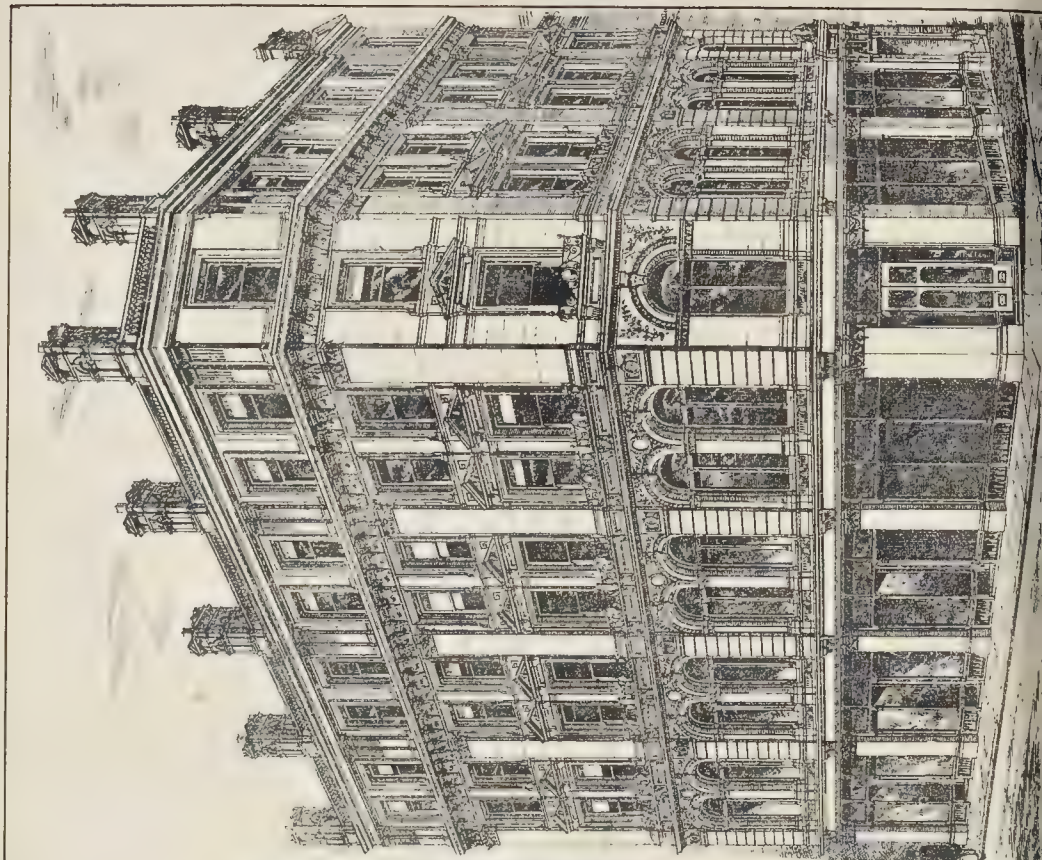




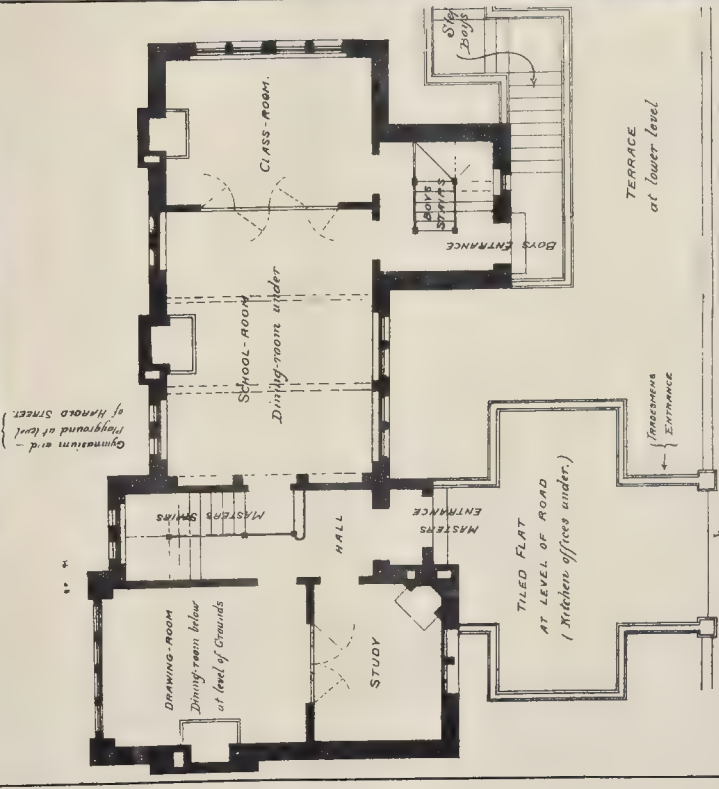
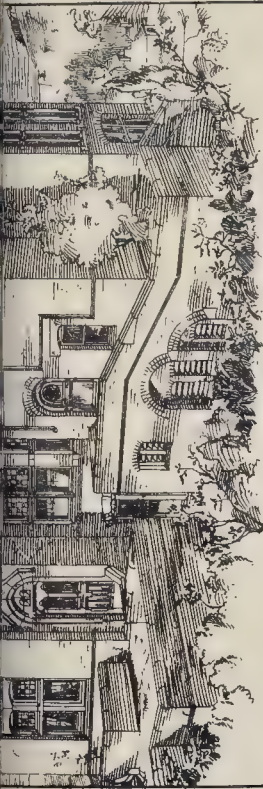
THE BUILDER, SEPTEMBER 3, 1887.



RESIDENCES AT TUNBRIDGE WELLS.—MR. W. H. OAKLEY, ARCHITECT.







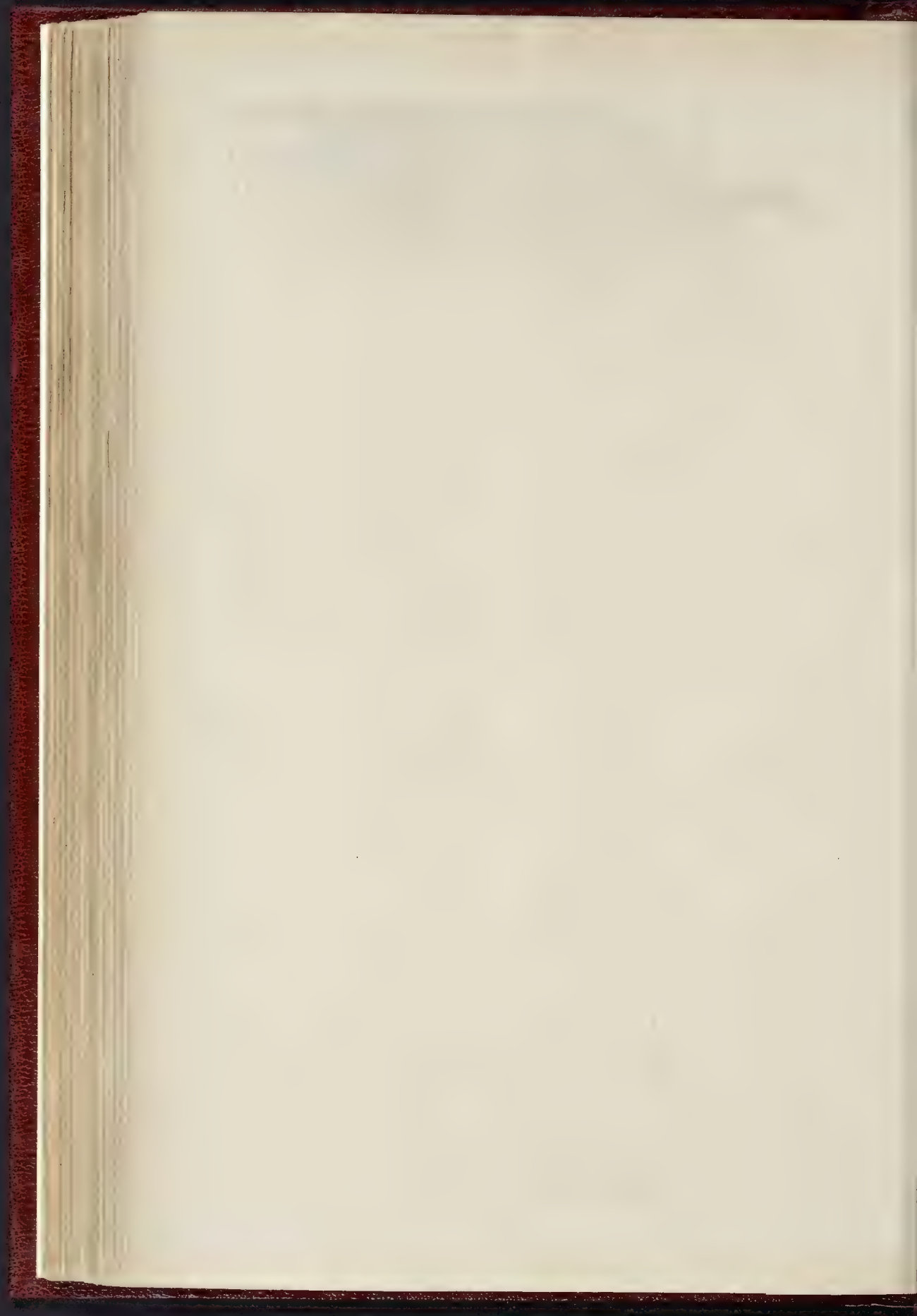
PLAN AND VIEW OF SCHOOL PREMISES AT DOVER.  
MR. J. TREADWAY HANSON, F.R.I.B.A., ARCHT.



PREMISES AT NORWOOD FOR THE LONDON AND COUNTY BANKING CO., LIMITED  
MR. HORACE CHESTON, F.R.I.B.A., ARCHT.

Scale 1/4" = 1 ft. 6 in. (Queen St. London W.)





buildings along its north side, where at present it open to show the trees beyond it.

The Master's Lodge has been the last work undertaken, and it has been altered very considerably inside from its former dark, ill-ventilated, and inconvenient state, and a new staircase has been erected, and a new porch and window, with many other structural alterations.

The Undergraduates' Block, with the Porter's gate, &c., has been carried out by Mr. Underly, of Waltham Abbey, the tutors' houses, the work to the ancient wing and offices by Messrs. Rattee & Kett; and the alterations to the Master's Lodge by Mr. Foster, of Hampton; the ironwork is by Mr. Jones, of Manchester; and the grates by Mr. D. O. Lloyd, of Maddox-street. The clerk of works (excepting for the lodge works) was Mr. Higgs. In the three niches of the new block are statues executed by Messrs. Singer, of Frome, the Blessed Virgin, St. Rhadegund, and St. John; the ancient statue of Bishop Alcock stands in a corresponding niche over his gateway.

The small scale plan with references shows the general dispositions of the buildings, the new portions being indicated by the darker tint.

#### RESIDENCES AT TUNBRIDGE WELLS.

THESE houses are situated in Limeshill-road, immediately facing the well-known Tunbridge Wells Common. They are built with red brick, having Bath stone and blue brick dressings and all courses, partly covered with ornamental and plain weather tiling and half-timbered work, with stucco and incised work, the roofs being covered with red and black tiling. They are built on the hard white local sandstone, and are fitted with the electric light. Care has been taken with regard to the sanitary arrangements.

The houses have been designed to meet a demand in Tunbridge Wells for residences of an economical character, and yet possessing more artistic feeling than the cement and stucco residences with which the place abounds.

The houses have been constructed by Messrs. Oakley & Drake, builders and contractors, of Tunbridge Wells, and have been designed by Mr. W. H. Oakley, architect, of London.

#### NEW PREMISES IN THE HAYMARKET.

This building, at the corner of the Haymarket and Coventry-street, being the first lock erected in the Piccadilly Improvement scheme, is French Renaissance in character, and was designed by and carried out under the supervision of Mr. H. H. Collins, of Old Broad-street. The lower portion is built of Whitbed Portland stone and granite and the upper part of Beer stone.

It presented many difficulties in construction, the basement, ground, and first floors, and three upper floors, being entirely distinct and separated by fireproof construction. The basement and ground-floor being appropriated for shops, the first-floor being left as one large room for the purposes of an Exhibition-room or large hall, and the upper portions being intended for residential chambers, the whole weight is thrown on the lower floors, and the arrangement of the necessary ironwork required much careful consideration. The cost of the building has been about 1,000l.

The contractor was Mr. Wm. Brass, of Old-street, E.C.; the ironwork and fireproof construction were supplied by Messrs. Dennett & Angle, with the assistance of Mr. Ordish, the engineer; the stained glass by Mr. Wm. Gibbs, of Kingsland-road; the ornamental ironwork by Messrs. Brawn & Co., of Birmingham; the mosaic paving by Messrs. Diespcker & Co.; and the carving was executed by Mr. Sanson.

#### SCHOOL PREMISES, DOVER.

ON one of our lithographic sheets we give a new and plan illustrating a block of school buildings with master's residence recently erected at Dover, on the side of Castle Hill, overlooking the town and commanding a view of the sea beyond.

The buildings were erected from the designs and under superintendence of Mr. J. Treadway Sanson, F.R.I.B.A., for Mr. J. Stanton Wise, (A.A.), to meet the requirements of a private high-class school for boys.

The master's house and school department

are kept quite distinct from one another, but have communication on each floor. The former is entered from the higher level, and the latter from the lower level.

The lower floor (there is no basement) of master's house contains, in front, kitchen offices, and towards garden front, private dining-room with steps down to garden. On the same floor of the boys' department are the dining-hall, assistant master's room, lavatory, &c. Each department has a separate staircase.

The plan of the principal floor is shown in the illustration, and above this (in master's house) are bed-rooms, bath-room, &c., and in the boys' department, dormitories, cubicles, bath-rooms (on each floor), and assistant masters' rooms.

There is also an isolated infirmary ward, with bath-room and nurse's room.

The buildings are in red brick and Bath stone, the roofs are tiled, and the joinery is in pitch pine.

The contractor for the works was Mr. W. J. Adcock, of Dover.

#### NEW PREMISES FOR THE LONDON AND COUNTY BANK, UPPER NORWOOD.

THIS building, recently completed, stands at the top of Westow Hill, close to the Crystal Palace, having a frontage to the main road of 36 ft. with a return frontage at the side of 31 ft. The bank entrance is in the main street; the entrance to the manager's residence and the tradesmen's entrance being at the side. The entire space on the ground and basement floors is taken up with the banking offices, strong-rooms, book-room, clerks' lavatories, and cellars, the two floors above the bank forming the residence for the manager.

The materials used in the elevations are Lindley's red Mansfield stone on the ground-floor and in the main cornice at the top, and red Farnham bricks above the ground-floor, the pillars and window dressings and all the brickwork at the corner being in gauged work.

The walls of the strong-rooms are formed of gauged brickwork in cement (with a tier of hoop-iron band laid between every course for greater security), and are lined with white glazed bricks. The roof is formed in strong cement-concrete, 14 in. thick, with 10 in. rolled iron joists embedded in it, 12 in. apart.

The internal doors and joinery of the bank, including the screens and desk fittings, are executed in American walnut. The brass work of the desk-rails, standards, and gas-fittings has been made by Messrs. Wenham & Waters, of Croydon, to designs specially prepared for the bank by the architect. The whole of the works, including the internal bank fittings, have been carried out by Mr. Martin Taylor, of Croydon. Mr. G. G. Woodward acted as clerk of the works, under the superintendence of Mr. Horace Cheston, architect, of Great Winchester-street.

#### THE EFFECT OF FREEZING ON CEMENT MORTAR.

IN a recent number of the *Builder* (see vol. lli., p. 255), the experience of German architects in the use of lime mortar during frost was given, from which it appeared that, if lime mortar is exposed to the action of frost for some days, it sets as firmly as mortar made in summer. This experience has been confirmed in the case of cement mortar by observations made in America, which reveal the fact that the behaviour of cement mortar in cold weather is even more favourable. From a paper read by Mr. Alfred Noble before the American Society of Civil Engineers, and published in the *Transactions of the Society*, we learn that in the construction of a lock at the St. Mary's Falls Canal (Michigan), between Lake Superior and Lake Huron, the laying of masonry was discontinued about the end of October in each year on account of the frequent recurrence of freezing weather. On the last day of work in 1877 mortars of Portland cement and of a good quality of American natural cement were used in adjoining portions of the wall. The same proportions of cement and sand, 1 to 1, were used in both classes of mortar. This masonry was laid during a slight rain. The following spring the surface of the Portland cement mortar was sound, showing perfectly the marks of the rain drops. The natural cement

mortar was disintegrated to a depth of from 3 in. to 4 in. In the same locality it was necessary to lay a concrete foundation for a movable dam in February. The weather was extremely cold, generally about zero. The mortar was made with Portland cement. Salt was used freely, but without retarding much the freezing of the concrete. The concrete was at once covered with a floor of timber and plank on which the masonry abutments were built. Samples of the frozen mortar set properly after being put in a warm place. There was never any settlement of the masonry, and within a few months the concrete sustained a pressure of 15 ft. of water without developing any leaks. In the construction of a bridge across Clark's Fork of the Columbia River, in North-western Montana, the caissons were filled with concrete during freezing weather. Portland cement was used. The proportion of cement to sand was 1 to 3. Within a week the laying of stone masonry was commenced on these caissons, and proceeded with as rapidly as possible, without apparent injury to the concrete, which had set firmly. In these cases the temperature had risen above freezing-point within two or three days after the concrete had been placed, and it had been permeated to some extent by warm air escaping through leaks from the air-chamber. The last case quoted by Mr. Noble is the St. Louis River Bridge on the Northern Pacific Railroad, near Duluth (Minnesota), where four small piers were built in the winter of 1884-85. During the laying of masonry for pier 1, the temperature varied from 0 to 20 degrees; during the building of pier 2 the temperature was about 20 degrees higher, and during the construction of the two remaining piers the temperature was occasionally above freezing-point. Portland cement was used throughout, the proportions of cement to sand being 1 to 1½ for face-stone, and 1 to 2½ for backing. During extremely cold weather salt was used freely in the mortar, and the sand was warmed (not made hot); but with the thermometer at 20 degrees the mortar froze quickly after being spread on the stone,—so quickly, indeed, that, if the stone, being set, could not be brought to a bearing by a little shaking, it was necessary to raise it again, scrape off the now frozen mortar, and spread a new bed. In setting the face-stone the mortar was kept back from the face an inch or so to facilitate subsequent pointing. A few weeks later, after there had been milder weather, an examination of the open edges of the mortar beds showed that the mortar used during the coldest weather had set firmly, and no difference could be detected by examination of detached fragments between the mortars in piers 1 and 4; that is to say, between that laid in the coldest and that laid in the mildest weather embraced in the period of construction of these piers.

In the discussion which followed the reading of the paper, some confirmatory results were given by other members of the society. Mr. G. S. Morrison mentioned an accidental experiment that occurred in the winter of 1885 in the work of the Omaha bridge (Nebraska). Mr. Morrison had a number of briquettes made of American cements and imported Portland cements, which were exposed to the air for twenty-four hours and then left in the customary way in a pail of water. Extremely cold weather set in, and the entire lot became a solid block of ice. When it thawed, the Portland cements were entirely uninjured, but the American cements were entirely ruined, some of them being reduced to mud. Subsequent experiments showed that the cements which stood freezing three days after they were made could stand freezing immediately after they were mixed. Mr. R. B. Stanton said that he had some experience in laying masonry in very cold weather. In the winter of 1878-79 it was found that a small pier on the Cincinnati Southern Railroad was defective. The pier was taken down and rebuilt with Louisville cement, and with the use of salt. The thermometer at the time ranged from 6 to 10 degrees below zero. The iron trestle was put upon the pier, and during the winter no change in the masonry was noticed. When, during the next summer, it became very hot, the pier seemed to sweat, the salt came out and made the sides white, but the cement was as hard as if it had been laid in the summer, and there has never been any trouble with the pier. Mr. Stanton further stated that in the winter of 1881, at Denver, Colorado, in building the round house and shops



of the Union Pacific Railroad yards, it became cold very suddenly. The work was proceeded with, and salt was used in lime mortar, and every night the top was covered with a thick coating of salt; the mortar was not really frozen. The next summer a locomotive got away and struck this masonry between two windows, tearing away the lower portion and leaving the whole keystone portion above suspended and held up by the mortar, and this masonry hung thus for several weeks. Some years ago Mr. E. C. Clarke made a number of experimental batches of concrete, some of Rosendale cement, and some of Portland cement. Of these, a portion was made with a large proportion of cement, and some weaker, of each kind. They were made just before freezing weather, and were left for two or three years exposed. During the first winter the Rosendale concretes, without exception, began to weather badly on the surface, and from year to year disintegrated. None of the Portland cement concretes were affected in three years, although lying right on the surface of the ground in blocks about 1 foot square. Mr. Shanahan, the Superintendent of Public Works of the State of New York, expressed the opinion that he would as willingly build masonry in the winter as in the summer, so far as its durability is concerned. He uses Rosendale cement in building masonry, a tolerably strong mortar,—that is, a large portion of cement to sand,—and always uses in mixing only the strongest brine. He never knew of a case to fail when built in that way.

## GLASGOW INSTITUTE OF ARCHITECTS

On Thursday in last week the annual excursion of this Institute took place, the destination being Dunblane and Doune. The party numbered about twenty, and left Glasgow at 9.20 a.m. arriving at Dunblane at 10.40, where they were received at the Cathedral by the Rev. Mr. Ritchie, minister of the parish; Mr. Alexander, clerk to the horitors; Mr. Barty, agent for several horitors; and Dr. R. Rowand Anderson, architect for the proposed restoration. Among others present the following were present.—Mr. David Thomson, President of the Institute; Mr. John Honeyman, past-president; Mr. T. L. Watson, treasurer; and Mr. Thomas Turnbull, a member of the Institute practising in Wellington, New Zealand, and at present on a visit to Europe. Mr. David Robertson, the president of the Institute of Messurers; and Mr. A. Lindsay Miller, secretary of the Architectural Section of the Philosophical Society, and other guests were also present. Dr. Anderson conducted the party to the choir, where (we quote from the report in the *Scottish News*) he recounted what was known and surmised of the history of the cathedral. In the adjoining aisle he exhibited some old illustrations and his own drawings of the building, and described some of the proposed restorations, dwelling particularly on certain points of great obscurity and difficulty with which he had been unconcoured. On these he invited the suggestions of members. The party then spent some hours in a careful examination of the whole structure, and in consideration of some of the points of difficulty. It is interesting to note that Dr. Anderson does not intend to renovate or restore the wasted or defaced architectural members. His restoration is to be confined to the rebuilding of the parts actually ruinous, with, of course, a new roof and floor and the glazing of the windows. The walls and pillars of the building were originally covered with a thin coating of plaster, which was afterwards decorated. No attempt will be made to restore this. The broken and wasted mouldings and carvings are not to be touched. Satisfaction was expressed by the visitors that the renovation was not to include the effacement of the present character of the building, as has occurred in so many other cathedrals and churches. The party then visited the ruins of the Episcopal Palace, and a call was afterwards made at Archbishop Leighton's Library, where some of the more curious of the old volumes were examined. At half-past one lunch was served at the Stirling Arms Hotel, and a vote of thanks was passed to the Rev. Mr. Ritchie and Dr. Anderson. At 2.43 train was taken for Doune, where the castle

was visited. Mr. Dunbar, the custodian, conducted the party over the building, which is interesting as one of the largest and best-preserved of the castles of Scotland. The afternoon was agreeably spent in examining the numerous fine apartments of the building, in tracing the remains of outworks, and in enjoying the beautiful prospects from the battlements. In the evening dinner was served in the Woodside Hotel, when Mr. David Thomson, the president, occupied the chair, and Mr. T. L. Watson, the vice-chair.

## BOYLE'S "C.C." VENTILATOR.

This ventilator is an adaptation of the cow ventilator made by Messrs. Robert Boyle & Son, which is a modification of the self-acting air-pump ventilator. The "C.C." ventilator is designed to be applied to buildings where cost is often the first consideration, and though it is not pretended that it is such a powerful exhaust as the latest improved form of the air-pump ventilator (1882 patent), it is recommended by the inventors as useful for such buildings as steam laundries, engine-rooms, workshops, cow-houses, stables, &c. It is also capable of application to schools and meeting-houses.

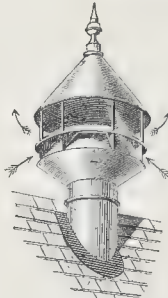
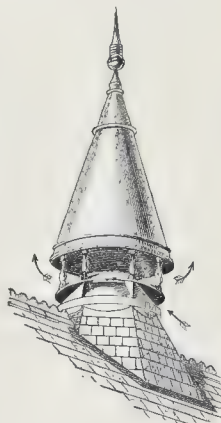


Fig. 1 shows the design most suitable for this class of building, whilst Fig. 2 is the form usually employed for workshops, &c.

**New Cemeteries.**—The new cemetery at Armley, in the borough of Leeds, was opened on Saturday, the 20th of August, by Mr. Barnabe, chairman of the Burial Board, to whom a silver key was presented for the purpose. Mr. J. P. Fritchett, of Darlington, is the architect. —The ceremony of opening the new cemetery at New Shoreham, Sussex, took place on the 18th ult., the bishop of the diocese at the same time consecrating a small portion of it. The ground is somewhat pear-shaped, and is surrounded partly by hedges and iron fences. A caretaker's lodge, of red kiln bricks and painted random flintwork, and an oak lych-gate, occupy the entrance, both these erections being covered with red tiles. Mr. Arthur Loader, of Brighton, was the architect.

"LANDSLIP, DORKING TUNNEL."

SIR,—A letter in the last number of your paper, headed "Landslip, Dorking Tunnel," and signed "Surveyor," has been brought to my notice; and as it contains several mis-statements calculated unnecessarily to alarm the public, I shall be obliged if you will kindly insert this letter in reply in your next number.

The tunnel has for some months been under repair, many of the bricks forming the inner lining (not the outer course, as described by your correspondent) having partly perished. These have been from time to time cut out and replaced by sound bricks, but this work has been principally at the north end of the tunnel. No bricks had been cut out at the portion of the tunnel where the disaster occurred, and therefore the arch had not been dangerously weakened at this point, as your correspondent implies.

The description of the brickwork that has fallen is purely imaginary, as the timbering is not yet sufficiently advanced to enable the extent of the fallen brickwork to be ascertained.

No bricks were slipped from the crown of the arch except where the crown has fallen in bodily, but certainly not near the mouth of the tunnel, as stated by your correspondent. The repairs are now being carried out by Mr. Firbank, with a staff of men, and it is to be hoped that this kind of work, and the public may rest assured that the tunnel will be re-opened until it is thoroughly restored and fit for traffic. The particular disaster which has alarmed your correspondent is, in my opinion, owing to the accident (which he alludes to) which occurred during the original construction of the tunnel not being properly repaired, the patching and mending being made in a haphazard way. The decayed bricks on the inner surface, which is a very common feature in the maintenance of old tunnels.

FRED. D. BANISTER, Chief Engineer.  
L.B. & S.C.R., London Bridge Terminus,  
August 31st

WEIGHT OF FIREPROOF FLOORS.

Sir,—Every domestic floor should bear safely, besides its own weight, a distributed load of 100 lb. per square foot (and warehouse floors, according to their destinations, from twice up to five times that load), without subjecting any iron to a tensile strain over 8 tons per square inch; for the "25 tons" of Lord Grimthorpe, in his "Essay on Domes" is quite impractical, being the extreme limit of English iron. Now, Mr. Weyss, who is known to be permanently stretched by any strain beyond that limit, has not only been able to make a safe floor of wrought-iron, but by Mr. Brannon or Lord Womys we might use the whole weight per square, and the weight of iron per square, wherever their construction ensures these conditions in floors of two very different spans, say 16 ft. and 30 ft., we could infer the corresponding weights for any other span, it being certain that, calling their spans  $s$ , both the total weight and that of iron per square must be expressible in the form  $W = \frac{a}{s^2}$  and  $I = \frac{b}{s^2}$ , where  $a$  and  $b$  are two constant numbers. But this is "what I cannot gather from Mr. Brannon's specifications, which, of course, I studied before making my own on the same problem. Indeed, his latest, dated 1874, nearly convinces me that thrice the total weight I hold necessary, and four times the iron, would be sufficient quantities for a safe timberless floor of his construction, of rightly-formed clay tubes and flat bar-iron underneath, and would carry the 100 lb. per square foot, on floors that, calling their span  $s$  feet, shall contain but these weights:—  
Pounds of clay per square =  $33 s + 1,800$ .

For stronger floors the iron might be increased up to fivefold with no increase of the clay.

Such floors can also be boarded without becoming less fire-resistant, the whole quantity of wood not exceeding once and a quarter the boards, and being cut off from all under-draught.

My methods for roofing and for stairs are equally light and cheap, and with fewer forms of tube; but I only speak here of flooring as the main part of the fireproof problem.

E. L. GARBETT.

E. L. GARBETT.

## BUMBLEDOM AND THE SANITARY ACTS.

SIR,—You have often pointed out in your valuable journal the weak points in the Sanitary Acts. Although these Acts give as large and ample powers as could be desired, yet as the weakest link in a chain is the measure of its strength, so is the willingness of the administrative authorities to carry out their Acts the measure of their value.

The administration of the Sanitary Acts rests, as far as country districts are concerned, with the Rural Sanitary Authority, who frequently in practice depute their powers to a parochial committee.

Too frequently this parochial committee is more interested in keeping down the rates than in promoting sanitation. Allow me to relate my own experience as an exemplification of this. I have been for years a resident in the parish of Freshford, which is under the Rural Sanitary Authority of Bath. My house is situate in the lower portion of a valley, being the last of some eighteen, and the only drainage we possess is an open ditch, which empties into the adjoining Avon. This ditch, unfortunately for me,



ows close to my sitting-rooms and along my garden. I receive, amongst other offensive matters, the waste of a brewery, and the offensive drainage of some stables. When the rainfall is heavy, the nuisance is less pronounced; but in a dry season like the present, the stench combines all the odours that pervade Cologne.

Now, sir, for the moral of my tale. Year after year have I appealed to the Rural Sanitary Authority to construct a proper drain to take the drainage of the valley. In this valley there are eighteen houses, besides the brewery and stables I have mentioned. Year after year my complaint has been forwarded to the Parochial Committee by the Sanitary Authority.

The Parochial Committee wait till a thunderstorm has cleared the ditch, and then gravely report that no nuisance exists. One of my neighbours suggested to the Rural Sanitary Authority that the opinion of a sanitary engineer should be taken as to be sanitary needs of the village, and he offered to obtain such report at his own expense, provided the Sanitary Authority would carry out its recommendations. I send you cuttings from a local newspaper, the *Staff Journal*, which will show you the spirit in which this reasonable suggestion is received. The suggestion that an engineer should be consulted was received with loud cries of "No, no"; and the suggestion that an engineer who made these subjects his study was more likely to form a just appreciation of the needs of the case was received with shouts of laughter.

Now, sir, I do not wish to dwell on my own grievances. I only put it forward as a typical case to show the weak points in the working of the Sanitary Acts.

To make these Acts efficient their power should be entrusted to skilled professional men, who should be empowered to carry out what they deem necessary despite all the objection that Bumbleton may raise. Until this is done the Acts will remain in many of the rural districts a dead letter until typhoid fever, cholera, or some deadly epidemic convinces even raterapayers that the laws of sanitary science are not to be defied with impunity.

ANDERCOMBY WILSON.

#### THE REGISTRATION OF PLUMBERS.

SIR,—With reference to the recent resolution of the British Medical Association in favour of the registration of plumbers (see *Builder*, p. 286, ante), will you favour me with space to say that this Company has established a register for plumbers, by which the public can distinguish those plumbers who have given evidence of their qualification as plumbers in conformity with clauses 4 and 5 of the Company's conditions. The register, which embraces both masters and journeymen, now includes the names and addresses of several hundred plumbers in London and the provinces, and lists are furnished free on application. In connexion with the City and Guilds Institute special classes of instruction and examinations for plumbers, have been established, and, in co-operation with that Institute, this Company is using its utmost efforts to extend technical training among plumbers, who will be hereafter required to pass an examination in both the principles and practice of plumbing to entitle them to registration. This company is thus doing its part to the full extent of its available means, both to enable the public to distinguish those who are competent among the existing practitioners, and also to provide for the adequate training of the coming generation of plumbers. But it rests with the public authorities, architects, and the public generally, to help forward the movement by requiring that the plumbers they engage should have given evidence of their being qualified craftsmen. The benefits of the movement are, I hope, becoming more widely recognised, and we feel that the resolution of the British Medical Association should go far to impress the public with the fact that the medical profession are fully alive to the necessity for registering qualified plumbers in the interests of the public health.

STUART KNILL, Alderman (Master).  
1, Adelaide-buildings, London Bridge,  
August 27th.

#### INSCRIPTION AT WELLOW CHURCH.

SIR,—The inscription in the Hungerford Chapel, noted in your paper of the 20th, and referred to by "E. T. S." [p. 316, ante], runs thus:—

"For the love of Jhu and Marie is sake,—  
Pray for them that this lete make."

The suggestion that the meaning was "Pray for them that built this Chapel" was discussed by the members of the excursion party, as was also the suggestion that "lete" was a corruption of the French "lit," a bed, in which case the meaning would be, "Pray for them that make their bed here," or "for them that lie here."

AN EXCURSIONIST.

\* 4. Plumbers (Masters and Journeymen) established in the year prior to March 1st, 1886, are not necessarily required to undergo an examination. Admission is granted to such plumbers on satisfactory statement or proof of experience, according to the circumstances of each case. 5. All applicants who cannot satisfy the Registering Committee of their experience are required to pass an examination by a Board of Examiners, composed largely of practical plumbers.

#### CHURCH-BUILDING NEWS.

**Haigh.**—St. David's Church, Haigh, near Wigan, the new chancel of which was consecrated by the Lord Bishop of Liverpool, on the 3rd ult., was built originally from the designs of the late Mr. Thomas Rickman, one of the pioneers in the revival of Gothic architecture. The original church was a plain parallelogram, with a flat plastered ceiling and plastered walls, and plain pointed windows on each side. A few years ago Mr. Medland Taylor, of Manchester, was consulted as to what could be done at moderate cost with the existing church, and last year the work of actual building was taken in hand. A spacious chancel has been built, and on the south of it an organ and choristers' vestry projects transept-wise, and to the east of these is the clergy vestry. The chancel arch is pointed, but it is of very broad proportions, so as not to protest too much against the low flat ceiling of the nave. The chancel and the east wall of the nave are almost entirely of stone. Internally, the very effective streaked Runcorn stone is used. The chancel fittings are all of Dantzic oak, and the screens in the arches adjacent to the chancel are traceried, and of the same material. On the north side, one bay from the east end, is a lean-to porch. In the floor-tiling are George Herbert's well-known lines:—"Bring not thy Plow, thy plow, thy pleasures thither, Christ Purged His Temple, so must thou thy heart." The gallery has been re-seated with open benches made out of the old framing. The benches in the nave are of pitch-pine. The plain plastered ceiling of the nave has been divided out into panels with wood mouldings and cussing. The chancel is lighted by two large candelabra brackets, north and south, the nave by eight pendants hung from the ceiling. The gallery, by some of the old gas standards. The funds for the work have been provided by public subscription, the Earl of Crawford, Mr. Rawcliffe, Mr. Fair, and others being amongst the larger contributors. The work has been executed by Mr. Winnard.

**Kennington.**—The Church of St. John-the-Divine, Vassall-road, Kennington, which was erected some years since from the designs of the late Mr. Street, R.A., is about to be completed by the erection of the tower and spire. This church has already cost upwards of 20,000l. The works for the erection of the tower have just been commenced, the foundation walls being carried to a depth of 10 ft. below the ground line. At the base the tower will be 25 ft. square, the height of this portion of the structure being 108 ft. to the cornice. It will be faced with red bricks, 2 in. thick, specially made for the occasion, with Bath stone dressings, and will be in every respect uniform with the architectural character of the church as already erected. At each angle of the tower massive buttresses having ornamental stone capitals will be carried up to within a few feet of the cornice. On each side of the lower portion of the tower there is a central Gothic window, 28 ft. in length. The upper portion will contain the belfry and floor of the bell-loft, and is intended to be fitted for a peal of eight or ten bells. The west entrance to the church will be immediately under the tower, the doorway being surmounted by a crocketed gable, with pinnacles on each side. The spire, which will be entirely faced with stone, will rise to a height of 104 ft. above the tower, the entire height of the structure from the ground line being 212 ft. The bell-loft will be reached by a winding staircase at the north side of the tower, in which it is proposed to place an illuminated clock and chimera. The structure is being erected from the designs of the late Mr. Street, under the superintendence of his son Mr. A. E. Street. Messrs. Dove Brothers are the contractors, and Mr. Osborne is foreman of the works. The tower is being erected in commemoration of the Queen's Jubilee.

**An Argentine Railway.**—The Argentine Government have ratified a contract with Mr. John Jackson, of Clement's-lane, London, for the laying of 450 miles of railway, at a calculated cost of two and a quarter millions of pounds. The permanent ways, all being of English manufacture, will consist of three separate lines.

#### STAINED GLASS.

**Chester.**—The large south transept window of Chester Cathedral, of which the stonework has been re-designed by Mr. A. W. Blomfield and carried out by Messrs. Thompson & Son, of Peterborough, has been filled with stained glass, and was seen for the first time on Sunday, the 7th ult. The restorations and stained glass are the gift of Lord Egerton of Tatton. The window consists of seven large lights and tracery, and the subjects represented are the Crucifixion, Nativity, and Ascension, occupying the three centre lights, and sixteen subjects illustrating "Faith," taken from the eleventh chapter of Hebrews, are grouped around, filling up the lights on either side, the tracery being filled with a representation of the Angelic Choir. The window is designed in the spirit of "Old Glass," no attempt being made to copy the "Munich" or "Pictorial" school, Lord Egerton wishing to have a mosaic effect of colour, combined with figure drawing after the Italian Gothic school. The inscription reads as follows:—"To the Glory of God and in memory of William Tatton, first Baron Egerton of Tatton, Lord Lieutenant, and Chairman of Quarter Sessions, County of Chester, died February, 1883. His son Wilbraham, Baron Egerton of Tatton, restored this window August, 1887." The work was designed and executed by Messrs. Heaton, Butler, & Bayne, under the architect's supervision.

**Copston Magna (Warwickshire).**—The east window of Copston Magna Church has been filled with stained glass in memory of the Toone family, at the cost of its surviving members. It has three lights, and contains the Nativity, the Crucifixion, and the Entombment, the traceries being filled with types of these events, the Burning Bush, the Pelican in her Piety, and Jonah devoured by the Whale, with the emblem of the Blessed Trinity, and monograms of the Holy Name. Under the main subjects are Three Angels holding scrolls inscribed with the words of the Apostles' Creed which refer thereto. The work was designed and drawn by Mr. N. H. J. Westlake, F.S.A., and produced by the firm of Lavers & Westlake under the direction of Mr. E. Swinfen Harris, F.R.I.B.A.

#### The Student's Column.

##### LAND SURVEYING AND LEVELLING.

###### X.—PLOTING A PLAN.

**FIG. 5** illustrates a good form of drawing table, having a slot or slots, as shown in the section, fig. 6, for the drawing-paper to slide into, when the draughtsman leans against the outer rail in the process of plotting. By the use of this precaution the drawing-paper is prevented from becoming creased when plotting at the top of the plan, as it can be pulled through the slot, as indicated by the dotted line in fig. 6.

**Fig. 8** illustrates the plotting of the angles taken between the base-lines in a transverse survey by means of the circular protractor. The station pegs which are indicated in the field, as shown by figs. 10 and 11, are marked upon the plan with a small pencil circle, surrounding the station point, as shown at the termination of the base-lines, Nos. 1 and 5, in fig. 8.

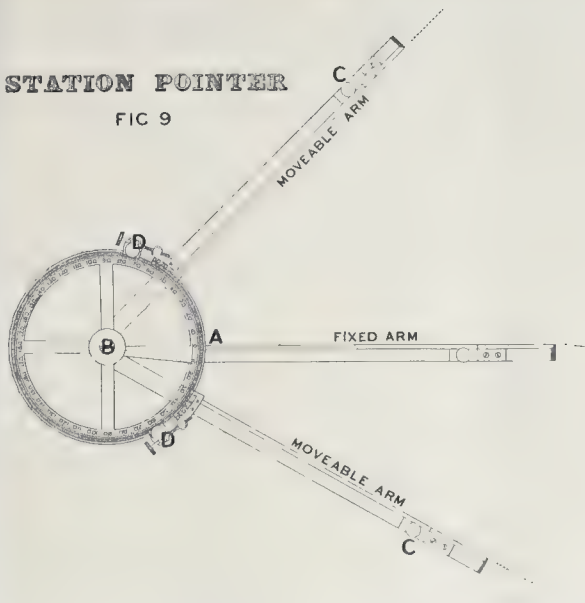
**Fig. 7** illustrates Stanley's patent protractor, the construction being explained by its accompanying sections. By its use angles already plotted upon paper can be measured off without drawing in extra lines upon the map or plan. The instrument is formed of two concentric circular pieces. The outer of these circles is divided into degrees, and sub-divided either into halves or thirds of a degree, while the inner circle carries a vernier, which enables the operator to read to minutes. Two arms, as shown in plan and section, are mounted upon these two circular rings, and have each one of their edges radiating from the centre of the instrument. These arms can be moved to include any angle up to nearly 360°, the amount or size of which is then recorded by the index mark upon the scale of divisions. The instrument is made of metal, having the underside of the two radiating arms, and the lower surface of the outer ring, in the same plane; so that when the protractor is placed upon the plan, the arms can be set to the lines, between which the required angle is to be measured. If these





## STATION POINTER

FIG 9



arms do not actually meet, the length of the arm permits the angle to be set without producing the direction of the lines in pencil to determine their point of intersection.

Fig. 9 illustrates a station pointer, which is used in a similar manner to a protractor, but it will be observed there are two radiating movable arms with verniers attached, one upon each side of a central arm fixed at zero. These arms marked D are each set by means of their respective lamp and tangent screw at D, to the required angle with the line B A. The instrument thus clamped is moved about upon the plan, until the edges of the fixed arms B C, B A, and B C respectively coincide with the points upon the plan which indicate the stations observed, when taking the two angles with B A in the field. By means of a needle pointer (fig. 14) the position of B can then be fixed. Lengthening screws to the arms are provided with the instrument for use when required.

The best form of beam and compasses for plotting long base-lines from chain measurements only, is shown in fig. 12, the top table forming the letter T, giving lateral rigidity to the beam. When only a straight edge is used to hold the beam compasses for a long measurement, it is apt to become bent horizontally while striking in the arcs, and the length of the radius is thereby shortened. Fig. 13 shows two other forms of beams, one of a triangular shape, and the other of a tubular shape, the latter with a universal centre-piece marked L, the top of which fits into one of the boxes in place of the points G or F. The tube between M and N slides within the tube between K and M, and the tube holding B slides within the centre tube from M to N. Clamping-screws marked K, M, N, are provided for fixing the tubes in position at the required distance.

## Books.

*A Few Words on Portland Cement.* By A. MANUFACTURER. London: E. & F. N. Spon. 1887.

The "Manufacturer" is Mr. D. L. Collins, of the firm of Gibbs & Co., Limited, who thinks, very reasonably, that in spite of the attention which engineers have given to Portland cement, the experience and opinion of a manufacturer who has been constantly handling it for many years, in the endeavour to produce stuff of a thoroughly good quality, ought to be of some value. The publication is a mere pamphlet of a few pages, and contains no superfluous words. The main point in it is the suggestion that the element of time is not sufficiently regarded at present in tests for tensile strength; or, rather, that its importance and significance are not rightly understood, and that cement

may be mixed so as to ensure a high tensile test at a short date, which, if tested a longer date, would be found to give a lower result from excess of lime. He also wishes to draw attention to the influence of circumstances, state of the atmosphere, and treatment by the manipulator, &c., as varying the results of tests from the same cement. Indeed, he gives comparative tests at seven days' age of the same cement in two cases made up by the same gauger, and tested apparently in the same neighbourhood, giving breakage at 372 lb. and 510 lb. respectively. His experience, he says, leads him to the conclusion that there is still very much to be learned about the laws which govern Portland cement; and in this probably the most accomplished engineering experts will readily concur.

*First Lessons in Science, designed for the Use of Children.* By the late Right Rev. JOHN WILLIAM COLENSO, D.D., Bishop of Natal, 1853-1883. London: W. Ridgway. 1887.

This book was written to give general ideas on the broader outlines of science to a class of adult natives in Colenso's diocese. The present volume, as we see from the original preface, was intended as the first of a series; it deals with the main facts of astronomy, including those which concern the figure and movements of the earth; others of the series, which we conclude was not carried farther, would have dealt with geology and other branches of science in turn. What was adapted to the comprehension of the African adult is supposed, we presume, to be pretty nearly equally fitted for assimilation by the English child; and certainly the book is admirably adapted to give a young reader his first ideas as to astronomical truths, in language at the same time simple and scientific; and no one will doubt that a mind so keen and eager as Colenso's would have kept abreast of the times in matters of this kind, and not deal out exploded theories to the youthful mind. It is curious, considering the terrible reputation as a "scoffing sceptic" which its author at one time enjoyed, that possibly the one objection which may be made to the book is that, for a scientific primer, there is a little too much religious preaching worked into it.

*The Duties of a Clerk of Works.* By JOHN LEANING. London: B. T. Batsford. 1887.

This is a small book, giving in a very brief and pointed manner the outlines of a clerk of work's duties. A little less brevity would have been as well in some places; for instance, in the paragraph on "Concrete" (p. 22), it should have been mentioned that rough and angular fragments should be employed in preference to smooth or rounded ones (one of the most

important points in the production of good concrete); and, in the remarks under head of "Bricklayer," it might have been as well to give a reason for the direction, "See that cement is spread out and exposed to the air in a dry place before using it." The "clerk of works" will find the reason if he looks in the *Builder*, Jan. 3, 1885, "Student's Column," pp. 51, 52. The direction in regard to engaging a clerk of works, to inquire what he has previously done, "and engage none but those who have creditably superintended a building in that capacity," presents a certain difficulty, for in that case how is any one ever to begin being a clerk of works? Every man must have his first appointment in all branches of work. The quondam architect's assistant often makes a good clerk of works, says Mr. Leaning, "his knowledge of drawing and detail is of great advantage to him"; but "one of the disadvantages of this type of clerk of works is his possible interference with detail of which sometimes he knows more than his employer the architect, and is consequently tempted to deal with matters which are not in his province." That depends very much on what sort of man "his employer the architect" may happen to be; there are some with whom no clerk of works would venture to take such a liberty; others, certainly, who, conscious of their own shortcomings, might be grateful or indifferent. In a general way, however, our impression is that the engagement of a "quondam architect's assistant" as clerk of works is usually a capital thing for the said assistant; it enables him to complete his education in a practical direction,—at the expense of the architect's client. Even in such cases, however, a conscientious young man who means business and does his best, and takes care to get very full instructions from his principal, may be able to make mother-wit and close attention stand to a great extent in the stead of practical experience. The model clerk of works is only the development of experience; no one can really fill the office all at once. Let him begin on small and unimportant buildings, and so qualify himself for looking after the more complicated construction and conflicting interests in connexion with larger ones. And let him get Mr. Leaning's little book, which contains much common sense in a small compass, and will certainly be of use to him in the way of suggestion.

## RECENT PATENTS.

## ABSTRACTS OF SPECIFICATIONS.

9,186, Step Ladders. J. O. Nicholson.

According to this invention two or more ladders slide one within the other, with iron or brass or wooden guide strips fixed in the strings of one ladder and sliding in grooves in the strings of the other ladder. The strings of the bottom ladder are held together by dovetailed pieces across back edges, the bottom tread being a fixture, the other treads being pivoted on the back edge and chined into quadrant shape so as to allow them to turn back and upper ladder to slide up or down in front of treads. Back stays slide on the same principle. The ladder can be extended and fixed at any height.

11,583, Purifying Air and Cooling Rooms in Dwelling-houses. C. H. Joliffe.

The ventilators which are the subject of this patent are screened by meshes of fine wire or cotton wool in layers, and the air is led through pipes submerged in tanks, whereby it is cooled. The admission and flow of air can be regulated at will, so that apartments may be kept at one desired temperature.

12,042, Casement or Fanlight Fasteners. H. J. Broadway.

These stays and fasteners are designed for holding the window firm in position when open, and giving greater security when closed. A bar or slide works on a flat bar or stay of metal, being held in position by an eccentric boss or lever which grips the bar, and so holds and fixes it in position. The stay or fastener according to this invention is simple and cheap.

17,158, Briquettes. S. P. Wilding.

The briquettes are, by this invention, made from ore, small coal, coal dust, saw dust, &c. Molasses and linseed oil are used to bind the mass, which is then subjected to pressure. This mixture gives a briquette which is impervious to moist air or water, even when the surface is injured.

7,966, Inlaid Floors. W. Boeling.

By this invention the flooring plates are made with a top and bottom plate connected by means of cross battens, and with the intermediate space filled in with pitch, asphalt, or any suitable material. The plates are then laid as a floor, part being laid in concrete; as, for instance, a border or pattern across.



## 8,648, Fireproof Column. A. W. Ramage.

The outside shell of the column or stanchion which is the subject of this invention is of rolled steel quarter cylindrical plates or plates with flanges riveted together, and used in combination with steel stays. Cement or concrete is used to fill up the hollow fireproof pillar.

## 9,808, Plumber's Portable Furnace. W. P. Thompson.

This furnace is adapted for use with naphtha, gasoline, or any of the light hydrocarbons. The receptacle for the liquid fuel is in the base or lower part of the apparatus, which base forms the foundation upon which the other parts are mounted and into which they are connected. Provision is made for placing the irons while heating. The oil is fed to the burner through the lower standard by means of an air pump (after the manner of the mechanism of a moderator lamp) contained in the apparatus, and the flow of the illuminating fluid is regulated by a needle-valve.

## 10,427, Cutting Edges of Wall-paper. J. &amp; J. Eccles.

The paper is drawn through rollers, and circular cutters at each end trim the edges as the paper passes through. The improvements are in the direction of simplicity and strength of working parts.

## 2,291, Ventilating Apparatus. E. M. Young and G. B. Moss.

In connexion with the fireplaces of the room chambers are placed for exhausting the foul air from the rooms or halls. The air-chambers becoming heated the foul air is drawn from the apartment and passes up the chimney-shaft.

## 3,757, Hanging Doors and Casements. W. S. Pilditch.

By this invention the hinges are so placed that by working a groove of a quarter circle both in one of the back edges of the door and a similar one in the corresponding edge of the door-post the hinges will to the necessary extent become embedded in the two quarter circles, and by this arrangement the edge of the door and that of the door-post is constantly maintained in such close contiguity that for all practical purposes prying eyes are barred and draughts of air excluded. By a mechanical arrangement also, the door when required can be put back parallel to the wall without detriment or disturbance of the hinges. The leaf of the hinge is secured to a moulding or other elevation extending from top to bottom of the door and equal in height to the moulding of the architrave.

## 7,438, Saws for Stone or Marble. E. Edwards.

Sand is generally used in cutting stone. The blades or saws are, by this invention, so placed that they produce a rapid and continuous displacement of the sand under the rubbing action of the blades. Grooves are formed upon both sides of the blade so that they alternate with each other, or holes are pierced for the purpose of retaining the sand, and thus increase the cutting power of the saws.

## NEW APPLICATIONS FOR PATENTS.

Aug. 12.—11,039, J. Kenyon and Others, Wind, Rain, or Dust Preventers for Doors.—11,045, A. Harris and J. Luckock, Window Fastenings.

Aug. 13.—11,063, J. Speakman, Paint Restorers or Removers.—11,078, T. Shelby, Securing Sheets of Zinc or other Metal to Roofs.

Aug. 15.—11,109, J. Carrett, Preventing Smoky Chimneys.—11,119, J. Guest, Axes, Adzes, &c.

Aug. 16.—11,193, J. Halo and C. Simmons, Water-cooled Fans and Traps.—11,196, E. Thomas, Door Fastenings.—11,205, H. Gregeen, Combination Gully-trap and Channel.

Aug. 17.—11,221, J. Singleton, Screws and Screw-drivers.—11,241, T. Carpenter, Sliding Chandeliers, Gaseliers, &c.

Aug. 18.—11,283, W. Bell, Roofing Tiles, &c.—11,287, De Pennefather, Ventilating Rooms, &c.—11,297, H. Lake, Door Latches.—11,304, J. Gilbert and J. Golding, Fastening for Windows and Sashes.

11,316, R. Wyatt, Flushing Cistern and Water-waste Preventer.

Aug. 19.—11,321, W. Harrington, Adjusting and Attaching Door Knobs to Spindles.—11,334, A. and R. Knox, Wood Planing Machines.—11,339, E. Finch, Syphon Flushing Cisterns.

Aug. 20.—11,378, J. Cartland, Attaching Door-knobs to Spindles.

Aug. 22.—11,410, J. Reid, Rendering Doors, Windows, Casements, &c., Draught-proof.—11,424, J. Carter, Air-chambered and Receding Party-walls.

11,434, O. Elphick, Syphon Cisterns.—11,435, A. Allom, Ventilation.—11,438, J. Cantle, Fireproof Holders for Joists for Party-walls.

Aug. 23.—11,490, R. Winn, Syphonic Apparatus for Discharging Water from Flushing Tanks or Cisterns.

Aug. 24.—11,508, R. Harrison, Devices for Opening and Closing Panlights, Sashes, &c.—11,509, H. Warrington and W. Howlett, Bricks and Building Blocks.

Aug. 25.—11,506.—R. Brenmohl, Door Furniture.

## PROVISIONAL SPECIFICATIONS ACCEPTED.

13,249, W. Lutwyche, Producing Mosaics by Means of Enamelled Substances and Coloured Glass.—4,323, F. Smith, Door Springs and Checks.

9,716, J. Hirschfeld, Fastening for Doors.—9,746, P. Bishop, Locking or Fastening Window

Sashes, either when wholly or partially Closed.—

9,971, S. Hazeland, Machinery for Planing Wood.—10,012, A. Boulton, Roof and Roofing Material.—

10,054, G. Lundberry, Door, Cupboard, and similar Fastenings.—9,605, G. Innes, Manufacture of Portland Cement, &c.—10,310, A. Sutherland, Service Cisterns and Valves for Water-closets.—10,351, J. Phillips, Ventilation of Sewers.—10,511, W. Sweetnam, Automatic Flushing Apparatus for Water-closets.—10,550, J. Rickard, Trip Wagons and Carts.—3,950, J. Inshaw, Domestic Fireplaces.—

9,757, J. Turner, Explosive Alarm for the Protection of Windows, Doors, &c.—9,984, G. Parkinson, Headstones, Curbing, and Palladings combined.—10,086, J. Dungey, Cup-and-ball Joints for Gas fittings.—10,292, J. Rhodes, Door Bolts.—10,449, R. Bettie, Boring Bits.—10,816, J. Gowland, Chimney Tops, Ventilators, and Cowls.—9,627, F. Pilkington, Fireproofing Columns, Stanchions, Girders, Ceilings, Walls, &c.—9,695, W. Wise, Windows and Window Fittings.—10,244, J. Rigby, Manufacture of Cement.—10,324, H. Matthews, Portland Cement.

## COMPLETE SPECIFICATIONS ACCEPTED.

## Open to Opposition for Two Months.

12,514, T. Lane, Window sash Fastenings.—13,033, M. Heichley, Syphon Flushing Cisterns.—3,431, J. Duckett, Water-closets.—6,381, F. Ferguson, Clay, Terra Cotta, or Cement Blocks having a hollow Tube formed in same, and constructed to form a Continuous Pipe on the Faces of Buildings.—9,908, H. Henry, Cowl or Chimney Cap.—11,637, M. Macleod, Dry Glazing.—13,208, W. Lutwyche, Producing Mosaics by Means of Enamelled Substances and Coloured Glass.—13,436, J. Harrington, Spirit Levels.—13,445, D. Anderson, Flushing Apparatus.—13,468, G. Wickham, Syphon Cisterns.—15,419, J. Hodges, Mortise and Rim Locks.—10,250, C. Rogers, Wood Screws.—13,555, J. Horrocks, Ventilation of Buildings, Sewers, &c.—14,146, W. Bevan, Sash Fastener.—16,105, J. Craig, Outlet Ventilators.

## RECENT SALES OF PROPERTY.

## ESTATE EXCHANGE REPORT.

## AUGUST 18.

## By WORSFOLD &amp; HAYWARD.

Dover—3, St. James-lane, freehold ..... £240

10, Cowley-hill, 35 acres, 60 years, ground-rent 10s. 1,175

9, Waterloo-crescent, 46 years, ground-rent 10s. 1,460

6 to 8, Saxon-street, 39 years, ground-rent 4s. 700

7, Edingham-crescent, 39 years, ground-rent 4s. 11s. 325

5, York-street, freehold ..... 325

11, Market-square, freehold ..... 1,225

Marton, near Dover, Hardwick-road—Kent cottage, freehold ..... 220

## AUGUST 22.

## By SEDGWICK, SON, &amp; WALL.

Paddington—9, 10, and 15, Ambery-road, 75 years, ground-rent 18s. 780

## AUGUST 23.

## By DERNHAM, TAYSON, &amp; CO.

Pimlico, Hugh street—An improved ground-rent of 8s. term 39 years ..... 120

Wond Green—3, 4, and 5, Sussex-terrace, 76 years, ground-rent 16s. 15s. 380

11 and 12, William's-terrace, 70 years, ground-rent 8s. 210

Streatham, Lewin-road—A plot of freehold land ..... 260

## AUGUST 24.

## By F. HOLLOWAY.

Stoke Newington—6, Defoe-road, 77 years, ground-rent 6s. 10s. 150

Maida Vale—5, 6, and 7, Elin-terrace, 74 years, ground-rent 21s. 1,100

Barking—6 and 6, Axe-street, 96 years, ground-rent 15s. 85s

1 to 24, Cooke-street, leasehold ..... 1,640

## AUGUST 25.

## By BRADLEY &amp; CO.

Stanford-le-Hope, Essex—Three enclosures of freehold land, 8s. 0r. 23p. 730

Ile of Ely—Hobourn's farm, 13s. 3s. 1p., freehold ..... 2,170

Streatham—Pembroke House, 67 years, ground-rent 40s. 2,950

## By E. SIMMONS.

Kennington—60, 61, and 62, Wat-street, 20 years, ground-rent 30s. 57s

61 and 65, Walcot-square, 20 years, ground-rent 12s. 38s

Lambeth—20 and 21, Cranborne-street, 37 years, ground-rent 16s. 13s. 4d. 700

Pekham—30, 38, and 40, Brayard-road, 80 years, ground-rent 9s. 16s. 6d. 705

Balham, Larch-road—A plot of freehold land ..... 400

Whitechapel, Grace-alley—Ground-rent of 6s. 6s. reversion in 51 years ..... 260

Westminster, Arlington-road—2 to 6, Duke-street, 31 years, ground-rent 1s. 770

Camberwell—2, 4, and 18, Victory-square, 93 years, ground-rent 15s. 15s. 380

Clerkenwell 9, Arlington-street, 21 years, ground-rent 6s. 6s. 320

Barboursland, Brookly-street, 22 years, ground-rent 6s. 320

Holloway-road—37, Hornsey-road, freehold ..... 270

34, Hornsey-road, freehold ..... 275

Stoke Newington—28 to 34 even, Woodlee-road, 50 years, ground-rent 22s. 840

64, Lordship-road, 56 years, ground-rent 8s. 840

Highbury—77 to 85 odd, Highbury-quadrant, 62 years, ground-rent 37s. 10s. 2,000

Hornsey-road—113, 115, and 117, Corby-street, 83 years, ground-rent 18s. 18s. 272s

115, Thorpedale-road, 83 years, ground-rent 5s. 12s. 6d. 19

## By C. D. FIELD &amp; SONS.

Camberwell—1 to 11, Bonnor-street, 74 years, ground-rent 47s. 4s. 2,32s

## Miscellaneous.

University College, Bristol.—The

College has been recently enabled to make a notable advance in the matter of engineering education, owing to the generosity of local firms.

At a meeting held in the early part of the present year, under the presidency of Mr. Alfred Fry, the desirability of instituting engineering scholarships was considered. The practical outcome of this meeting was that most of the firms of the neighbourhood agreed to institute Bursaries or Scholarships at their works. The holders of these are to be nominated by the College authorities. Some will be awarded on the results of the annual examinations, while others will be reserved for deserving students who may be unable to pay the usual premiums required on entrance into the works. The educational scheme adopted at Bristol does not include any attempt to impart practical workshop instruction within the College walls, but the students spend six months (April to October) in each year acquiring practical experience in the works and drawing-offices of engineers in the West of England. This system is stated to answer so well that Messrs. Stothert & Pitt, of Bath, and the Bristol Wagon Works Company propose to make it obligatory on all their pupils to attend the College courses in the winter months for the first three years of their pupillage. Several firms have also signified their willingness to take College students for short periods, so that civil engineering and electrical engineering pupils may spend one or two terms of six months in works, while at the same time mechanical engineers may have experience in two or three different establishments during their College career.

In return for these concessions, the Council of the College has decided to permit deserving apprentices or artisans, nominated by the local engineers, to attend the College courses at reduced rates. It is expected that about nine first-class scholarships and a larger number of second-class ones will be available during the coming session. The following are the names of the firms which have already placed at the disposal of the College authorities one or more Scholarship places in their works, on exceptionally favourable terms.—Messrs. Stothert & Pitt, Bath; The Bristol Wagon Works Company, Bristol; Messrs. Cox & Co., Falmouth; Messrs. Newall & Co., Bristol; Messrs. Willoughby Bros., Plymouth; Messrs. Bush & De Soyres, Bristol; Mr. Thos. Beckett, Atlas Engine Works, Bristol; Messrs. John Watts & Co., Bristol; and Messrs. Spencer & Co., Melksham, Wilts.

**Isothermal System of Building.**—This new system of building (according to the *Deutscher Dachdecker*), is principally based upon the employment of iron in layers between which isolating agents (air and materials of organic composition) are alternated in such a manner as to effect complete protection against cold as well as heat. The various parts of the buildings being constructed in factories, expedition and cheapness are insured. There is comparatively little brickwork, it being only used in the cellars, foundations, and chimneys.

As soon as the last coat of oil-paint is dry, the house is ready for occupation. The building of such a house takes four to five weeks, and can be carried on in winter as well as in summer.

The inventor of the system, Herr. Hielemann, of Berlin, claims, moreover, that it insures complete dryness, and a saving of about one-third in the cost of building. It is, however, only applicable to structures not more than two stories high, such as agricultural and industrial buildings, dwelling-houses, villas, workmen's dwellings, &c. Cottages with two rooms and cellars, &c., can be erected for 112s. 10s., with iron including stove, painting, paper-hanging, &c. Villas with five rooms cost 240s., and with eight rooms, 450s. Sheds, stables, and similar erections, can be put up from 1s. per square foot of surface built over. The use of oil-paint gives these structures a cheerful appearance. A building erected on this plan may be seen at the Berlin goods station of the Potsdam Railway.



**The Rebuilding of Chelmsford Workhouse.**—At a meeting of the Guardians of Chelmsford Union, held last week, the chief business before the Board was the consideration of the plans submitted for the rebuilding of the Union House. Mr. E. Corder (Chairman) presided, and there were twenty-six other guardians present. At a previous meeting it is decided to ask Mr. F. Chancellor, Mr. C. P. Periwé, and Mr. F. Whitmore, architects, of Chelmsford, to send in plans for the new building. All three gentlemen did so, and the plans were referred by the Guardians to the Building Committee for examination. This committee now presented their report under—“The Clerk submitted to us three schemes and plans which he had received from the architects for the re-erection of the workhouse, bearing the several mottoes, ‘Union is Strength,’ ‘Kelpie,’ and ‘Adaptation.’ The committee having carefully examined the plans, it was resolved that they cannot recommend the adoption of the plans proposed by ‘Kelpie.’ The plans of the other two committees were then put to the vote, when they appeared six in favour of ‘Union is Strength’ and four in favour of ‘Adaptation.’ It was, however, resolved that the guardians be recommended to adopt the scheme and plans sent in with the motto ‘Union is strength.’” After some discussion, the chairman moved, Mr. A. C. Veley seconded, and it was resolved, that the report of the committee be received and adopted. The closed letter bearing the motto “Union is strength” was opened, and it was found that the accepted plans were those of Mr. F. Chancellor. The plans marked “Adaptation,” which seriously competed in committee with those approved by the Guardians, belonged to Mr. C. P. Periwé; and those marked “Kelpie” to Mr. F. Whitmore. The Building Committee were then instructed to meet Mr. Chancellor and complete the plans and specifications for the local Government Board.

**The Stavanger Cathedral, Norway.**—In a recent article on the state of this cathedral the Norwegian technical journal *Teknisk Ugeskrift* says:—“During recent years the work of restoring this celebrated Norwegian edifice, the second cathedral in Norway after that of Throndhjem, has, thanks to the munificence of the corporation of this city, been almost completed, and the building is now one of the sights which no artistic visitor to Norway should miss, though the position of the town, by being somewhat out of the ordinary tourist track, has rendered this cathedral less known than its prototype at Throndhjem. The cathedral of Stavanger was built in the middle of the twelfth century by one Reinold or Ragnhald, a monk from the Winchester Cathedral, who, by the order of King Sigurd Jerusalemfaren, brought over workmen from England for this purpose. This explains the remarkable similarity between certain parts of these two cathedrals, and also why the first cathedral was consecrated to St. Swithin, Bishop of Winchester, 837-862. In 1272 the cathedral was almost destroyed by fire, and it was not till the middle of the fifteenth century that it was fully restored. At that period it attained the greatest magnificence, having eighteen altars, &c.; but the Reformation soon destroyed all this, and for three centuries the edifice remained to decay, stripped of all its interior ornaments. In the middle of the eighteenth century the whole interior was, by the order of some Vandal authority, “whitewashed,” a process whereby all the fine Gothic tracery and ornaments were obliterated. It is curious to know that about the same period a similar outrage was perpetrated in the Throndhjem Cathedral. Thus it remained until 1867, when some art-loving corporation of the city decided upon restoring the cathedral as near as possible to its ancient magnificence, on a plan submitted by a well-known Norwegian architect, Herr von der Lippe, and this work has since been carried out most satisfactorily, the principal and most arduous task being to remove the “whitewash” referred to. The nave, the oldest part of the cathedral, is over 100 ft. in length and about 30 ft. in width. It is built of grey granite, with sandstone cornices, window and door frames. In the manner of basilican churches, the nave is divided into two lower side naves and one central nave, 10 ft. in height, the whole being covered by a wooden roof. All along the centre of the nave run two rows of pillars, joined by arches, in Norman style, the latter bearing

on the inside zigzag tracery, whilst, curiously enough, the capital of one is ornamented with old Pagan Norse dragon tracery. On the west side there has once been a large tower, but it has been found impossible to rebuild this on account of the walls of the cathedral now deviating from the perpendicular. The choir, which in all probability dates from the fire in 1272, is 70 ft. in length, and with the same height and width as the nave. It is chiefly built of sandstone, and in the richest Anglo-Gothic style, and is one of the finest pieces of ancient architecture in Scandinavia. The roof is supported by Gothic pillars and groined, the windows being ornamented with beautiful foliation. In the east gable is a large, handsome stained-glass window, with figures of the four Evangelists. There is also a magnificently-carved baptismal font of sandstone, dating from the earliest time of the cathedral.

**The London Parochial Charities Act, 1883.**—By an Act of the current session the Ecclesiastical Commissioners, as owners, are authorised to sell about 53 acres of Chisold Park, Stoke Newington, to the Metropolitan Board of Works and the Hackney District Board, or to either of them, for preservation as an open space. The purchase-money is to be contributed by various metropolitan parish and district Boards, including the South Hornsey Local Board, into whose parish portion of the park extends. The Act further provides for a contribution not exceeding £7,500, being made out of the charity funds dealt with by the London Parochial Charities Act of 1883. The Coal, Corn, and Finance Committee of the Common Council have just reported in favour of the making of this last-named contribution. At a delegates' meeting of the London Trades' Council, held on Tuesday, 23rd August, in the Memorial Hall, Farringdon-street, a resolution was passed, on the motion of Mr. C. J. Drummond, Secretary to the London Society of Compositors, supporting the Charity Commissioners' scheme for erecting technical schools,—“in the best sense of the word,”—in various parts of the metropolis. It is proposed to erect the first one on the site of Farringdon, *olim* Fleet Market, the cost to be defrayed out of the parochial funds of St. Bride's under provision of this Act.

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	6 10 0	7 10 0
Teak, E.I. ....do	6 10 0	13 0 0
Sesqui, U.S. ....do	0 2 3	0 3 0
Ash, Canada ....load	3 0 0	4 10 0
Birch ....do	2 0 0	3 10 0
Elm ....do	3 10 0	4 10 0
Fr. Baltic, &c. ....do	1 10 0	4 0 0
Oak ....do	2 10 0	4 10 0
Canada ....do	3 0 0	6 0 0
Pine, Canada red ....do	2 0 0	3 10 0
“ yellow ....do	2 0 0	4 0 0

TIMBER (continued).

	£. s. d.	£. s. d.
Lath, Baltic ....fathom	3 0 0	5 0 0
St. Petersburg ....do	4 0 0	5 10 0
Wainscot, Riga ....log	0 0 0	0 0 0
“ Odessa, crown ....do	2 10 0	3 0 0
Denia, Finland, 2nd and 1st, std. 100	7 0 0	8 0 0
“ 4th and 3rd ....do	5 10 0	6 10 0
Riga ....do	5 10 0	7 0 0
St. Petersburg, 1st yellow ....do	8 0 0	13 0 0
“ 2nd ....do	7 0 0	8 0 0
“ white ....do	6 10 0	8 10 0
Swedish ....do	0 0 0	0 0 0
White Sea ....do	0 0 0	0 0 0
Canada, Pine, 1st ....do	10 0 0	24 0 0
“ 2nd ....do	10 0 0	15 0 0
“ 3rd, &c. ....do	8 0 0	9 0 0
“ Spruce, 1st ....do	8 0 0	9 0 0
“ 3rd and 2nd ....do	5 0 0	7 0 0
New Brunswick, &c. ....do	5 0 0	6 10 0
Battens, all kinds ....do	4 0 0	10 10 0
Flooring Boards, sq., 1 in., prepared, First ....do	0 8 0	0 11 0
Second ....do	0 6 0	0 7 6
Other qualities ....do	0 4 0	0 8 0
Cedar, Cuba ....foot	0 0 3	0 0 3
Honduras, &c. ....do	0 0 3	0 0 3
Australian ....do	0 0 2	0 0 3
Mahogany, Cuba ....do	0 0 4	0 0 8
“ do ....do	0 0 4	0 0 8
St. Domingo, cargo average ....do	0 0 3	0 0 3
Mexican ....do	0 0 3	0 0 5
Tobacco ....do	0 0 3	0 0 5
Honduras ....do	0 0 3	0 0 5
Maple, Bird's-eye ....do	0 0 5	0 0 7
Rose, Rio ....do	8 0 0	11 0 0
Bahia ....do	7 0 0	9 0 0
Box, Turkey ....do	5 0 0	12 0 0
Satin, St. Domingo ....do	0 0 5	0 0 9
Porto Rico ....do	0 0 6	0 0 10
Walnut, Italian ....do	0 0 3	0 0 5

METALS.

Iron—Bar, Welsh, in London...ton	4 7 0	4 15 0
“ in Wales ....do	4 2 0	4 7 6
“ Staffordshire, London ....do	5 10 0	6 0 0
Sheets, single, in London ....do	0 0 0	0 0 0
Hoops ....do	0 0 0	0 0 0
Nail-roads ....do	0 0 0	0 0 0

COPPER.

British, cake and ingot ....ton	43 10 0	44 0 0
Best selected ....do	44 10 0	45 10 0
Soft ....do	50 0 0	0 0 0
Sheets, strong ....do	40 7 6	40 15 0
Chill, bars ....do	0 0 0	0 0 0

YELLOW METAL.

Lead ....lb.	0 0 0	0 0 0
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LEAD.

Pig, Spanish ....ton	11 18 9	0 0 0
Australian ....do	12 3 6	12 5 0
Sheet, English ....do	13 3 9	0 0 0

SPELTER.

Silesian, special ....ton	14 7 6	15 0 0
Ordinary brands ....do	14 15 0	14 17 6

TIN.

Straits ....ton	103 0 0	0 0 0
Australian ....do	103 2 6	0 0 0
English ingots ....do	106 5 0	0 0 0

ZINC.

English sheet ....ton	0 0 0	0 0 0
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OILS.

Linseed ....ton	20 17 6	21 2 6
Cocunut, Ceylon ....do	30 0 0	33 0 0
Ceylon ....do	23 15 0	24 0 0
Palm, Lagos ....do	21 10 0	22 0 0
Rapeseed, English pale ....do	23 10 0	23 15 0
“ brown ....do	22 5 0	0 0 0
Cottonseed, refined ....do	20 15 0	21 0 0
Tallow and Oleine ....do	25 0 0	45 0 0
Lubricating, U.S. ....do	5 0 0	6 0 0
“ refined ....do	5 0 0	12 0 0

TURPENTINE.

American, in casks ....cwt.	1 5 9	1 10 0
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TAR.

Stockholm ....barrel	0 14 0	0 14 6
Archangel ....do	0 9 6	0 9 9

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitoms of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Repairs to Shire Hall .....	County of Hertford .....	Urban A. Smith .....	Sept. 8th .....	ii.
Guernsey Granite .....	Gravesend U.S.A. ....	Official .....	Sept. 10th .....	ii.
Supply and Delivery of Granite .....	Woodford Local Board .....	J. W. Hooper .....	do. ....	ix.
New School Buildings, Skipton .....	The Governors .....	Official .....	do. ....	ii.
Disinfectants .....	St. Luke's Vestry .....	— De Pape .....	Sept. 12th .....	ii.
Widening Green Lanes .....	Tottenham Local Board .....	do. ....	Sept. 13th .....	ii.
Engine House, &c. ....	do. ....	do. ....	do. ....	ii.
Broken Granite and Granite Curb .....	East Ham Local Board .....	W. H. Savage .....	do. ....	ii.
Taking-down and Rebuilding Bridge .....	Kent Justices of the Peace .....	F. W. Ruck .....	Sept. 14th .....	ix.
Turret Clock .....	Malvern Local Board .....	J. E. Palmer .....	Sept. 17th .....	ix.
Drainage Works .....	Central London Sch. Dis. .....	A. Allen, Jun. ....	Sept. 18th .....	ix.
Repairing, Cleansing, and Painting School, &c. ....	do. ....	H. Jarvis & Son .....	do. ....	ix.
Erecting and Enlarging Schools, Repairs, &c. ....	School Bds. for London .....	Official .....	Not stated .....	ix.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Clerk of Works .....	Aston Bd. of Guardians .....	£l. 10s. weekly .....	Sept. 12th .....	xiv.
Draughtsman and Assistant Surveyors .....	Civil Service Com. ....	Not stated .....	Sept. 27th .....	xiv.

TENDERS.

BROMLEY.—Additions to “Invicta Works,” Bromley-by-Bow. Mr. Charles H. Goode.—Quantities

Atherton & Latta .....	£2,430	0 0
Palmer .....	2,392	0 0
Shepherd .....	2,251	0 0
Brass & Son .....	2,346	0 0
Johnson .....	2,233	0 0
Harris & Wardrop .....	2,218	0 0
Walker .....	2,218	0 0

BROMLEY (Kent).—For sewer extensions, for the Bromley Local Board. Mr. Hugh S. Crogeon, surveyor:—

G. Osenton .....	£1,200	0 0
Woodhams & Fry .....	955	0 0
A. T. Cattle .....	884	0 0
E. & W. Hies .....	860	0 0
Grudle .....	855	0 0
J. H. Mollett .....	793	0 0
R. Nicholson .....	778	0 0
H. Potter .....	764	0 0
E. Peill & Sons .....	740	0 0
F. Lansbury (accepted) .....	719	0 0



CARLISLE.—Accepted for putting and converting into six dwelling-houses the old Whip Manufactory, for Mr. Jas. R. Armstrong. Mr. Charles Armstrong, architect, Carlisle.

<i>Bricklayer and Mason.</i>	
Alex. McGuinness, Carlisle.....	£143 3 0
<i>Carpenter and Joiner.</i>	
Joseph Hindson, Carlisle.....	71 7 0
<i>Plasterer.</i>	
Samuel Fergusson, Carlisle.....	35 10 0
<i>Cement and Fireproof Floors.</i>	
Samuel Fergusson.....	62 10 0
<i>Plumber.</i>	
George Sowerby.....	15 0 0
<i>Painting and Glazing.</i>	
David Canning.....	11 8 6

DARENTH (Kent).—For external painting and repairs to the Asylum for Imbeciles, Darenth, near Dartford, Kent, for the Managers of the Metropolitan Asylum District. Messrs. A. & C. Harston, architects, 18, Leadenhall-street. Quantities not supplied.—

A. Sewell.....	£2,450 0 0
W. Tufes.....	1,565 0 0
Cullen & Co.....	1,392 1 5
Vigor & Co.....	1,170 0 0
G. Forley.....	1,030 0 0
McLachlan.....	974 0 0
R. Proctor.....	885 0 0
W. Hadlow, 72, Biggin-street, Dover.....	685 18 3

\* Accepted.

DARENTH (Kent).—For alterations and additions to the mortuary at the School for Imbecile Children, Darenth, Kent, for the Managers of the Metropolitan Asylum District. Messrs. A. & C. Harston, architects, 18, Leadenhall-street.—

W. Shurmer, Lower Clapton (accepted) £289 10 0

HUCKNALL TORKARD.—For the enlargement of the Parish Church, Hucknall Torkard, Mr. Robt. C. Clarke, architect, Nottingham.

Parnell & Son, Rugby.....	£4,426 0 0
Dennett & Ingle, Nottingham.....	4,393 0 0
Thompson, Peterborough.....	4,354 0 0
Hodson & Son, Nottingham.....	4,381 0 0
Rudd & Son, Grantham.....	4,081 0 0
Vickers, Nottingham.....	4,069 0 0
Smith & Lunn, Newark.....	3,993 0 0
Fish & Son, Nottingham (accepted).....	3,734 0 0

KING'S LYNN.—For building furnishing store at King's Lynn (bricks and plate-glass being found by the proprietor), for Mr. Alfred Jernyn. Mr. W. Adams, architect.—

R. Dye (accepted) £1,238 0 0

[Eight tenders were received, the amount of the highest being £1,920.]

LEYTONSTONE.—For the completion of the Bethnal Green Schools at Leytonstone, Essex, for the Guardians. Messrs. A. & C. Harston, architects, 18, Leadenhall-street. Quantities supplied.—

<i>Third Contract.</i>	
J. & H. Cocks.....	£23,999 0 0
Ingram & Son.....	23,318 0 0
H. & H. F. Higgs.....	23,450 0 0
J. Holland.....	23,360 0 0
R. Edwards.....	23,210 0 0
D. Brown & Co.....	23,170 0 0
W. Johnson.....	22,000 0 0
S. Grist.....	21,983 0 0
Jackson & Todd, 199, Hackney-road*.....	21,630 0 0
J. S. Robson, Snarebrook.....	21,384 0 0

\* Accepted. Messrs. Jackson & Todd carried out Contracts Nos. 1 and 2.

LONDON.—For alterations and additions to the Robuck Tavern, Hackney-road, for Messrs. Bruce Bros. Messrs. Williams & Son, architects.—

J. Anley..... £687 0 0

Thomerson..... 969 0 0

Ivory..... 945 0 0

Jackson & Todd (accepted)..... 915 0 0

LONDON.—For the erection of factory and warehouse at Mount-street, Bethnal Green, for Messrs. Nicholson & Sons. Mr. C. R. Winter, architect.—

Jackson & Todd..... £6,670 0 0

\* Revised estimate accepted.

LONDON.—For the erection of the Olive Branch Tavern, Waterloo-road, for Messrs. Hart & Son. Mr. J. G. Finch Noyes, architect.—

Patrick.....	£6,937 0 0
Boyes.....	6,962 0 0
Patman & Co.....	6,973 0 0
Kilby & Gayford.....	6,538 0 0
Lawrence & Son.....	6,465 0 0
Canning & Mullens.....	6,465 0 0
Spencer & Co.....	6,350 0 0
Jackson & Todd (accepted).....	6,290 0 0

LONDON.—For alterations and additions to the Colchester Arms, Salisbury-street, Jamaica-road, Bermondsey. Messrs. Williams & Son, architects.—

Staines & Son.....	£724 0 0
Salt.....	614 0 0
Jackson & Todd (accepted).....	589 0 0

LONDON.—For alterations and additions at George's C. Capes, architect. Quantities not supplied.—

Bush.....	£735 0 0
Chappell.....	623 0 0
Lawrence.....	595 0 0
Nightingale.....	593 0 0

LONDON.—For gasfitting works at the Crown and Anchor, Finsbury.—

Earl & Philips.....	£123 10 0
Green & Son.....	114 0 0
Clark.....	93 7 8
W. Winn (accepted).....	85 0 0

LONDON.—For building new ball-room at 16, Salisbury-road, Dalston, for Mr. Hind. Mr. Wm. Shroobridge, architect.—

Steel Bros.....	£240 0 0
Deering & Son.....	240 0 0
Anley.....	240 0 0

LONDON.—For the erection of a house in Egleton-gardens, South Kensington, for Mr. W. Wetherley. Mr. T. H. Smith, architect, 17, Basinghall-street.—

Matthews & Co..... £2,400 0 0

\* Exclusive of internal painting and decorations.

LONDON.—For rebuilding the Goat in Boots public-house, Fulham-road, and the erection of three houses and shops on site adjoining, for Mr. W. Prangnell. Mr. T. H. Smith, architect, 17, Basinghall-street. Quantities by Mr. J. T. Wallford, 110, Buckingham Palace-road.—

W. Greger.....	£4,911	£3,337	Total
J. & J. Greenwood.....	4,815	3,185	8,000
Patman & Fotheringham.....	4,704	3,310	7,914
E. Lawrence & Sons.....	4,701	3,016	7,717
Holliday & Greenwood.....	4,579	2,992	7,571
Jackson & Todd.....	4,235	2,680	6,925
Spencer & Co.....	4,167	2,700	6,867
Turtie & Appleton.....	4,025	2,799	6,824

\* Accepted subject to modifications.

ORPINGTON (Kent).—For Mission Chapel at Crofton. Mr. St. Pierre Harris, A.R.I.B.A., architect and surveyor, 1, Basinghall-street, and Orpington.—

H. Somerset & Son, Clapham..... £485 0 0

W. Holl, Croydon..... 469 0 0

\* Accepted with additions at 520.

PORTSMOUTH.—For reseating, alterations, heating apparatus, cleaning, and painting, &c., Daniel-street, Wesleyan Chapel, Portsea. Mr. A. E. J. Guy, architect, Albert-road, Southsea. Quantities by Mr. Jas. W. Stroud, 33, Lion-terrace, Portsea.—

Matthews Bros., Portsea.....	£1,336 11 6
F. Francis, Southsea.....	1,293 0 0
W. E. & C. Light, Landport.....	1,109 0 0
T. Bowler, Stanshaw.....	1,099 0 0
Crook & Sons, Southampton.....	1,022 0 0
C. Dye, Landport.....	1,009 0 0
F. White, Landport.....	1,001 0 0
E. & A. Sprigging, Stanshaw.....	923 0 0
J. Crookrell, Landport.....	905 0 0
Outridge & Reading, Landport.....	897 0 0
Scammell & Dowdell, Landport.....	877 0 0
T. Quick, Southsea.....	857 0 0
T. P. Hall, Bedford-road, Southsea*.....	720 0 0

\* Accepted.

PORTSMOUTH.—For reseating, gallery front, rostrum and painting and decorating the Wesley Chapel, Arundel-street, Landport. Mr. A. E. J. Guy, architect, Albert-road, Landport. Quantities by Mr. Jas. W. Stroud, Lion-terrace, Portsea.—

J. Crookrell, Landport.....	£1,200 0 0
W. Learmonth, Landport.....	1,105 0 0
W. Coltherup, Landport.....	1,039 0 0
W. Black, Portsea.....	1,070 0 0
R. Stokes, Southsea.....	1,060 0 0
C. Dye, Landport.....	1,038 0 0
T. W. Quick, Southsea.....	987 0 0
T. P. Hall, Southsea.....	981 0 0
Scammell & Dowdell, Wingfield-street, Landport (accepted).....	975 0 0

READING.—For erecting new house in Hamilton-road. Reading, for Mr. C. Batho. Mr. Jos. Morris, architect.—

John Bottrill, Reading (accepted)..... £875 0 0

[No competition.]

ROMFORD (Essex).—For erecting a cottage hospital. Messrs. Frank Brown & John S. Corder, joint architects, 9, Thoroughfare, Ipswich.—

Hines.....	£710 0 0
Hammond & Son.....	664 0 0
Dwight & Davis (accepted).....	605 0 0
Booth.....	584 0 0

SANDY (Bed).—For the erection of Baptist Chapel. Sandy. Messrs. Usher & Anthony, architects, 9, St. Paul's-square, Bedford.—

Kimberley, Banbury.....	£2,439 0 0
Jackson, Koynton.....	2,400 0 0
Foster, Kempston.....	2,296 0 0
White, Bedford.....	2,255 0 0
Harrison, Bedford.....	2,230 0 0
Saint, Cambridge.....	2,184 0 0
Warton & Walker, Bedford.....	2,140 0 0
Page, Buckden.....	2,025 0 0
Rainford & Bartle, Potton.....	1,944 0 0
Peters, Potton.....	1,969 0 0
Woodman, Potton.....	1,908 0 0
Edwood & Son, Sandy.....	1,885 0 0
Wade, St. Neots (accepted).....	1,788 0 0

SOUTH SHIELDS.—For alterations to business premises, for Mr. T. A. Dry, jun. Mr. Henry Griever, A.R.I.B.A., architect.—

Jos. Wright, South Shields.....	£476 17 0
Charles F. Temple, South Shields.....	419 10 0
Gilliland & Hall, South Shields.....	365 10 0
George Goddard, South Shields.....	355 0 0
Nicholas Napier, South Shields.....	339 0 0
William Scott, South Shields.....	333 10 0
John Yeales, Jarrow.....	305 0 0
W. J. Robertson, South Shields.....	299 11 0
John Shields, South Shields.....	285 0 0
John Shields, South Shields.....	250 0 0

\* Accepted.

WANDSWORTH.—For lifts at the Infirmary extension, St. John's Hill, New Wandsworth, for the Guardians of the Wandsworth and Clapham Union. Mr. Thos. W. Aldwinckle, architect, 2, East India-avenue.—

G. Scott & Son.....	£260 0 0
Clark, Bunnett, & Co.....	245 10 0
Geo. Johnson.....	235 15 0
Archd. Smith & Stevens.....	195 15 0
Waygood & Co.....	195 15 0
W. R. Dell & Son.....	188 0 0
Atwood & Co.....	180 0 0
T. Thomas & Sons.....	176 0 0
Middleton.....	132 0 0

WEST MARDEN (Sussex).—For completing house and stables at West Marden, Sussex, for Mr. Alexander Beale. Mr. William J. Martin, F.R.I.B.A., architect, Reading.—

Robert Pink, Godalming.....	£594 0 0
J. & A. Gammon, Petersfield.....	551 0 0
Crook & Sons, Southampton.....	507 17 6
Snell & Co., Maidenhead.....	490 0 0
Cousens & Chase, West Marden.....	454 11 0
Joseph King.....	373 17 7

WIX (Essex).—For the erection of new chancel, and restoration and reseating the nave, of St. Mary's Church, for the Vicar and Wardens. Messrs. W. W. Wadmore & Baker, architects, 35, Great St. Helens, London. Quantities supplied:—

	Chancel.	Nave.	Total.
Alfred Coe, Ipswich.....	£410	£462 10	£872 10
J. Grimes, Colchester.....	385	453 0	838 0
Everett & Son, Colchester	370	460 0	830 0
O. T. Gibbons, Ipswich ..	360	385 0	725 0
A. Brown, Brantree .....	325	373 0	698 0
	* Accepted.		

\* Accepted.

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LIVERPOOL:  
6 and 8, Hatton Garden.

GLASGOW:  
Petershill-road.

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### Technical School and College Building.



THE large and practical volume brought out under this title\* by an architect who has made a special study of the subject, may be said to be a book for the times; for though the recently

proposed Technical Education Bill failed to pass, owing in great measure to its own inherently unsatisfactory character, there is no doubt that technical education is fairly in the air at last in this country, and that the provision of buildings for the efficient and convenient administration of this class of instruction is one of the special services which will be increasingly demanded from English architects for the next quarter of a century, and for which they will require to qualify themselves. Mr. Robins, the author of the present volume, and Mr. Waterhouse, the architect of more than one large and in the main successful technical school, have secured the honour of leading the way.

Mr. Robins logically concludes that before considering what is required in schools for technical education, it is well to come to some conclusion as to what technical education consists in and what is its main object. In regard to this there have been many different opinions, but the reasonable view, and the one which is likely to be adopted by the majority of those who give any thought to the subject, is that expressed by Professor Huxley, Professor Ayrton, and the late Professor Fleeming Jenkin, from each of whom are quoted (p. 13) expressions which practically all concur in the same opinion, viz., that the object of technical education is not to teach trades (which Professor Jenkin characterised as "a mischievous delusion"), but to give a training in the principles of applied science generally, with some more special instruction in that branch of science which bears more immediately on the trade which the student intends to follow; but not professing to teach him any of the special manipulation of his trade: that he must learn elsewhere.

It is obvious that an institution on a large scale, to give general instruction on applied science, would be one of a very extensive and complicated nature, including the provision of a great variety of what may be termed

"scientific plant." Indeed, the programme of a German "*Realschule*" of the first grade," for students between the ages of ten and nineteen, is a little bewildering to the mind. It includes German, French, and English; a little Latin, and "plenty of mathematics"; a fair knowledge of natural history, chemistry, physics, &c.; and the list ends up with "history, geography, singing, gymnastics, drawing, machine-drawing, and religion."\* We do not find among the diagrams of apparatus given in Mr. Robins's book any plans or sections of the desks and apparatus for teaching religion, though we have no doubt the systematic German mind will have developed something of the kind. Apart, however, from the "religion," this curriculum, with its languages, history, and geography, is, of course, beyond the scope of a technical school, properly so called. And it is one of the points in which the book seems a little defective, that we do not find anywhere a distinct summary of what the author considers should be included in a Technical College, and of the accommodation required in such a building, and the best manner of arranging and planning the various departments, in themselves and in relation to one another. The reader can gather a great deal about the requirements from a comparison of the plans and descriptions of various existing buildings; but we have not found any definite description of the requirements for a model technical college; and the buildings illustrated to which the term "college" would properly apply, as establishments including the whole curriculum of a technical or scientific education, are not numerous. The majority of them are schools for special training in one or two branches of technical study; and in regard to these we observe that chemical schools and laboratories occupy by far the largest place: in fact, the great majority of the illustrations of *matériel* refer entirely to chemistry. One reason, of course, for this is that rooms and plant for chemical classes present special difficulties in planning and arrangement, owing to the necessity for a complicated service of taps, pipes, and sinks, and still more for a special and thorough system of exhaust ventilation to draw off foul gases; and no doubt the many ingenious contrivances which have been adopted to serve this latter end, as well as to form a perfectly convenient arrangement of tables, shelves, and seats, are of special interest, and represent that portion of the furniture of a science school which most emphatically calls for special knowledge and study on the part

of the architect. Nevertheless, there seems rather too much space bestowed on this branch of the subject in comparison with others which are hardly illustrated at all.

The programme of the *Polytechnikum* of Zurich (quoted page 18), comes nearest perhaps to the proper programme of a technical school. This Mr. Robins gives as including "Physics, chemistry, machine, engineering,\* architecture, drawing, modelling, agriculture, forestry, botany, &c." What remains to be added under the head of "&c.," of course, we cannot say; probably only unimportant matters. Architecture appears to us to be out of the proper scope of a technical college, which might as well in that case include ornamental design and other artistic subjects; but it is possible that "architecture" really means here "building construction." Our idea of the programme of a technical college would be to include physics, chemistry, and mechanics; physiology, botany, and mineralogy; mathematics, geometry, and drawing: the latter not in the artistic sense, but as the cultivation of the power of delineating on paper whatever it is desired to illustrate. The three first heads include the study of the forces of nature; the three next that of the facts in regard to the three great divisions of animal, vegetable, and mineral life (so to speak); the three last deal with the power of measuring and comparing imaginary and visible quantities or forces, and of delineation in intelligible form. Such subjects as engineering, architecture, agriculture, forestry, &c., appear to us to be beyond the proper scope of a technical college; they are the practical applications of theoretic knowledge to special ends; they are, in fact, "trades," and it is not the business of a technical college to teach trades. A man who intends to be an architect, an engineer, or a cultivator of land, should go to an architect's or engineer's office,† or to an agricultural school, from the technical college, bringing his general theoretical knowledge acquired at the college to bear on the special problems of his intended profession.

No college exactly on such a plan is figured among Mr. Robins's illustrations; but the mass of information, and the number of plans of various buildings which are given, will be of great use to any one in putting together a complete scheme, and as affording suggestions and memoranda as to what is needed in each department. We only complain that there is a want of systematic exposition. On p. 45, in the

\* So in text; probably the comma is a misprint, and it should read "machine-engineering," i.e., mechanical engineering.

† Speaking of course in reference to England, where there are no architectural and engineering colleges, except those for preparation for the Royal Engineers and for the Indian Public Works Department.

\* Technical School and College Building: being a Treatise on the Design and Construction of Applied Science and Art Buildings, and their suitable Fittings and Sanitation; with a chapter on Technical Education. By Edward Cookworthy Robins, F.S.A., F.R.I.B.A., &c. London: Whitaker & Co. 1887.

\* We heard a story of a well-known painter, who was educated abroad, lamenting that he had received a check early in life, from having "failed in chemistry and religion." It appears this may have been uttered in sober seriousness.



chapter on "Buildings for Applied Science and Art Instruction," we read:—"To proceed to details. It is desirable, in the first place, to note the particular accommodation required for some of the leading special subjects, number and relative portion of apartments; in short, the systematic general arrangement of the plan." This is just what we want, but we do not get it. We only get details about the arrangement of the chemical department, and then we go off to plans and descriptions of various foreign buildings. A great deal, as we have said, may be extracted from these; but to present a number of different examples for inspection, and merely let us pick what we can out of them, is hardly a complete manner of treating the subject.

In a general way, the English plans given in the book are much less formal and probably more utilitarian in arrangement than the foreign ones. They are mostly, it must be admitted, not such large buildings; but the French and Germans are, as might be expected, very much possessed with the idea of architectural symmetry in laying out buildings of this kind; the architectural arrangement seems to come first, as far as the main massing of the plan is concerned, and the groups of rooms are then fitted into it. This, it is needless to observe, is not the most practical or philosophical manner of going to work; and it is not surprising that we are conscious of waste spaces and passages that either "lead to nothing," or take an unconscionably round-about course in leading to something, in some of these Continental plans. The desideratum is, to have sufficient space for light and ventilation, without unduly long passages of communication, and especially to have those apartments which have to be used in conjunction with one another near together. Thus, in the case of one chemical laboratory, it is mentioned that the balance-room was at such a distance from the laboratory that the journey to it was always deferred as long as possible; which, we presume, implies that guess work was used in some stages of an analysis where accurate weighing would have been desirable.

There is a separate chapter on "Fittings for Applied Science Buildings," but this again is mainly occupied with chemical laboratory fittings. No doubt, for reasons above mentioned, these are the most difficult to deal with, and a great many sections are shown of various ingenious arrangements for carrying off noxious gases at once from the work-table, for the study of which we must refer the reader to the illustrations in Mr. Robins's pages. Two of the most efficient seem to be that at Finsbury, designed by Dr. Armstrong and shown on plate 50, where there is a down-draught escape running, with a narrow opening, along the whole length of the draught closet, and the one in use at the South Kensington building, which is essentially the same form of outlet contrived so as to serve two sets of workers, the down-draught flue, with its two sides, forming a kind of partition down the centre of the table, each side forming practically a separate table. In nearly all cases a collecting hood is placed over the table, so as to catch the vapours and convey them to the extract flue. A very ingenious modification of the draught-closet is that invented by Professor Hofman, and shown in plate 47. When draught-closet flues pass directly upwards (which is sometimes, it may be presumed, a more convenient arrangement when an extracting system of ventilation is employed), it is found that condensed liquid and dirt are very liable to drop into the closet and vitiate experiments there being performed. The Hofman method takes the flue up with a bend towards the back of the closet at first, then under the vertical portion is formed a receptacle for receiving anything that may fall from the flue. In most of the recently-constructed large public laboratories, we are told, the flues from the various closets are all connected with the central flue, and the draught is produced either by a shaft with a furnace in it or by a fan, anent which Mr. Robins observes that no competing draughts should be introduced into a chemical laboratory; "no two opposite

ways should be provided for the escape of the air; and, as the draught-closets cannot well be too efficient, the whole of the air of the laboratory may be exhausted through them, but it is better to have additional outlets." This seems rather a contradiction. The author mentions elsewhere that in certain cases extract ventilation through the draught-closets has answered completely. As he says, and as every one knows, it is no use trying to extract forcibly through two separate systems of outlets, for that is merely making one a passage to the other, and in that case what do we want with additional outlets?

In regard to ventilation, the author is entirely for mechanical ventilation, as every scientific architect must inevitably be now, after all the evidence that has been before us, as to the relative efficiency of mechanical and what is rather absurdly termed natural ventilation. He seems to be against injection of air, though he quotes the testimony of Professor Carnelly, of University College, Dublin, to the effect that the system of forcing in air by air-pumps, over heated pipes, and allowing it to escape by the draught closets, instead of extracting from them by aspiration, had answered very well there. We should be disposed to prefer the extraction system,—in the case, at all events, of a chemical laboratory, where it is so requisite to remove gases instantly and by the most direct path. A hood opening into an extract flue would be more certain and immediate in its action of extracting gases formed in its neighbourhood, than a system in which general pressure of the air in the room was the agent. The gas formed by a special experiment might even, in that case, be dispersed to some extent before being forced up the nearest extraction-flue. From the chapter on "Heating and Ventilation," in which a great deal of information, not new mostly, is very conveniently summarised, it appears that the propulsion system at Finsbury Technical College has developed various defects,—dust comes from the flues, which are targeted, and the heating and ventilation are so closely connected that quicker heat: a point to make a memorandum of in regard to the working of combined warming and ventilation. At the City and Guilds Institute, the evil of dust has been obviated by using flues lined with a glazed surface. It is noted that at this institution the internal iron smoke-flue has been removed from the main ventilating shaft, "the experience gained at Finsbury College proving its comparative inefficiency, and an extract fan has been fixed at the top of the shaft, worked by gearing from the engine in the basement": another point to be noted by those who trust to a smoke-flue up the ventilating shaft as an aspirator. As we have said, a great deal of information is collected in this chapter, and the wholesome example is quoted of Herr Baeckelmans, architect, of Antwerp, who refused to carry out the erection of the town hospital, because the Hospital Committee would not appoint an engineer to consider the plans with him, with regard to the heating and ventilation, before the foundations were laid. Honour to Herr Baeckelmans, and may we all be more like him! Among the various methods of ventilation noted and illustrated with varying favour by the author, is one which we venture to think is quite over-rated. This is the plan, described on page 167, of admitting fresh cold air through perforations in the bed-mould of the cornice of the room, and extracting through perforations in the upper member of the same, into an upcast flue with a cowl or a gas jet at the bottom, or into a smoke flue. This is recommended by Mr. Robson, who says:—"I can speak strongly in its favour for facility of application, simplicity, economy of first cost, and self-acting properties." If the "pull" is a pretty strong one, we should imagine it would be very "self-acting," and that if those who recommend it will go up a ladder and smoke a cigar close to the inlet perforations, they will see the smoke taking the "girt" of the cornice and going the shortest way into the extract perforations. If it does not, it will be because the pull is a

very weak one, and in that case it is inefficient in another manner.

Among the special difficulties which have to be encountered in the design of a technical school, the most prominent, next to that of carrying off the fumes from the chemical laboratory, is the problem of providing, also in the chemical department, a perfectly steady table for the delicate tests carried on in the balance-room. We should hardly have thought the difficulty need be greater than that of mounting an equatorial telescope, though the author speaks as if it were. In one of the foreign laboratories he found the balance-room so planned as to be a passage from one room to another,—certainly a very stupid oversight. He mentions that in one case a satisfactory table had been formed by supporting it on beams under and disconnected from the actual floor. If this was successful, *à fortiori* a concrete table, built up from the foundations, and with the floor framed round it so as not to touch it, ought to answer. Of course, in cities there is a great deal of tremor of the ground to be reckoned with; equatorial telescopes of any consequence are generally kept out of cities. Professor Ayrton has been experimenting, it appears, with schemes for supporting tables on water, with the view, we presume, of escaping earth tremors; but so far without success.

A few "pictures" of technical educational buildings by the author are added to the work, but in general the illustrations are, as is fitting, severely practical; and the large number of details of fittings, very carefully drawn in elevation and section, are of great value and interest, whether regarded as precedents and models for adoption, or as suggestions for further improvement and thinking out of the subject. For the present, and probably for some time to come, Mr. Robins's book is the authority on the subject of which it treats, and is a record of a practical experience extending over a good many years, and turned to good account, though, as we have said, there might have been more logic and system in its arrangement. The volume is appropriately dedicated to Professor Huxley.

#### REPORT OF THE "SELECT COMMITTEE ON ADMIRALTY AND WAR OFFICE (SITES)."



WE have already commented on the miserable and discreditable result of the deliberations of the Committee above referred to. After going through the show of a large architectural competition, in which a design, open certainly to many objections, practical and architectural, was selected, the Committee have now recommended that the scheme for a new building should be abandoned, and that a piece of cheap patchwork should be made with an old building which has nothing to recommend it, and new ones in regard to which the main object seems to be to make a bid for popularity on the ground of economy, and to cut down the whole scheme to the level of the "cheap and nasty." Even on purely architectural grounds the decision, as we have already said, is one of which the country ought to be ashamed. But the detail of the report brings it out in an even more ignominious light. The existing main building of the Admiralty is notoriously an ill-designed and clumsy affair, not worth preserving on architectural grounds, and which could only be an excrescence on any design with which it might be incorporated. For this, of course, the general public and the legislative body care nothing, national architecture being one of the things which, in the eyes of the public and of politicians, is of no consequence whatever. But we do profess to be a practical nation, and in that light, at least, it may be matter for question with most reasonable people whether a very wise or rational thing has been done in proposing to retain and utilise, as part of an important public building, a structure which is stated, on good evidence, to have an essentially defective foundation,—the building is erected upon oak planking with sleepers laid upon it, and that oak planking lies upon a sort of mud



foundation containing water,"\*—which has already settled considerably; which is given a life of about seventy-five years at the best; which would probably settle further if any additional weight were placed on it; and which cannot be made practically suitable for its proposed purpose without raising one story and adding another; in other words, putting on that additional weight which the evidence shows that it will not bear. A more lame and impotent conclusion it would be impossible to imagine, or one saying less for the good sense or good taste of those who have arrived at it from such premises.

As usual in these cases, there is a good deal that is amusing in the proceedings, or that would be amusing to any one of a cynical turn of mind. There is no sort of evidence of architectural interest in the proceedings, the object of a great portion of which seems to have been to exhibit once more the cross-examining powers of one officious and vain busybody, whose sole object is to get, if possible, his own way. That Mr. Shaw-Lefevre has not got it in this case is certainly from no want of special pleading or of industry in examining and being examined. In his proposed "report," Mr. Shaw-Lefevre takes upon himself to affirm that it is "admitted on all hands" that the internal arrangements of Messrs. Leeming's design were excellent, and that there "is ample light and air to every part of it." He must be perfectly aware that there was strong dissatisfaction in many quarters among persons who have a claim to be called experts in such matters, in regard to the provision for light and air in the smaller courts, and that they were condemned in the strongest terms by those who know more about such matters than Mr. Shaw-Lefevre ever knew or is ever likely to know. As to the design itself, it was a very commonplace one, ornate but not noble; but though we should have had no pleasure in seeing it built, we cannot but feel, after reading the evidence in the report, that the conclusion come to is likely to prove an even greater *fiasco* than the result of the competition. An architect of genius might still make something of the proposed buildings, in a simple way, and apart from the old building it is proposed to retain; but then we are only to have the same architects, cut down to plain work. Of course, if any change had been made, the Messrs. Leeming deserved, as a matter of justice, full compensation; but we do not see that, when the scheme was abandoned, they had any absolute claim to be employed on the new scheme. However, they seem very desirous to be accommodating, and to carry out the building in any way which the authorities are pleased to prescribe; and that is no doubt one of the first of virtues in an architect, according to the English official mind.

From the lengthy evidence given by Mr. Shaw-Lefevre,—which consists, in fact, to a great extent, of a sort of essay in favour of his own views,—it appears that the objection to take Drummond's and Biddulph's banks was on the ground that the two firms had been allowed to build them without any intimation that the ground might be wanted by the Government, and that therefore there would have been something unchivalrous in dispossessing them. There is something in this, no doubt; but it is hardly what ought to stand in the way of a great public work. If it is the case that Messrs. Drummond offered their land to the Government before building, and got no reply, that is one more item of the blundering which has run through the whole history. Among other points in this "evidence" the witness is good enough to assure us that the competition was "a fair representation of the architectural talent of the country," and that he can speak on that point, as he alone knows the names beyond those of the nine selected. We do not know, it is true, the names of any other competitors except those who asked us to publish their designs; but we know who were some of those who did not and would not compete;

and we know that if the architectural talent of the country was fairly represented, the Committee did it great injustice, for one or two of the nine designs they selected for premiation were not only poor but absolutely vulgar. It is true we have Mr. Hardwick's evidence in admiration of the selected design; but Mr. Hardwick is the designer of Drummond's bank.

Among other points in the evidence, we observe that Mr. Shaw-Lefevre admits that in getting a vote for 10,000*l.* on account of the new building he intended to commit Parliament to that design, and to the employment of those architects. Did the members who voted know that? As Mr. Isaacs observed, it was, to say the least, "a very informal way of doing it." Among other curious points in the evidence is Mr. Taylor's theory, in regard to the lighting of the quadrangle buildings, that beyond forty-five degrees you get no more light even if the opposite buildings were removed altogether. He modified this in the next reply into the form that it is the "recognised angle for lighting a building," which is certainly a new way of putting it. It is what a man has a right to demand by law under certain circumstances, but does Mr. Taylor really believe that if a window is receiving light at an angle of 45 degrees over the top of an opposite building, that it will get no better light if that building is removed? He will not find many people who are in the habit of using their eyes to agree with him. Then Mr. Taylor, who gives evidence obviously in favour of Mr. Shaw-Lefevre's position, wants us to believe that it was quite a delusion to be shocked at the narrow, funnel-like appearance of the small courts as shown on the model (which gave many persons the first real idea of what the effect of building in this way would be); that this was the wrong way to regard it; that it would be quite different if you were down in the courts and looked up at the light. We should say that a well would look darker and deeper when you were down in it than when you were on the top; but it is not a mere question of light,—that is just the mistake; it is much more a question of ventilation, of having deep well-like receptacles in the interior of a building, which must inevitably become, in all still and warm weather, receptacles of stagnant and impure air.

Some question was raised by Mr. Isaacs in the course of the sitting as to the estimated cost of the alternative schemes, and we imagine that his questions and evidence (though very likely without his intending that result) operated a good deal with some of the committee in swaying them towards the economical conclusion ultimately adopted. Messrs. Leeming's original design was estimated at a cubical cost of 1*s.* a foot, and Mr. Taylor laid down that the alternative and much plainer building in which the old Admiralty was to be incorporated, would be 1*s.* 2*d.* a foot. This comparative proposition seems preposterous on the face of it; and Mr. Isaacs pointed out that the Hôtel Victoria, a building of about the same degree of decorative treatment externally as Messrs. Leeming's design, came to 1*s.* 6*d.* a cubic foot. His estimate of the possibility of executing the alternative buildings at 6*d.* or 7*d.* a foot was an excess in the other direction, unless they were to be of prison-like plainness. But 1*s.* a foot would hardly do for Messrs. Leeming's design. No doubt it would be less decoratively finished internally than a modern hotel,—for the most part at least; but all the elaborate arrangements for heating, ventilation, and sanitation which would be demanded in a great set of public offices of the present day, have a great effect in sending up the price, and we should imagine 1*s.* 3*d.* per foot would be nearer than 1*s.* Some of the ideas afloat in the Committee about cubing are rather curious. Sir William Harcourt seems to have got hold of a notion, derived, as he said, "from Mr. Denison's 'Book on Building,'" which is an authority on the subject, that a large building must necessarily be taken at a higher rate per cube foot than a smaller one. We can imagine that Sir Wm. Harcourt would be just the kind of person who would take "Denison's 'Book on Building'" to be an

authority; but the idea that a building with a proportionally greater amount of empty cubic space in it as compared with cube of walling, is to cost more per cube foot, is certainly original. Mr. Taylor endeavoured to set him right by putting in the saving clause that it would depend on whether the larger building had rooms of the same size as the smaller one, *i.e.*, a proportionately large number of small rooms and cross walls; but the matter does not seem to have been made clear. Mr. Shaw-Lefevre seems to have twisted this correction of Mr. Taylor's into another absurdity in the opposite direction, for he asks the questions (2008-9), "The rooms are lower, are they not? That would tend to add to the cost?"

Mr. Ewan Christian gave very decisive evidence:—

"My view is very decidedly that the site cannot be properly completed without the purchase of the two banks and of the houses which intervene between them. I consider that the purchase and the clearing away of those buildings is essential to the great improvement that ought to be made in connexion with this great public edifice. It is a magnificent site, and it would be a very great pity to spoil it for the sake of the saving that would be effected by leaving these buildings untouched."

Mr. Christian pointed out strongly the importance of taking advantage also of the occasion to widen the upper part of Whitehall, which could otherwise probably never be done, and said the losing the chance would be "a national misfortune." Few Englishmen probably would see it in that light, because few Englishmen understand the value to a city of such an improvement in its architectural effectiveness. Mr. Christian was one of the witnesses from whom the astute cross-examiner of the Committee could not get all the replies he wanted. The following little extract is amusing; the object of the questions being, of course, to show that Mr. Shaw-Lefevre's scheme was a splendid one, without the expense of purchasing the banks and widening Whitehall:—

"920. I presume you would be of the opinion that the façade to the Mall and to the Parade offers a very unusual opportunity for architecture?—Decidedly."

"921. It is a very important site, is it not?—A most important site; that is the view I maintain."

"922. Probably in London there is no more important position than would be occupied by a building with one frontage to Pall-mall and the other to the Parade?—Entirely so; and for that reason I want to see Whitehall widened."

"923. I am merely asking you now about the Mall and the Parade; do you consider those very important frontages?—Most important frontages."

"924. And that a building facing these two frontages would be a very important one in London?—I think that it would be one of the most important operations carried out during this century."

"925. Do you think it unreasonable, therefore, that an important building should be placed there?—I do not think so at all; on the contrary, I want to see it very much; but that is the reason why I want to see Whitehall widened."

Mr. W. H. Smith was cross-examined in the same pertinacious manner; asked, for instance, if he thought it would be a wise course to extend a building with the admitted defects of the old Admiralty building? Mr. Shaw-Lefevre knew perfectly well that no one had proposed to "extend the defects" of the building; it was proposed simply to leave it incorporated in the new building. In his answers to this and other catch questions Mr. Smith was very practical, and in his objection to the useless columns projected in front of the original design, and their effect on the lighting of the rooms. But Mr. W. H. Smith's main confession of faith is irritatingly characteristic of what we have come to in England. "It would be much more economical," he observes, "to construct a building simply for purposes of business than for architectural effect. . . . I hope that public opinion will come round to erect what I should call a building for business purposes and not constructed for architectural effect." Public opinion, we fear, is only too ready to endorse such a sentiment, without waiting for any coming round. That is what we have come to; and a melancholy goal it is. We are a nation of shopkeepers; and the most eminent and successful shopkeeper of the day can see nothing to value in

\* Mr. John Taylor's evidence.



architectural splendour,—no consideration in regard to a great national building but "how much can we save on it?"

## NOTES.

**T**HE dreadful calamity at Exeter has, of course, brought out the usual fresh crop of suggestions and advice about the construction of theatres, which are repeated after each calamity and forgotten again till the next theatre conflagration revives them. Some of these are the mere impractical fancies of frightened persons. Among the measures which really may be carried out with great advantage, and which are within practical possibility, are the lighting of all theatres by incandescent electric lamps, the provision of an iron fireproof curtain between the stage and the house, which should be used habitually at each performance, and the employment of some less combustible material than canvas for the scenery. The use of a fine wire gauze for painting on, which has been suggested, would, we believe, be practicable and beneficial, but it would be possibly too costly to be readily adopted, except where it was desired to keep the scenery for repeated and permanent use, when the superior lasting powers of the wire might do something towards restoring the first outlay. We do not believe actors would ever be reconciled to an iron stage floor to replace the boards; and the effect upon the acoustic properties of the house would probably be bad. The daily use of the cut-off iron curtain is an important point, as the evidence in the Exeter case goes to show that the rapidity of the conflagration was mainly due to the flames being blown towards the auditorium by draughts from doors in the stage portion of the house. The suggestions for exterior balconies to which the audience could betake themselves till rescued we do not think are very rational. If they were to be made safe against a sudden crowd they would be very costly to construct, and if audiences will get into panics there would very likely be as much loss of life from a rush to the doors on to the balcony, —and perhaps even from the crowd pushing those in front of them over the parapet,—as from the rush to the ordinary exit doors. It is, after all, in most cases the unfortunate people who kill themselves, and not the fire which kills them. The evidence in regard to the Exeter disaster, so far, seems to indicate that the exit from the gallery was decidedly inadequate; but it also leads to the conclusion that no one need have been hurt if people had kept their heads. To take military order and walk downstairs in step, three abreast or two abreast, or as many as the width of the stairs allows, is the thing to do; and two or three men with cool heads might induce a crowd to do this. Unfortunately the gallery, usually the most crowded part of the house and the furthest from the street, is generally occupied by just the kind of crowd which is most liable to go into an unreasoning panic. Until people can be cured of giving way to panics they will kill themselves whenever there is an alarm of fire in a theatre, and structural improvements will be of little avail.

**W**E have received a circular in regard to the aims of the National Association for the Promotion of Technical Education, which was inaugurated at a meeting held in London on July 1st of this year, and of which Lord Hartington is President. Among the Vice-Presidents and members of the Executive Committee are Professor Huxley, Professor Tyndall, Sir Lyon Playfair, Sir John Lubbock, Sir F. Bramwell, Sir Henry Roscoe, and others. The subjects which it is proposed should first engage the attention of the Association are at present tabulated as follows:—

"(1) The encouragement of Educational Reform, whether by legislation or otherwise, to be carried out by the following amongst other means:—  
(a) The promotion in our primary schools of the better training of the hand and eye by improved instruction in drawing, in the elements of science, and the elementary use of tools. (b) The introduction of such changes in the present system of primary instruction as may be necessary to enable children to take advantage of technical teaching.

(c) The more extended provision of higher elementary schools, where technical education may be provided for those who are fit to take advantage of it. (d) The reform of the present system of evening schools, with special provisions for the encouragement of technical (including commercial and agricultural) instruction. (e) The development, organisation, and maintenance of a system of secondary education throughout the country, with a view to placing the higher technical and commercial education in our schools and colleges on a better footing. (f) The improvement of the training of teachers, so that they may take an effective part in the work which the Association desires to forward. 2. The formation of a central consultative body, which will give opportunities for conference between persons of various classes and from different localities, will form and influence public opinion, and will obtain public support for the furtherance of technical education. 3. The collection of information as to the existing means for carrying out the work of technical education, and the best methods of extending and organising it throughout the United Kingdom. 4. The preparation, in a popular form, of information to be obtained from Reports of Commissions, Consular Reports, and from various other sources (including, if necessary, special inquiries at home and abroad), for diffusion throughout the country."

It is proposed to form branches in various industrial towns, and a circular letter has been addressed to those known to be interested in the subject, asking them to give the names of others in their town or district who would be able to give advice as to the work of the Association, and also information as to what has been actually done in the way of technical education in their own neighbourhood. This appears a business-like way of getting an enlightened public opinion on the subject, and promoting public interest in it, which is an almost necessary preliminary to getting any complete educational measure carried out.

**I**N the matter of absurd wrong-headedness, the Trades Union Congress appears to go from bad to worse. It now meets not to consider questions of trade, but to criticise political action from a Utopian standpoint of its own, on which the glorified working man takes his place as the centre of the universe. The usual clamour about an eight hours' movement was brought forward, on the principle apparently that the less work we do the more prosperous we shall be, and Mr. Broadhurst was taken to task for having presumed to vote against an eight-hours amendment in the Coal Mines Bill. Mr. Broadhurst, however, is not the member to put up with this kind of thing, or to allow himself to be dragged at the heels of a committee, and he gave the principal accuser, a certain Mr. Hardie, "frae the North," an answer which must have made him feel rather small.

**A** NEW use has been discovered for the water of the river Thames as it is found near Blackwall. It makes an efficient ink. Whether the fluid is agreeable, or even inoffensive, in the inkstand is not stated. But letters have been written to the daily papers in this medium, and as they have appeared in print the ink has, at all events, remained legible when dry. The attention of the Home Secretary was called to this phenomenon in the House of Commons, on September 1st, and Mr. Matthews expressed the hope that "when the new works now in progress are completed the cause of complaint will be lessened, if not removed." It would be consolatory to have the scientific ground for the hope stated. It seems not to have occurred to any one to ask for an explanation of the colour. The Metropolitan Board ought not to be surprised at its appearance. It is only the recurrence of what has taken place at Bradford, Northampton, Leicester, Clifton, Cheltenham,—in fact, everywhere where a mixture of lime with any iron salt has been applied to sewage. This fact has been brought before the Institution of Civil Engineers ("Minutes of Proceedings," vol. 65, p. 223); nor is the colour the worst part of the affair. The first action of the compound is apparently satisfactory, and clarification goes on rapidly. But after a sufficient lapse of time in the laboratory, or after a flow of four or five miles down the river, a secondary action commences, and the liberation of hydrogen gas causes an intolerable nuisance. At North-

ampton 62-30 grains out of 119-78 grains of foreign matter per gallon were precipitated by chloride of iron and lime, which removed almost the whole of the suspended matter in the sewage, while increasing that in solution. But the secondary action was so offensive that the Court of Chancery granted an injunction against the process, which was in consequence abandoned, as was the case in the other places mentioned. The treatment of the whole volume of London sewage by the same process may thus be not unreasonably expected to intensify the nuisance, which has thus far justified the warning given at the Institution of Civil Engineers.

**T**HE subject of the Channel Tunnel has come up at the British Association in the shape of a report, drawn up by Mr. F. Brady, Mr. Pigou, and Professor Boyd Dawkins. The report is entirely in favour of the tunnel, so far as the behaviour of the ground, as far as the boring has been carried, is concerned. The authors of the report are contemptuous about the military objections, their report being obviously made in what are supposed to be commercial interests. But they do not touch on the subject of the means of properly ventilating a tunnel twenty-five miles long, with no possibility of intermediate upcast shafts. This, independently of the military objections, is one of the points which must be satisfactorily settled before things are allowed to go further.

**T**HE Law and City Courts Committee recommend the Corporation to take no further steps at present to acquire the site of No. 84, Basinghall-street for the new Court, since they have failed to make satisfactory terms with the leaseholders and tenants. On the other hand, they advocate the adoption of some plans and elevations, in the Gothic style, as an alternative for some others in the Italian style, all prepared by Mr. A. Murray, acting architect. Mr. Murray's plans cover the present Court site, together with the Guildhall stores and land tax rooms, and are capable of extension so as to take in the new site of No. 84, Basinghall-street, if it be eventually secured. The cost of the initial buildings is estimated at about 14,500*l.* to which should be added 1,500*l.* for fittings. A complete development of the scheme would involve an additional outlay of say 6,000*l.* The Committee accordingly ask for authority to draw for 16,000*l.* upon the City of London Court general fund wherewith to proceed with the erection of new Court buildings.

**A**DDITIONAL buildings are about to be erected by the Government at Edinburgh Castle, and, judging from past experience, we are not sanguine as to the result being a gain from an æsthetic point of view. We gather from the *Scotsman* that the Town Council, "in their capacity as Guardians of the amenity of the City, urged certain objections to the scheme." The principal part of this scheme consists in the erection of a guard-house at the entrance to the ancient fortress, and certain adjuncts. "It was thought that the guard-room might have been more artistically designed, and fears were expressed that the screen wall would interfere with the view of the Castle Rock. It is not clear whether these objections took written shape, but recently, when the subject was revived, the Council were informed that the day of grace for lodging objections had passed, and that the scheme must be proceeded with as designed by the English officials." The guard-house is to be in a "castellated" style of architecture, with loopholes, battlemented parapet, gables, and turrets, rising to a height of 50 ft., pierced by a circular archway. The upper floor is to be utilised as a court-martial room. Contracts for the building have been entered into, which will now be pushed on with all convenient speed.

**N**OTHING shows the unquenchable vitality of the United States so much as its railway mileage account for 1886 and part of this year. Notwithstanding strikes, droughts, and depression of trade, the enormous quantity of 10,000 miles is expected to be the sum



of this year's laying, more than ever has been known before except in 1882, when 11,568 miles were put down. This brings up the total of the American railway mileage to 141,300 miles, half of which has made its appearance altogether since 1874, 70,000 miles in thirteen years. As might be expected, some parts of the country are especially active in railway making, the Eastern or older States contributing little or nothing to the general stock, while the South (Texas particularly) and the North-West have been the busiest, showing the growth of population and industrial undertakings. The fact is that the Southern States, though pretty old in years, have practically only just begun their real commercial life (always excepting cotton), and so far are only on a par with younger States in the North-West, like Kansas and Dakota. Even at the very moderate estimate of 25,000 dols. per mile, including stations, put down for the construction of North American railways, the 93,750,000 dols. is a pretty large sum to disburse for carriage purposes.

AN interesting bas-relief relating to the myth of Pentheus has just been published in the "Bullettino della Commissione Archeologica Comunale di Roma" (xv., 7). It was found during the excavations carried on by Sir Savile Lumley, the English Ambassador, in the Via Portuense. The figure of Pentheus occupies the centre of the design; in his right hand he holds a sword which he has just drawn from the scabbard he holds in his left. On either side of him is a Maenad brandishing a thyrsos and with a snake coiled about her left arm. The type of the design is much the same as that currently employed to represent Orestes pursued by the Furies, but from the fact that the two women hold thyrsi in their hands there can be no doubt of their Bacchic intent, and hence the youth they pursue must be Pentheus. The relief is executed in the pseudo-archaic style, and Sig. Borsari, who edits it, thinks that from the character of the tomb in which it was found it belongs to the first century A.D. Figured monuments of the myth of Pentheus are notably rare.

SINCE the discovery of the Pergamene frieze with the Gigantomachia, special interest has naturally attached to everything dealing with the mythology of the Giants. It might almost certainly have been predicted that Germany would shortly furnish us with an exhaustive treatise on the myth as it appears in literature and art. Such a treatise is in fact "Die Giganten und Titanen in der Antiken Sage und Kunst," just published by Dr. Maximilian Mayer, a book which will be read by only a few, but referred to by many. Herr Mayer devotes the first part of his book to the literature of the subject. He gives all the variant saga of the Giants and Titans collectively, and of the several individual Giants and Titans whose names have come down to us. Next, he gives in chronological sequence the various forms of the Gigantomachia. Under the head of Art, he goes through, first, the description of works of art that have perished; then representations on vases, sculptures, and smaller monuments, such as terra-cotta gems and coins. The book is illustrated by three plates and a few woodcuts.

THE house, No. 42, Lothian-street, Edinburgh, which was formerly occupied by Thomas de Quincey, and where he died in 1859, has been distinguished by a tablet, composed of tiles with an ornamental border, the letters being in ivory white on an Indian red ground. The inscription is as follows:—

THOMAS DE QUINCEY,  
PROSE WRITER.  
Born 1785—Died 1859,  
LIVED HERE.

Something of a similar description is to be done upon a new building in course of erection in Chambers-street, upon the site of the house where Sir Walter Scott was born. The house where he resided in Castle-street might also be distinguished, and there are many others throughout the city which were occupied by

men of note where tablets might be inserted. The pillar which is to receive the statue of the Duke of Buccleuch, by Mr. Boehm, has been complete for several weeks; the statue and other sculptures are on the ground ready to be fitted up, but nothing is being done. A high canvas screen hides all within from view, and we are given to understand that things will remain *in statu quo* till the 6th of next month, when there will be a ceremonial inauguration and banquet.

BY the removal of some old houses at the south-west corner of Little Queen-street, Holborn, there is now afforded an excellent opportunity of making a great and long-needed improvement. The point in question is at the junction of Little Queen-street with Great Queen-street, and everybody who knows these streets is aware of the large amount of vehicular traffic which they take, and is acquainted with the great frequency of accidents and blocks, caused by the narrowness of Little Queen-street and the abruptness of the turn into Great Queen-street. We would commend to the notice of the Holborn District Board of Works, and others whom it may concern, the desirability of utilising part of the now vacant site by rounding-off the angle so as the better to accommodate the ever-increasing traffic. That the traffic is increasing is shown by the fact that these two streets now form part of the route of two lines of omnibuses, running between the King's Cross and Victoria termini. Great Queen-street and Little Queen-street certainly form an important link between main arteries for through traffic, and the improvement which is now possible may therefore, we think, be fairly regarded as "metropolitan" rather than "local" in character, a distinction which, if recognised at Spring-gardens, would permit of half of the cost (which cannot be very considerable) being defrayed by the Metropolitan Board of Works.

FROM a report published in the *Nouvelles Annales de la Construction*, the total area of the streets of Paris, measured between the kerbs, amounted at the end of 1886 to 8,517,100 square metres (91,678,065 square feet), of which 6,252,000 square metres are laid in granite, 1,608,100 square metres macadamised, 302,000 square metres asphalted, and 355,000 square metres provided with wood pavement. The cost last year for relaying and repairs amounted to 11,000,000 fr. (440,000*l.*). To put all the streets of Paris into thorough order would require about 75,000,000 fr. (3,000,000*l.*), of which 15 millions would have to be spent in changing macadamised roads into pavement, and 60 millions in improving existing pavements. It has not yet been determined in what way the latter is to be effected. The bed of concrete under a pavement of stone cubes, which has been tried in the Rue St. Lazare, has not answered. The noise caused by the passing traffic has been increased, whilst the vibration is felt more than ever in the houses. It has been found, moreover, that the Yvette sandstone employed, notwithstanding its great hardness, is being crushed between the bed of concrete and the wheels of vehicles as between an anvil and a hammer. The experimental pavement laid down in the Rue de Rivoli, in which a layer of sand has been introduced between the bed of concrete and the stone cubes, in order to ensure a certain amount of elasticity, has proved more successful. Wood pavements appear to give every satisfaction at Paris, and they are now also to be introduced in the tracks of tramways.

THE surplus fund derived from the International Exhibition of last year at Edinburgh has not yet been disposed of. To aid in the building of a mechanical laboratory in connexion with the chair of Engineering in the University, for which a sum of 10,000*l.* is needed, Professor Armstrong has advanced a claim upon that fund. "No provision," says the Professor, "has been made for supplying the department with anything in the shape of a proper equipment for teaching appliances viewed from the modern standpoint,"—a state of things which he trusts will be remedied.

IN the series of "Öffentliche Vorträge," published annually at Basle, and which for the most part treat of scientific subjects, Dr. Hugo Blumner, a Zurich professor, has a paper worth reading on the "Life and Education of a Greek Artist" (*Lebens und Bildungsgang eines griechischen Künstlers*). As he rightly says, to write the history of any individual artist would be impossible; we have no Vasari for Greek artists; but to put together a sort of mosaic of scattered notices, and thereby construct for artist life as a whole a sort of conjectural biography, is a possible and by no means an unprofitable task. He has brought together a number of interesting details as to the status of the artist, his relation to his model, the relation of master and pupil, students' fees, the price of works of art, and the like. It will surprise many to learn that enthusiasts about art as the Greeks were, they nevertheless looked down with a frank contempt on the artist as a handicraftsman. This rule of general etiquette was, it is true, honoured in the breach: Pheidias was the friend of Pericles, and Lysippus the companion of Alexander: but an artist had to rise to pre-eminence before he rid himself of the social slur. The *locus classicus* on this point is, of course, Lucian's account of his own brief apprenticeship to art in the sculptor's studio. Lucian, the most susceptible of art critics, puts into the mouth of his dream-lady, Eloquence (a special pleader, it is true), this description of a statuary's life:—"By turning statuary you will become nothing but a low mechanic, living on the work of your hands, and confining all your hopes and desires to that alone; getting a mean and scanty subsistence in obscurity, poor and dejected, neither serviceable to your friends nor formidable to your enemies, neither courted nor envied by your fellow citizens: a low plebeian always, like the timid hare, in dread of your superiors, and looking up with adoration to the great and eloquent above you. Should you even become a Pheidias or Polycleto, all men will admire your skill, but not one, whilst they are in their senses, will wish to change conditions with you; for, after all, you will be considered as a vulgar mechanic (*χρυσόπαις*), who lives by the labour of his hands." Certainly the modern cult of the craftsman was not in vogue at Athens.

A CORRESPONDENT, writing in reference to our foot-note to the article on "Recent Excavations at the Acropolis" (page 319, *ante*), observes that *στεφάνι* is not correctly translated a "wreath." It is not; a "cicret" would be the more correct expression. But when our correspondent goes on to defend the use of "stephane" as an English word, we are quite impatient. There is an absurd tendency in the present day to invent new systems of nomenclature in art and archaeology (not to speak of such varieties as Alpine club slang, with its "arêtes" and "schrunds," &c.): South Kensington has a jargon of its own; Greek archaeologists threaten us with another. There are English words enough to describe most objects in art, without using bastard Anglo-Greek.

JUDGING from the report in *L'Emulation*, an architectural contemporary hailing from Brussels, of an excursion by a party of Belgian architects to Maestricht, Aix-la-Chapelle, and Cologne, recently, the architectural confraternity in that part of the world seem to have a gay and light-hearted manner of enjoying themselves and entertaining their *confères*. At a dinner given to the visitors at the "Dragon d'Or," at Cologne, the usual toasts and speeches were varied by the singing of songs composed for the occasion. The chorus of one of them is sufficiently to the point for quotation:—

"Ob gothisch ob roman,  
Man lübt's mit trinken an,  
Ob Renaissance und Zopf,  
Es trinkt ein jeder Tropf,  
Rococo, Négrée,  
Das hat ein Jeder weg,  
Im Fränkischen Styl, Pariser Styl, im Misch-  
maschtyl, mit Schnickschnack viel,—  
Bei allem Bruen, das ich nannte,  
Da trinkt man stets das anerkannte  
Das elegante und pikante,—  
Hooch  
La Société Centrale d'Architecture—Hurrah!"



# ENGLISH ARCHÆOLOGISTS IN BRITTANY.

On the evening of Thursday, the 11th of August, the day but one following the close of the Salisbury meeting of the Royal Archaeological Institute, a party of the members, joined by several members of the Wiltshire Archaeological Society, started from Southampton for Cherbourg to fulfil an invitation given in the spring of this year to the members of the Institute by the Société Polymathique du Morbihan, asking them to visit their district in the south of Brittany, which is one of the richest in the world in prehistoric remains. We are indebted to a member of the party for the following account of the visit:—

The travellers arrived at Cherbourg early on Friday morning, the 12th inst., after a fine passage, and by midday reached Coutances, their first stopping-place, where they visited the cathedral, the churches of St. Nicholas and St. Pierre, and the public gardens. The present cathedral is stated to have been commenced in 1206, on the site of an earlier eleventh-century church, of which no remains are now visible. Whether this date be correct or not, the church is undoubtedly of early thirteenth-century date, and very nearly coeval with Salisbury Cathedral, which the visitors had seen only a few days previously. It contrasts with Salisbury by having a lofty lantern tower as an integral part of the design of the original builders; and the two churches show how the architects of France and England worked side by side, each carrying out the same principles. The cathedral was readily thrown open to the party, who, by the kindness of the authorities and of the Mayor of the town, had an ample opportunity of inspecting every part of it. The glorious lantern is too well known to require more than passing mention; but the exquisite foliage carving to be found in many parts of the church, but especially in the two lateral porches so singularly placed at the extreme west end of the nave, received, as it deserved, attentive study. It has up to the present happily escaped restoration, and should on no account be missed by any architectural visitor to Coutances. The demon of restoration, doing his destructive work all over France, is happily absent from Coutances just now. Some repairs are being done, chiefly to the north windows of the nave and to the lantern. A beautiful chapel on the south side of the choir is in a sadly neglected condition, but probably requires little more than cleaning and the removal of a mass of incongruous furniture. The other two churches of Coutances are often overlooked, but are both interesting. St. Nicholas, a large cruciform church, has choir and crossing of apparently late thirteenth-century work, with later nave, while St. Pierre, a Flamboyant church, also cruciform in plan, is surmounted by an octagonal lantern, Renaissance in style, the design evidently inspired by that of the cathedral, and showing how the architects of the sixteenth century could apply in their own style a design used in the cathedral by those of the thirteenth. In domestic work the city cannot be called rich, but there are very many old houses to be found which have so far escaped the hand of the restorer.

One of the great beauties of Coutances is its public garden bequeathed to the town, together with his house now used as a museum by a private citizen. After the fatigues of the day and the previous night, its quiet shade and fine view were exceedingly grateful to the English party. The visitors went on in the evening to Pont Orson, where they spent the night, visiting next day Mont St. Michel. This noble pile of buildings has now been taken over as a national monument by the French Government, who, although they allow no religious service within the walls, are busily engaged in putting the church and monastery through a process of restoration. The spirit in which this is carried out may be judged from the fact that after thoroughly scraping the First Pointed carving of the cloister, which was, perhaps, in beauty, second to no Gothic carving in the world, making all the shafts "as good as new," the ambulatory has been covered with a high-pitched roof of black glazed tiles having a broad band of brightly-glazed tiles coloured orange and blue carried horizontally half-way up the roof completely round the four sides of the square. The church is now in hand for complete restoration,—by no means the first time it has gone through the process, and it is much

to be feared that in a few months hardly a stone of the fine Norman nave and transepts, which, if correctly dated 1020, are among the earliest known specimens of Norman work left us, will be seen in its original condition. The dormitory, which is placed in an unusual position on the east side of the cloister, and on the same level, is next to be taken in hand, after which the turns of the Salle des Chevaliers and the Salle des Moines will, no doubt, come. All who wish to see the Mount before this destructive process is carried out should lose no time in visiting it.

Pont Orson, where the travellers first saw Brittany, is generally overlooked by visitors to Mont St. Michel, who pass through it without stopping; but there is a good deal to be found there of interest to architect and archaeologist. The church has a Norman nave, with central tower, chancel, and transepts of later date. The sculpture of the Norman south door of the nave is very remarkable. The tympanum is plain, but in the middle of it is sculptured in low relief the figure of a man standing apparently with his hands on each side of his waist, while a bird, nearly as tall as the man, standing erect, with the end of his tail in the ground, and his two feet on the man's right hip, is pecking at his neck with his beak. The members were much puzzled by these figures, and would be glad if any of our readers could give an explanation of their meaning. In the north transept chapel is a sculptured reredos of Renaissance work, representing scenes from the life of Our Lord in very high relief. It is much mutilated, and the kneeling figures of the donor and his wife in the lowest panel to the right of the spectator are almost broken away, but enough of them remains to identify their dress. Another large panel, worked probably by the same hand, is now at the side of the chapel under the window. These sculptures are stated to have been all removed from a destroyed chapel of a lapsed guild. The guild is said to have been founded in the thirteenth century. The church is almost paved with grave slabs of a very peculiar character. They are lettered with very large letters in relief, most of them having nearly the form of Lombardic lettering. These stones are mostly dated between 1600 and 1700, and go to show that the little village was a place of some importance during that century, a surmise borne out by the houses still standing. There are several good old houses left, especially an old blacksmith's forge in the main street. It may possibly be of sixteenth-century date, and is almost unaltered, with shingle roof and thick oak posts, by which generation after generation of horses have stood to be shod.

On their return from Mont St. Michel, the archaeological party left for Rennes, arriving there rather late on Saturday evening. Although great part of Rennes presents no objects of interest beyond those found in ordinary French towns, and is in consequence often avoided by architectural travellers, there is in the old parts of the town, which escaped the fire of 1720, a great deal of Domestic work left, dating from the fifteenth century downwards,—much mutilated, no doubt, but happily unrestored. This is chiefly to be found in the neighbourhood of the cathedral. The Rue St. Yves is almost entirely composed of old houses, and there is one especially fine example of a late fifteenth-century house a few doors up a small street turning out of the Rue de la Monnaie. Up a court, immediately opposite the west door of the cathedral, much concealed by houses, is one of the old city gates, in very fair preservation.

The cathedral is entirely modern, having been finished as late as 1847, but it contains some good modern wall-paintings in the choir. The other churches have little calling for remark. There is a good Late Flamboyant church, now desecrated, near the Quay and the Rue St. Yves.

The Museum was visited by the travellers, the custodian having been informed of their intention by the President of the Rennes Archaeological Society. It contains a fair collection of stone implements, but not much of local interest. There are some new cases filled with flint flakes, &c., from the neighbourhood of Dol, with a notice that the best specimens are withdrawn for further examination. We could not learn any particulars about these finds, but they may turn out to be of great archaeological value. We understand that it is intended to publish full information shortly. A great part of the afternoon was spent in the

Public Garden, one of the great beauties of Rennes, and on Monday morning the party started for Vannes by the first train.

They arrived at Vannes about midday, and were met at the station by Admiral Tremlett, an old and much-esteemed member of the Institute, under whose guidance the various places in South Brittany were visited. After seeing part of the town the party was received by the Comte de Limur at his mansion, and there shown the splendid collection of minerals, brought together entirely by himself. He especially called the attention of the visitors to specimens of jadeite from a vein he discovered some years ago at Roquesda, a few miles from Vannes, and which bears a remarkable similarity to that of New Caledonia. He also pointed out some specimens of stalactites formed of oxide of iron, almost pure, from caves in Finistère, near the Pointe du Raz.

Later in the afternoon the archaeologists visited the museum of the Société Polymathique, and were there met by Dr. De Closmadec and other members of the society; but many others were prevented from attending by the fact that the 15th of August was the date of a religious fête, the Assumption of the Virgin, very strictly observed in Brittany. On their way to the museum the English met one of the church processions (consisting chiefly of children) which are so often seen here. Dr. De Closmadec, who was himself present at the finding of many of the treasures in the museum, devoted much of his time to going through it and explaining the exhibits. Here are preserved the polished stone axes, &c., found in the Mont St. Michel, Carnac, the Butte de Tumiac, and in most of the more important dolmens and excavations made in the Morbihan district; and no museum in Europe is richer than that of Vannes in its own class of neolithic implements.

On Tuesday morning, August 16th, the party started in carriages for the peninsula of Rhys, which forms the southern shore of the Morbihan Sea, shutting it out from the Bay of Biscay. This peninsula is generally low and flat, but enjoys a very mild climate. It is about the most northerly part of France in which vines are cultivated, vineyards being entirely wanting at Vannes, Auray, and the other places visited by the tourists. There are large salt-ponds on the flat shores, the manufacture of salt from sea water and the breeding of oysters being about the only local industry except agriculture. After a drive of some ten miles the carriages stopped at the Castle of Sucinio, a well-preserved ruin, built by the Dukes of Brittany originally in 1250, but almost or entirely rebuilt in 1420. The moat is very well preserved; it is now dry, but holds some water in winter and probably in ordinary summers. Of the seven towers six remain with their curtain walls very perfect and still crowned by machicolations, but the battlements are entirely lost. In plan the castle was an irregular pentagon, the east face consisting of the gate and gate towers, two angle towers, one of which contained the well, and a tower in which was the chapel, between the gate and the well tower. The window of the chapel and the springers of the vault are well preserved, and the well and well-chamber are almost perfect.

Leaving Sucinio for Sarzeau, the road runs for some distance parallel to a very high, ancient wall, apparently the boundary of a chase or park belonging to the owners of the castle. In this wall long strings of stones are occasionally found, set herring-bone wise, but this is not at all uncommon in Medieval buildings in this neighbourhood.

At Sarzeau, where the halt for lunch was made, there is little of interest except a few old houses and farm buildings in the village, and a good Renaissance chateau a little way out of it. It was the birthplace of Le Sage, author of "Gil Blas," and the house in which he was born is still pointed out, but the part now visible can hardly have been built in his day.

The next place visited was St. Gildas, situated close to the open sea, on the southern side of the peninsula, and frequented in summer for sea bathing. This was the site of a very ancient monastery, said to have been founded by St. Gildas, in the sixth century, but more famous from having been once under the rule of Abélard. The transepts and eastern limb of the twelfth-century church, in the Romanesque style of the Loire and Angoulême, still remains, but the arches forming the chevot



have just been taken down and rebuilt, and the whole church is undergoing restoration. It is now used as the parish church. Some very curious capitals, supposed to be those of the nave arcades destroyed in the last century, are still in the floor,—two, one on each side of the door, being used as holy water basins.

The convent buildings are all modern, and are occupied by a few Religieuses who take in boarders during the bathing season, but these are expected to conform to rather strict rules.

From St. Gildas the party returned to Vannes by road, passing at a distance the Butte de Tumiac, one of the finest tumuli known, and one which some years ago richly rewarded the explorations of the Société Polytechnique. The chamber then discovered in it is now inaccessible, being filled up with débris from the mound above.

#### THE RELICS IN PICCADILLY.

SOME alleged sixteenth-century relics have been discovered in Piccadilly. They comprise, we read, a mass of parchment MSS., sporting guns, bronze armour, and a red granite tomb or sarcophagus. These articles were found in a series of arches at a depth of from 16 ft. to 17 ft. below the surface, in the course of excavations that are being made for the new premises of the Junior Travellers' Club, Nos. 66, 67, at the south-western corner of White Horse-street, by the Badminton Club. Bearing in mind the history of this portion of the highway,—until comparatively recent times a country road,—it would seem that the things found can boast of but little antiquity. For, according to a copy plan, *penes* nos, of the Lord Berkeley's Estate, as surveyed in 1676, the modern White Horse-street stands in what was then known as the Stone Bridge Fields. These fields, being a plot of 9 acres, triangular in shape, were divided by the Aye Brooke, or Tyburn, from the Shoulder of Mutton Field (nearly 4 acres) and the Great Brooke Field (13 acres). The Tyburn here ran south-westwards, in its course from the Penneles Bank, at Hay Hill Farm, to the hollow eastwards of the Brooke Shott, where, at the ancient Cow ford, it crossed the highway to Bath, Exeter, and Western England. This hollow, latterly known as Stonebridge Close, is still plainly discernible both in Piccadilly and the Green, formerly the Upper Park. It often lay quite under water, and at times even the bridge failed to render the road passable, as for instance, when in March, 1692, Sir Robert Atkins, Speaker, was prevented by the flood from attending an urgent meeting of the Commons. A contemporary account of Wyatt's rebellion describes the posting of cannon upon the eminence at Brooke Shott (where the Parliament afterwards planted a fort or redoubt, in 1643), and the placing of troops of horse along "the road [Piccadilly], above the new bridge over against St. James's." "Berkeley Fields," again, are set out in a plan of the Grosvenor Estate, as surveyed for building improvements, in 1723. The Brooke Shott, famous for its ice-houses and ducks, was subsequently taken in for the plantation, or Wilderness, attached to the Ranger's Lodge, which R. Adam built in 1768. We find by a State Paper that in 1666-7 had been built the wall which, until about forty years ago, bounded the Green Park along its Piccadilly side. From various other maps and plans it clearly appears that until 150 years ago, at most, the northern side of Piccadilly, in this portion of the thoroughfare now so-called, was not occupied, save by some masons' yards, a few small tenements here and there, and one or two inns. Amongst these inns were the Hercules' Pillars, familiar to readers of "Tom Jones," and the Greyhound (its site bought by the Earl of Coventry in 1764, for 10,000 guineas), the Half-Moon, and the White Horse. The signs of the last two named are preserved in existing thoroughfares. The White Horse inn, its yard and paddock reaching at the back to Shepherd's, or, rather, Sheppard's Market, was standing as late as 1752, according to Mr. H. B. Wheatley's "Round About Piccadilly." But the inn is unmistakably cited in Baldwin's "New Complete Guide for 1774-5." In John Lockie's "Topography of London, 1810," White Horse-street, Piccadilly, appears. Meanwhile the building of Piccadilly, as we now know it, had gradually extended westwards. In 1710 Bolton-street was the most westerly street in this quarter of the town. Bath House

at its corner (west) was built for William Pulteney (Lord Bath), but has been rebuilt by Alexander Baring, elevated Lord Ashburton, 10th April, 1835. The next turning is Clarges-street (1717-8). Just beyond, on the site of Carter's statutory works, stood Hertford House, once the Pulteney Hotel, which, having been originally built for the Earl of Barrymore by Novosielski and added to by Smirke, was re-erected, mainly with the existing stones, in 1851. The next is what is mentioned in the "New Complete Guide," *at supra*, as Half-Moon-street, Hyde Park-road. Then comes White Horse-street. We may add that next east of Carter's statutory works, "near to the Queen's Mead House, in Hyde Park-road," was the workshop of John Van Nost, a maker of leaden figures, who came to England with King William III.

#### THE ANNUAL REPORT OF THE LOCAL GOVERNMENT BOARD.

THE Sixteenth Annual Report of the Local Government Board, 1886-87, just issued,\* is dated "June, 1887," so that, considering its bulk (including appendices it consists of upwards of 600 pages), it has made its appearance within what,—for a Government publication,—must be regarded as a fairly reasonable interval. The Report itself, signed by the President of the Board, the Right Hon. C. T. Ritchie, occupies 172 pages, and is divided into three parts, viz., I., Relief of the Poor and the Poor Rate; II., Local Government and the Public Health; III., Local Taxation and Valuation. It is with the second section that we and our readers are most directly concerned, from a sanitary point of view; but it is impossible to read through the Report without seeing that all three of the subjects enumerated are more closely affected by each other than is always remembered.

With regard to Poor Law Relief, it appears that on the 1st of January last the total number of paupers of all classes in England and Wales in receipt of relief was 822,215, of whom 201,598 were indoor and 620,517 outdoor paupers. As compared with the returns of the 1st of January, 1886, these figures show a net increase of 9,201, or 1.1 per cent. on the total number of paupers. On the other hand, it is satisfactory (bearing in mind the continuous increase in the amount expended on the relief of the poor during the ten preceding years) to find from the returns that the cost of the relief of the poor during the year ending Lady Day, 1886 (£2,096,230) was 195,370*l.* less than in the preceding year. This expenditure represented an average charge of 6*s.* 0*d.* per head on the estimated population, being 2*d.* per head less than in the preceding year, and an average rate of 1*s.* 1*d.* in the pound on the rateable value of the property liable to contribute to the Poor-rate. The Report chronicles a fair amount of work in the shape of the erection of new buildings for poor-law administration, and enumerates several important new works of the kind which need to be taken in hand as soon as possible. Appendix B contains the reports of the several Poor-Law Inspectors. We notice that Mr. R. Hedley, the Inspector for the district comprising the Metropolis, confirms what was our view at the time of the "Mansion House Fund." He says he believes that the Mansion House Fund, which was hastily collected and hastily distributed in the early part of the year under review, "has had its effect in increasing the number of persons chargeable to the poor-rates,"—mainly, we suppose (though we do not notice that Mr. Hedley says so), because the existence of a big fund to be doled away attracted from the country large numbers of helpless or shiftless people who would not otherwise have come to London, but who, now they are here, are some of them a burden upon the rates, while others are in the over-glutted labour market. It is not surprising, therefore, to find Mr. Hedley coming to the conclusion that a further increase of pauperism in the metropolis may be looked for, "unless in the near future we are favoured by a great increase in commercial activity." Although Mr. Hedley doubts the very exceptional character of the distress of the year 1886 in the metropolis, he says,—

"I believe that the building trade in London was during the year perhaps more depressed than any other. I have

been told that there are many offices and warehouses in the City and central parts of the metropolis which are unoccupied, and I know that in some unions there are hundreds, yea thousands, of empty houses."

The building trade of London must always be large, for purposes of renewal only, but it is difficult to wish for a revival of activity in the covering of acre upon acre and field after field of the outskirts of London with row upon row of brick dwelling-houses; and I could gladly learn of many of those who have hitherto been engaged in work of that kind had been absorbed into other branches of industry."

These words are full of suggestiveness, and, in so far as they are directed towards the stopping of "jerry" building, we quite sympathise with them, though obviously it would ill become us to deprecate the growth of the legitimate building industries of the metropolis.

Turning now to the second section of the Report, viz., that dealing with "Local Government and Public Health," we find that since the constitution of the Local Government Board on its present basis in August, 1871, it has sanctioned the borrowing, by Urban and Rural Sanitary Authorities, of amounts reaching a gross total of 36,722,067*l.* By far the greater proportion of these loans has been sanctioned for the purpose of sanitary improvements in Urban Districts, to be executed under the provisions of the Sanitary Acts, the Public Health Act, 1875, and Local Acts and Provisional Orders. The remainder has been sanctioned principally for the execution of sanitary improvements in Rural Districts, or for improvement schemes in Urban Districts under the Artisans' and Labourers' Dwellings Improvement Act, 1875. Of the amount mentioned, thirty-one millions and a quarter have been sanctioned as expenditure for sanitary purposes in urban districts, 2,378,331*l.* for similar works in rural districts, and 2,243,358*l.* for expenditure under the Artisans' and Labourers' Dwellings Act. In addition, the Board has since its constitution sanctioned loans to joint boards to the amount of 950,284*l.* These loans are in respect of systems of sewerage and sewage disposal, or for the provision of hospitals. With regard to the appointment and salaries of sanitary officers, we are glad to notice the following passages in the Report,—

"In some of the cases in which we received applications for sanctions to appointments under our Regulations, with a view to the repayment of a moiety of the salaries of the officers out of the Parliamentary Grant, the arrangements proposed did not appear to us to be satisfactory, and we deemed it necessary to withhold our assent.

We have, in previous Reports, referred to the inadequacy of the salaries frequently proposed by Sanitary Authorities, and during the past year we received numerous proposals, when an office became vacant, to reduce the salary previously assigned to it. In many cases, however, the existing salaries did not appear to us to be more than adequate to secure the efficient discharge of the duties, and we therefore felt compelled to withhold our assent. We are fully sensible of the reasons urged by many Authorities for endeavouring to reduce local expenditure, and are desirous of co-operating with them in this direction whenever such reduction may be effected without impairing the efficiency of local administration. There are, however, other considerations to which we cannot but attach great weight, especially in those cases in which a moiety of the salary of the officer is repaid out of the Parliamentary Grant, for the proper distribution of which we are responsible.

The object of the Grant is not only to relieve the local rates by means of a subvention from Imperial Revenue, but also to secure the appointment of efficient officers by aiding the local Authorities to pay such salaries as will afford an adequate remuneration for the proper discharge of the duties which devolve upon the officers."

It appears that during the year ended on the 31st of March last, the sum of 71,953*l.* was distributed out of this grant in aid of the payment of salaries of Medical Officers of Health and Inspectors of Nuisances.

During the year the Engineering Inspectors of the Board held local inquiries in respect of 451 applications by Sanitary and other Authorities for sanction to borrow money for public works. We are glad to learn that the special Survey of Sanitary Districts which was mentioned in the Board's last Report as being in progress, in view of the possible introduction of cholera into this country, was continued during the year on the same lines as in 1885, with the result that upwards of 550 districts have now been visited, and the respective Authorities have since been communicated with as to the most pressing sanitary needs which the survey brought to light.

With regard to the third section of the Report, "Local Taxation and Valuation," it appears that the aggregate receipts of the Local Authorities during the financial year 1884-85, excluding loans, amounted to 43,849,181*l.* The total amount of loans out-

\* London: Printed for Her Majesty's Stationery Office by Eyre & Spottiswoode.

\* We are afraid that this state of things still obtains.



standing at the end of the same period was 173,207,968l., as compared with 92,820,100l. at the end of the year 1874-5,—an increase of eighty millions in ten years.

The appendices to the Report contain a great mass of detail as to the work of the Board and its officers, including the report on the Metropolitan Water Supply for the year 1886 by Major-General A. de G. Scott, the Water Examiner, appointed under the Metropolitan Water Act, 1871, in succession to the late Sir Francis Bolton. From this report we notice that "constant supply" has been greatly extended over the systems of nearly all the companies providing the metropolis with water.

#### REFUSE DESTROYERS AND THEIR RESULTS UP TO THE PRESENT TIME.

This was the subject of a paper read by Mr. C. Jones, Assoc. Inst. C.E., Ealing, at the recent annual meeting of the Association of Municipal and Sanitary Engineers, and the discussion of which was postponed to the district meeting held at West Bromwich on Saturday last. We quote some passages from the paper:—

It must be taken as an acknowledged fact that there is some difficulty in constructing a suitable furnace for burning refuse, and there is little doubt that the experience of many years gained by "Fryer's Destructor" has done immense service, if not actually made this particular system a success. Turning to the several inventions brought out, it would appear at first sight that the object sought to be carried out was simple and easily to be performed; but after trials sometimes extending over two or three years, and with different kinds of refuse at different towns, they have nearly all been at last abandoned. All these trials tended to show that we must move with the greatest caution in adopting any particular process.

Furnaces of the ordinary type were used in London districts and in Northern towns over thirty years ago, but most of these were built either by contractors or those who did not consider,—in a scientific way, at any rate,—the action of heat, and how to utilise the small combustible portion contained in refuse to burn up the larger quantity of less combustible material. The shape and general construction of the fire-brick arches were wrong, the arrangements for feeding were bad, and the flues and passages for gases were designed more by guesswork than calculation. It is, therefore, no wonder that these proved to be only feeble attempts to introduce the principle of fire. It was found necessary to burn coal or other fuel in these furnaces in order to dispose of the refuse as collected, and they were ultimately used only for burning paper, straw, hampers and baskets, and other light materials, and several are used for that purpose at the present moment. One of these furnaces was built by the Corporation of Manchester about 1873, and many alterations were made from time to time. After three or four years' experiments, about the year 1876, Mr. Fryer, of Nottingham, appears to have come upon the scene of action and arranged with the Corporation for a trial of his furnace, which he named the "Destructor." This trial turned out sufficiently successful to induce the authorities to have another erected, and in a very short period they had no less than three large destructors built upon Fryer's patent.

The Birmingham Corporation followed next; then came Leeds and Bradford. These destructors have been seen by most of the members of this Association, and called forth a very able paper from our late esteemed friend Mr. Morant. About this date Messrs. Pearse & Lupton, of Bradford, invented a furnace for dealing with town refuse, and the Corporation (of which Mr. Pearse was then a member) allowed them 50l. for a six months' trial of their invention. These furnaces consisted of fire-brick arches, feeding hoppers, and regulating dampers, with perforated fire-brick walls at the back of each cell. The inventor claimed many advantages, and especially mentioned the perforated wall for dealing with offensive gases.

The trial appears to have been conducted upon fair lines. The Sanitary Committee instructed one of its officials to remain with them and note the quantity of work done, the wear and tear of cells, and the amount of smoke and smell given off; and the inventors were

allowed to engage their own men and work the apparatus in any way they thought proper. Although several improvements were made, and a fair amount of refuse burned, they abandoned the trial.

The next invention was that of Pickard, who had been employed by the Leeds Corporation as foreman at the Destructor works; he called his refuse destructor the "Gourmand," and it consisted of a large fire arch with two sets of furnace bars and two furnace mouths to one cell. Although there was nothing to favour this form of cell, there was certainly one part of his invention which is of the highest importance, and that is the flues and second fires; he conducted his gases from the cells down an horizontal flue and erected two ordinary fireplaces in this flue with the fires crossing it, or the fire-bars at right angles to the flue. If he had built his furnace carefully, and made continuous practical trials, he would probably have adopted several other features contained in the "Fume Cremator," and thus have solved that part of the problem in advance of the author.

Immediately afterwards Healey brought out his refuse furnace, and the author found that Mr. Healey was engaged as assistant to Mr. Bryan when at Blackburn, and the erection of a "Fryer" was carried out at the time. An agreement was made with the makers, and a furnace called Fryer's and Healey's destructor was erected at Bradford. The arches and furnaces were like Fryer's, and following in the steps of the two previous inventors it was attempted to purify the gases. The main arch was constructed hollow over the top; the gases were made to pass at the back of each cell down the sides and over the arches, and the high temperature of the arches and flues was to have destroyed the offensive gases. This, however, did not take place, and although this destructor has been altered and experimented upon at great expense, no advantages have hitherto been obtained.

Then followed Thwaite, with a boiler and refuse furnace combined. It consisted of a vertical boiler with a hopper in the centre at the usual place for the chimney, and the heat of the boiling water and hot gases were said to prepare the refuse for combustion.

Then came Young, of Glasgow, with his refuse furnace, consisting of an ordinary furnace with closed ashpits. Air is blown into this ashpit by a powerful fan, and combustion thus facilitated. The refuse burnt is composed of paper, straw, and light materials, and is readily consumed, whilst the cinders are picked out and burnt under an ordinary boiler. The author believes that Mr. Hewson, of Leeds, made the blowing of air under the ashpits a principal part of his patents taken out last year.

The next to enter the field was Mr. Wilkinson, of Birmingham; he had considerable experience with two kinds of furnaces, viz., Fryer's destructors and Fryer's carboniser, and it was thought his inventions would contain some advantages over those already used by his Corporation. They consisted of cells with fire-brick arches and flat fire-bars, with large double furnace mouths and a perforated wall at the back of each cell, similar to that invented by Pearse and Lupton, and Mr. Wilkinson spoke so high of their use that the Corporation of Blackpool were induced to erect one about two years ago. These furnaces have been found to cost a great deal for repairs, and will probably be abandoned and replaced by Fryer's this year.

The next inventor was Burton, who constructed a long single furnace with two fires, and the refuse was dragged through by a long endless chain, which was moved at intervals by a windlass as the refuse became consumed. It is evident that no great heat could be generated, or the chain would be burnt and the process stopped.

Then followed Stafford and Pearson, of Burnley, with the "Beehive," which is so familiar to our members that it is unnecessary to describe its construction.

In the valuable digest prepared by Mr. Clavey, of Burton-upon-Trent, for his Board in 1886, under the head of Burnley, where the "Beehive" was born, in answer to the query as to whether "the destructor gives satisfaction," the reply is, "It gives every satisfaction"; but on turning to Leicester, where it was in the hands of one of our most experienced officers, I find the reply to the same question as follows, that "the Beehive did not give satisfaction, and had been demolished."

At Bradford, "the Beehive was abandoned within three months of its erection, on account of the excessive cost of working it."

Details are given in a tabulated statement supplied by Mr. Gordon as to the experiments carried out at Leicester with the Beehive, which did not give satisfaction. Turning to Richmond, where, in answer to similar questions, the reply is, "They had two Beehive destructors, which did not give satisfaction, and were closed on account of several law actions." The author took the trouble to visit the Beehive destructor at Burnley, thinking that he might be induced to have it at Ealing, and the answers just given justified the opinion he then formed. A few weeks subsequently to the opening of the Beehive at Richmond, the author was invited by the Vestry, who sought his advice in conjunction with Dr. Tidy, in connection with a law action. The Vestry found that the best remedy was to close them.

The manufacturer of the Beehive subsequently invented the "Nelson." The author has no personal knowledge of this apparatus, but one was erected in the town of Nelson as a private speculation, and like the others referred to appears to have found no great favour.

Another apparatus was invented by Hardie, of Burnley, and consists of the old saddle boiler with an inclined furnace underneath, and he proposed to do away with chimneys by adopting the air-blowing principle, somewhat like Young & Co., Glasgow.

Mr. Jacob, Borough Engineer of Salford, designed a furnace for burning sewage sludge, also town refuse; but from what I can gather, the Corporation, after investigation, decided to erect a "Fryer" in preference. Its construction was upon the limekiln model, and is illustrated in a late volume of the "Proceedings of the Institution of Civil Engineers."

Next on the list is Ogden, of Burnley, with a refuse furnace constructed with two fires and a boiler over the top; he claims several advantages over all others; first, the burning of offensive gases by passing them through a coke fire, and also the carbonising of refuse and retaining its fertilising properties.

Finally, we have Horsfall, of Leeds, with an ordinary furnace with closed ashpit and the combustion maintained by a combination of steam and air being blown in under the fire-bars. This principle was tried in Manchester in 1876, in Warrington in 1880, and has been in use at Rochdale since 1881, under boiler furnaces that are burning screened refuse. There have been numerous other refuse furnaces invented, but as they have not been placed before the public, there is no need to name them.

Having enumerated, so far as has been ascertained, all the various destructors brought before the public, it is found that at the present time there are probably not more than about thirty of every description in use in England, varying in size from two to twelve cells, and the various models actually in use, so far as can be gathered, consist of Fryer's, Healey's, the Beehive, the Nelson, and the one at Birmingham known as the "Wilkinson." Consequently the subject appears at first sight to be one of great simplicity, but a few minutes' consideration will convince every one present who has had to deal with the difficulties that gather around this matter, that it is no easy thing to reduce into ordinary space the many questions that of necessity arise. Those who are engaged in the larger towns of England, such as Manchester, Birmingham, Leeds, and London, are fully alive to the immense difficulties which have to be coped with in settling what may be called the dustbin nuisance. Whilst our towns and the suburban parts of our district were content, and shoots were without difficulty provided, whilst sanitary science had not yet dislodged its nostrils to gather up every whiff borne upon every wind that tells its tale of what ought not to be, and whilst thousands of tons of refuse garbage were transported from our neighbourhoods and dealt with as circumstances might dictate or necessity require, in somebody else's neighbourhood, it was well; but that time has for ever passed away, and the absolute necessity of dealing with this growing difficulty has come home in a very painful manner to most of our local authorities, whether they be constituted under the powers of the Public Health Act, or the Metropolitan Management Act of London.

It is during the last ten or fifteen years these difficulties have principally cropped up; and



upon referring to data supplied by Mr. Santo Crimp, in which he includes some twenty-five towns (omitting Manchester and Birmingham, which were of still earlier date), it appears that among the early destructors erected was one built in Leeds in 1877. The next date are another at Leeds in 1879, and others in Hackmondwike and Warrington in the same year. Then follow Blackburn, Bradford, and Bury in 1881; Bolton, Hull, Nottingham, and Salford in 1882; Ealing 1883; Newcastle, Preston, and Whitechapel in 1886; and believe that Bournemouth, Batley, Longton, and Battersea, with other towns, are now erecting or are upon the point of erecting destructors.

It was at one of the meetings of the Association at Leeds, under the presidency of the late Mr. Morant, that the author first saw Fryer's destructor, and the difficulty experienced at Ealing, not only with the house refuse, but with the sewage sludge, led the author to look for a remedy in the apparatus here seen at work. Very shortly his Board at him have the destructor, and a 2-cell destructor was built. The author then endeavoured to settle the sludge question, and can only repeat what has been said again and again, that he found the destructor absolutely certain in its work, and saw that he had secured a most valuable appliance, and one by means of which he could without difficulty rid himself of a most unendurable nuisance and without expense. It was soon found that a 2-cell destructor was not sufficient for the author's purpose, and consequently the next season two more cells were erected, and at the present moment the destructor at Ealing is dealing with the sewage sludge of a population of 19,000 and the house refuse of 22,000. The adoption of this mode of dealing with sewage sludge has produced a great deal of discussion and not a little difference of opinion. This author remarks refers more particularly to the Metropolitan Board of Works, who, having heard something of what the author was doing, tried some experiments for themselves, and, attempting to burn their sludge in a Hoffman kiln, signally failed, and Mr. Dibdin states that this was the cause of offensive effluvia and could not be carried out without a nuisance. The author cannot help expressing surprise that the Metropolitan Board of Works, with all their resources of wealth and engineering skill, should not have carried out their experiments in all integrity and with the best appliances that could be had. The dealing with the metropolitan sewage was a question of multiplication of power, and the author is still of opinion that the gigantic sludge barges now being built will have to give way to a more scientific mode of dealing with the difficulty than that of carrying the sludge out to sea and there precipitating it for the benefit of the fishy denizens of the deep or to be encountered by unfortunate passenger vessels.

During the years the author has been burning sludge at Ealing he has never used a press, nor has he used any other fuel in the destructor than that supplied by the house refuse. A very few days after the sludge has been pumped on to the ash beds, all the draining and drying necessary has taken place, and the material burns readily. In corroboration I may quote an extract from Dr. Tidy's lecture at the Society of Arts, April 14th, 1886:—

"To my mind, the destructor has reached its highest state of perfection at Ealing, from the great thought that Mr. Jones, the Surveyor at Ealing, has given to it. The sludge there is mixed with house refuse, and burnt. Mr. Jones's view is that every town produces sufficient house refuse to burn the sludge. One has to notice the differences of destructors. I have seen a good many myself, and I should say the differences are mainly two; first, a certain escape of offensive vapours from the shaft, and I think those offensive vapours are mainly due to partial burning, the destructive distillation, as a matter of fact, of the material, instead of their complete destruction; secondly, the escape of fine sand and such like from the shaft at certain stages of the operation. I have seen these two nuisances very well marked, and I had occasion to advise on them on more than one occasion. I cannot help thinking myself that in Jones's destructor, where he places a muffle furnace or 'fume destroyer,' as he calls it, between the furnace and the main shaft, he has, in a great measure, met those two difficulties."

The author would call attention to one of the most valuable papers which has appeared in the scientific world upon this question, viz., the report made by the well-known scientist, Dr. William Odling, at the request of the Bradford Authority, who had both Fryer's and Healey's destructors at work. Those who have gone into this question closely know that one of the

difficulties to be contended with is one springing from the sensitiveness which is felt by the authorities of almost every town when the question of smell is introduced; although no one can, for a moment, expect to go into sewage works or the distaff of any important town and find it smelling sweet as lavender. There does seem to be a very strong feeling that it is an impossibility to put up a destructor without creating an insupportable stink, and there has been admittedly some slight ground for the statement. Those who were in the committee-room of the House upon the Kensington Vestry Bill will remember the awful and heartrending accounts by some of the opponents of the scheme as they detailed the horrors that would arise in the erection of a destructor. This apparently happened at Bradford, and so Dr. Odling was called in to decide the question. The following are his conclusions:—

"1. The furnaces should be of the same general form and dimensions as built at present in use. They should not, however, be built in double blocks back to back, but in single blocks, so as to be readily accessible both at back and front.

2. The drying up of the fresh refuse in the furnaces, before its actually taking fire, should be better provided for, and the moist vapour given off by the drying, instead of being allowed to escape at once into the main flue, should be caused to pass over and through the mass of actively burning refuse. This would effect several desirable objects. The incipient burning of the refuse would, in the first place, be least and least objectionable in property, and to the dryness of this refuse. Secondly, any possible offence from the discharge of the vapours given off in the mere drying would be provided for. Lastly, the passage of the moist vapour or steam given off in the drying, through the actively burning portion of the refuse, would tend to make this portion burn with a flame, a very desirable result as an aid to the destruction of the embryonic vapours given off in the incipient burning. At present, the foreman in charge occasionally delivers, with some such view, a jet of water on to the actively burning refuse, but the continuous passage through this burning refuse of the watery vapour given off in the drying of the fresh refuse would be far more efficacious.

3. The opening into the flues leading from the furnace to the main flue should be so situated and arranged that the smoke and vapour given off by the incipient burning, together with a sufficient supply of air, should be caused, on its way into the flues, to pass over the most actively burning portion of the refuse, and thereby get almost, if not quite, completely consumed.

4. The flues into which the products of the drying, the incipient burning, and the active burning first pass from the furnace on their way to the main flue should be of some length, but of no greater size than necessary, and be constructed with a view to their being maintained at as high a degree of heat as practicable. It is to these strongly heated flues that the complete destruction of any residue of unconsumed embryonic vapour must be entrusted. No amount of mere heating, however, will of itself cause their destruction. They must be sufficiently strongly heated in admixture with a sufficiency of air in order to effect their burning or destruction. The flues serving for this purpose might also be made available to aid in some measure the drying up of the fresh refuse passing into the furnace."

From the very first invention to the last, there have been attempts made to deal with the difficulties arising from the gases given off from burning refuse; and besides those named with the inventions specified, there have been many schemes tried both by the authorities who have them in use and the inventors. Fryer patented a method of water spray a few years ago; the water was distributed in a kind of shower by a revolving shaft in the centre of a chamber to which the gases were conducted like an ordinary shower-bath. Another invention was introduced by an engineer in Salford, who conveyed the gases over a long water channel and baffled them with revolving discs or wheels. This invention claimed not only to deodorise the gases, but to precipitate and retain the ammonia in the water or other fluid. Mr. Hewson at one time strongly recommended this invention. All these experiments and inventions point to one end, and all of them were more or less puffed up; several corporations were unfortunate enough to give them a trial, probably led on by the sanguine statements of the makers; but we have the evidence and experience of our fellow-engineers who have worked them, which is of the greatest value to the members of this Association, and at once gives a clear and honest account of their capacity after they had left the hand of the inventor or manufacturer. In placing these facts before the meeting, the author has endeavoured to give them in a fair and practical manner, and with a desire to call attention to those inventors who have conceived the idea of passing gases through and into separate furnaces. It will, however, be seen that most of them simply suggested an ordinary coke furnace, and the author's first experiments were conducted with a fire of this kind; but although considerable power was found in such a furnace, there were many details which

required further development before practical success was attained.

An ordinary furnace was found to consume an enormous quantity of coke, and at once raised the cost of treatment to more than double, while the heat generated passed away into the chimney without utilising all its power to consume the offensive yet burnable gases. Therefore it was necessary to consider how an arrangement could be contrived which would reduce the consumption of coke and would effectually destroy offensive gases; in other words, a muffle furnace was wanted which could be retained at a very high temperature ready to receive the vapours and gases at any time, and keep them inside it sufficiently long to thoroughly deodorise them; and all this had to be effectually done with a small consumption of fuel, with no extra cost for labour, and with no great increase of wear and tear.

In his experiments the author found that gases were very similar to wind, and that by baffles they could be conducted in any direction; it was found that if they could be baffled and deflected without injuring the speed or draught, they might be kept sufficiently long in the furnace to consume and deodorise their offensive properties. It was also found by the regulated admission of oxygen that the fire could be maintained at one glowing temperature with a small consumption of coke and even breeze, and that it required very little attention. It must be left to others to say the author has succeeded in those very important points referred to by the following independent and disinterested authorities.

In evidence before a Select Committee of the House of Commons, Mr. T. Cordington, M.Inst.C.E., one of the Inspectors of the Local Government Board, said:—"He noticed improvements in many ways, and thought Fryer's with all the latest improvements was one suitable for doing its work, and considered the 'Fume Cremator' a very great safeguard against nuisance or annoyance, as it much increased the heat, and enabled a more thorough destruction of noxious gases and half-burnt paper and other things which escape."

Mr. Alfred Fletcher, Chief Inspector under the Alkali Acts, and Mr. John T. Harrison, Inspector under the Local Government Board; Mr. Alfred Fryer, inventor of the destructor, and numerous others, have spoken highly of the fume cremator; and I can only follow their remarks by inviting the members of this Association to come at any time and judge of its merits themselves.

Finally, the results have entirely, so far as the destruction of the gases is concerned, confirmed the view taken by Dr. Odling; and further, the whole of the machinery is worked by the steam obtained from this simple apparatus. The author need hardly remind engineers how valuable the results thus obtained may be where power is required, and the ease with which the power may be utilised as circumstances dictate.

The paper was supplemented by a selection from a mass of information the author has received upon the subject, contained in a report by Mr. W. G. Laws, City Engineer, Newcastle-on-Tyne.

We postpone our report of the discussion.

#### SHEFFIELD SOCIETY OF ARCHITECTS AND SURVEYORS.

A MEETING of this Society was held on Wednesday, 31st August, at the School of Art. Mr. J. B. Mitchell Withers presided.

The meeting was well attended, members were enrolled, and the following officers for 1887-8 elected:—

President.—Mr. T. J. Flockton, F.S.I.

Vice-President.—Mr. F. Fowler, F.S.I.

Treasurer.—Mr. J. B. Mitchell Withers, F.R.I.B.A.

Secretary.—Mr. W. C. Fenton.

Council.—Mr. C. Hadfield, F.R.I.B.A.; Mr. C. J. Innocent, A.R.I.B.A., F.S.I.; Mr. J. D. Webster, F.R.I.B.A.; Mr. E. M. Gibbs; and Mr. E. Holmes.

It was resolved, on the motion of Mr. E. M. Gibbs, seconded by Mr. B. H. Wightman,—"That the Council ascertain the terms on which the School of Art Council would allow the use of their committee-room and library for reference."

A vote of thanks to the chairman concluded the proceedings.



### THE PROGRESS AND POSITION OF SANITATION.

LETTER FROM THE QUEEN.

MR. EDWIN CHADWICK, C.B., as President of the Association of Public Sanitary Inspectors, has received the following letter in acknowledgment of a Jubilee Address of congratulation presented to Her Majesty by that body:

"Whitehall, August 20, 1887.

Sir,  
I have had the honour to lay before the Queen the loyal and dutiful address of the President, Chairman of the Council and Members of the Council of the Association of Public Sanitary Inspectors for England and Wales, on the occasion of Her Majesty attaining the fiftieth year of her reign, and I have to inform you that Her Majesty was pleased to receive the same very graciously, and to command me to express her gratification at the results referred to as springing from the administration of the laws dealing with sanitary matters to which she has signified her assent.

I have the honour to be,

Sir,  
Your obedient servant,  
HENRY MATTHEWS."

In the Address referred to, the Sanitary Inspectors, after expressing their grateful sense of the blessings they had enjoyed in common with other of Her Majesty's subjects during her long and glorious reign, set forth that:—

"As humble executive officers, we have been enabled to aid in the practical application of the new sanitary science which has been first developed during your reign, with the powerful aid of your lamented Prince Consort, by which mainly, and with as yet very rudimentary and imperfect executive arrangements, the general health of your subjects has been far advanced beyond that of any State of Europe or of the United States of America; that the mean duration of life of all your subjects has already been augmented to three years and a half, that on the last year's population of England and Wales there has been a saving of eighty-four thousand cases of deaths and of more than one million seven hundred thousand cases of sickness over the average rates of death and the average sickness rates at the commencement of your Majesty's reign; that instances of general application have been presented of reductions of the death rates of the civil population by one-third and one-half; that by more complete applications of our science the death rate of your Home Army has been reduced by more than one-half, and of your Indian Army by more than four-fifths, and that these experiences are available for the whole of the civil population of your Empire; that particular and decided examples have been achieved by the practical application of sanitary science, as displayed in district half-time schools, and by which far greater reductions of the present excessive infantile death-rates may be accomplished, and far greater reductions of the burthen of excessive sickness and deaths of all Your Majesty's subjects. By a further advance in the same lines, by superior sanitary education and inspection, it may be confidently anticipated that during the continuance of Your Majesty's reign still greater results may be achieved than those of the last half-century."

### Illustrations.

#### DECORATIVE SCULPTURE FOR THE INDIAN PENINSULAR RAILWAY TERMINUS ADMINISTRATIVE OFFICES, BOMBAY.

THESE sculptured groups and statues have been executed in London by Mr. Thomas Earp, of the firm of Earp, Son, & Hobbs, for decoration of the exterior of the above-named terminal station, at Bombay.

The central figure of "Progress," 14 ft. in height, in three stones, is intended to hold in the right hand a flaming torch of copper, gilt, whilst the left hand rests upon a winged wheel by her side. This figure surmounts the central dome of the building.

The groups in the tympanums represent, the one "Science," embodying Astronomy, Electricity, Physical Geography, Medicine, Chemistry, Mechanics; the other "Trade," representing the central figure of Peace fostering interchange of relations between East and West, peace being an essential condition of Commerce.

The lion and tiger are for the gate piers of the entrance to the station, and measure 9 ft. 6 in. in length and 5 ft. 6 in. in height. The three groups below represent,—(1) "Commerce," the central figure expressing invitation and welcome, the left-hand figure holding Britannia's Trident, the right-hand figure with laurel wreath for successful enterprise; (2) "Agriculture": the central figure with cornucopia and ploughshare, "Plenty"; the left-hand figure with dibble and seeds, "Sowing"; the right-hand figure with sickle and wheat "Reaping"; and (3) "Civil Engineering," the central figure shown with cylinder of steam-engine; the left-hand figure "Military Engineering" with gunner's quadrant; the right-hand figure with screw propeller representing "Naval Engineering." These groups are 10 ft. in height and 8 ft. 6 in. in breadth, and in three stones each.

The figure of the Queen Empress (shown in annexed cut) is 9 ft. 6 in. in height, and in one stone. Her Majesty is represented in State robes and orders, holding in either hand the sceptre and orb.



Statue of Her Majesty, forming part of the Decorative Sculpture of the Indian Peninsular Railway Terminus, Bombay.—Mr. Thos. Earp, Sculptor.

In addition to the sculpture here illustrated there are decorative lions and griffins for the gables, and also nine large portrait heads, in circles, representing Lord Dufferin, Sir Bartle Frere, &c.

These works were carefully packed in strong iron-bound cases, and having arrived at their destination by steamer from London without sustaining damage, have now been placed in position.

The work has all been executed in Bath stone.

#### NEW CHURCH AT STRATTON.

THE new church now being built, from Mr. T. G. Jackson's design, at Stratton, in Hampshire, is to supersede a very mean modern structure of brick, which stands on low ground in Stratton Park. The new church, which is being erected at the expense of the Earl of Northbrook and the Hon. Francis Baring, is situated on higher ground, nearer the village. The materials are brick, with flint facing and dressings of Chilmark stone externally, and of chalk internally. The spire is of timber and shingled. The seats and other fittings are to be of oak throughout.

The contractors for the general work are Messrs. Parnell & Son, of Rugby, and Mr. B. Evans is clerk of works.

#### NEW CHURCH AT NORTHINGTON, HAMPSHIRE.

THE present church at Northington, near Alresford, in Hampshire, is a modern structure of no particular architectural interest, though it was improved to some extent a few years ago by Mr. Butterfield.

It is now proposed to replace it by an entirely new church, from the designs of Mr. T. G. Jackson, which is to stand a few yards away from the present site. The new church, which is to be erected at the expense of Lord Ashburton, will contain sittings for 260 persons, and will be constructed of brick, with flint facings, and with dressings of Chilmark stone outside and chalk inside.

Our illustration is taken from a sepia drawing by the architect, exhibited this year in the Royal Academy.

#### CLUB-HOUSE, SHIPSTON-ON-STOUR.

This building is about to be erected by the liberality of Mr. Frederick Townsend, M.P. It contains billiard-room, reading-room, recreation-room, kitchen, &c., on the ground-floor, and a public hall above, approached by two staircases, and having an open timber roof. In connexion with the hall is a resting or green room, with an attic for stores, above. The walls are of red brick, the roofs covered with Broseley tiles. The timber is to be oak, cut upon the estate of Mr. Townsend, and the lowest tender (by Mr. John King, of Shipston-on-Stour) amounts to 1,064l. The architect is Mr. Ed. W. Mountford, A.R.I.B.A., of 22, Buckingham-street, Strand.

The drawing was in the exhibition of the Royal Academy.

#### A VILLAGE SHOP AND FOUR COTTAGES AT DOULTING, SOMERSET.

THESE buildings are designed (the cottages being already built) for a site in the village of Doulting, which belongs to Sir Richard H. Paget, Bart., M.P., and is renowned for its quarries of the excellent "Doulting" stone as well as for the ancient "Abbott's Barn."

The accommodation in each cottage is, on the ground-floor, a porch, living-room (14 ft. by 11 ft.), kitchen, and pantry, and on the upper floor three bedrooms, each having separate access to the staircase. The shop is about the size of two cottages, and is situated facing the church and two main roads, and being in the curve of two other roads is in a prominent position. The oriel window lights a sitting-room, whence a very pleasant view is obtained.

The materials are, for walling throughout, Doulting stone from Messrs. Charles Trask & Son's quarries, "hammer-dressed," with finely-wrought window and other dressings; the gable copings, tops of chimney-stacks, &c., are of the harder or weather beds of the Cheltenham quarries. The roofs are covered with slates.

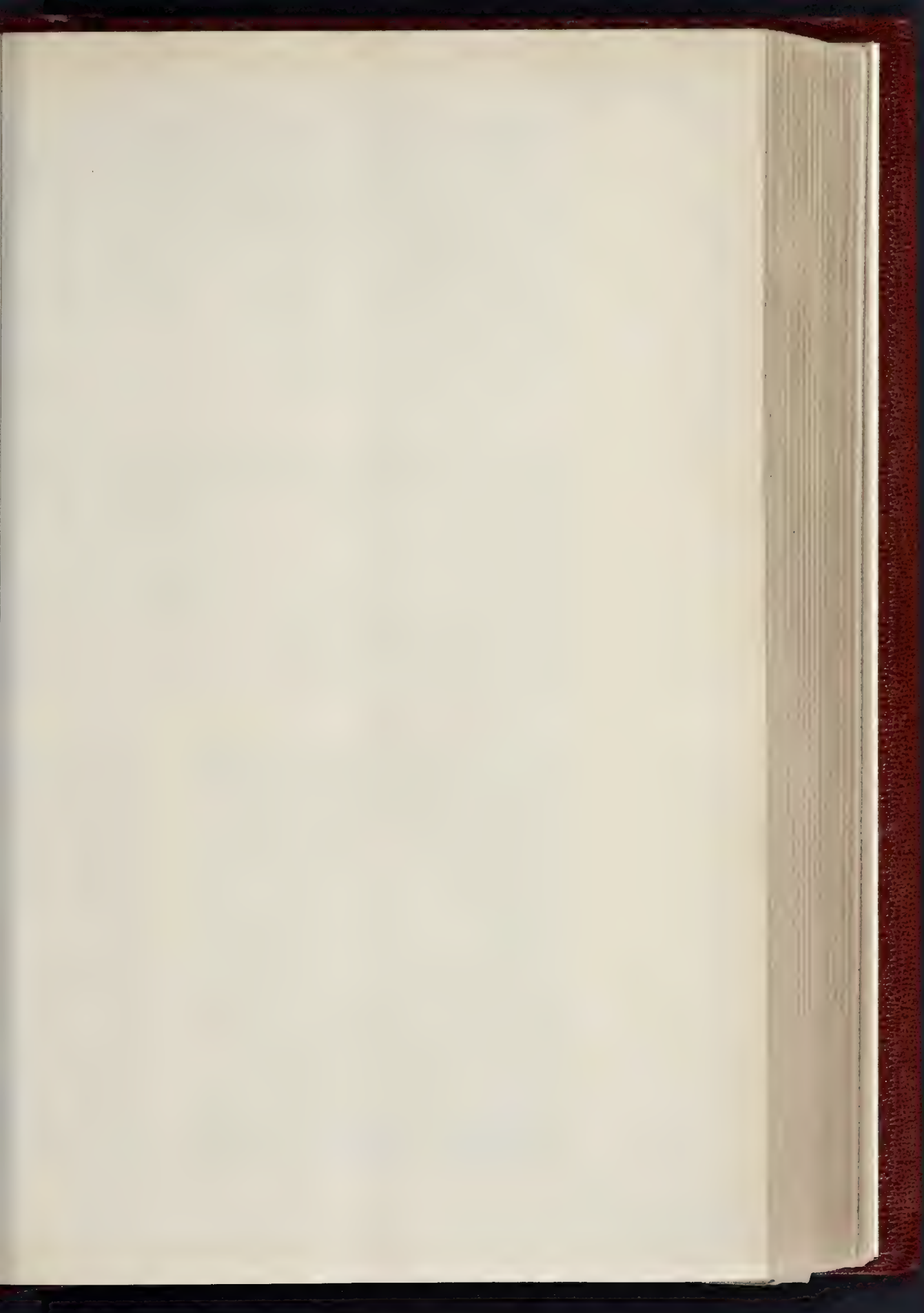
The ground on which the cottages stand naturally lies about 3 ft. above the adjoining road level, and an attempt has been made to turn this irregularity to account in the design. Mr. George J. Skipper, of Norwich, is the architect of the work, and Mr. F. W. Pullen, of Shepton Mallet, the contractor.

#### Gilchrist Engineering Scholarships.

WE may draw attention to these scholarships, to be competed for at University College. The examination is intended to be such as can be passed by a well-taught school-boy fresh from school, and will be held on the 29th and 30th of September. Candidates must send in notice to the Secretary of University College of their intention to compete, not later than September 23rd. The scholarships are of the value of 35l., and tenable for two years.

#### The Lighting of the House of Commons.

Mr. Plunket, the First Commissioner of Works, in answer to a question put by Mr. Graham last week, said that there was no doubt that the use of gas in the cloister used as the cloak-room was doing a certain amount of injury to the stonework of the roof, and he quite agreed as to the advisability of substituting electric lighting. Unfortunately, there was the odious question of expense, and he had been for some time engaged in having estimates prepared which he hoped very soon to submit to the proper authorities.







TRADE.



COMMERCIAL.



AGRICULTURE.

DECORATIVE SCULPTURE FOR THE GREAT INDIAN EXHIBITION.

MR. F. W. STEVENS, F.R.I.B.A., ARCHT.

The Photographs by Mr. F. W. Stevens.



SCIENCE.



ENGINEERING.

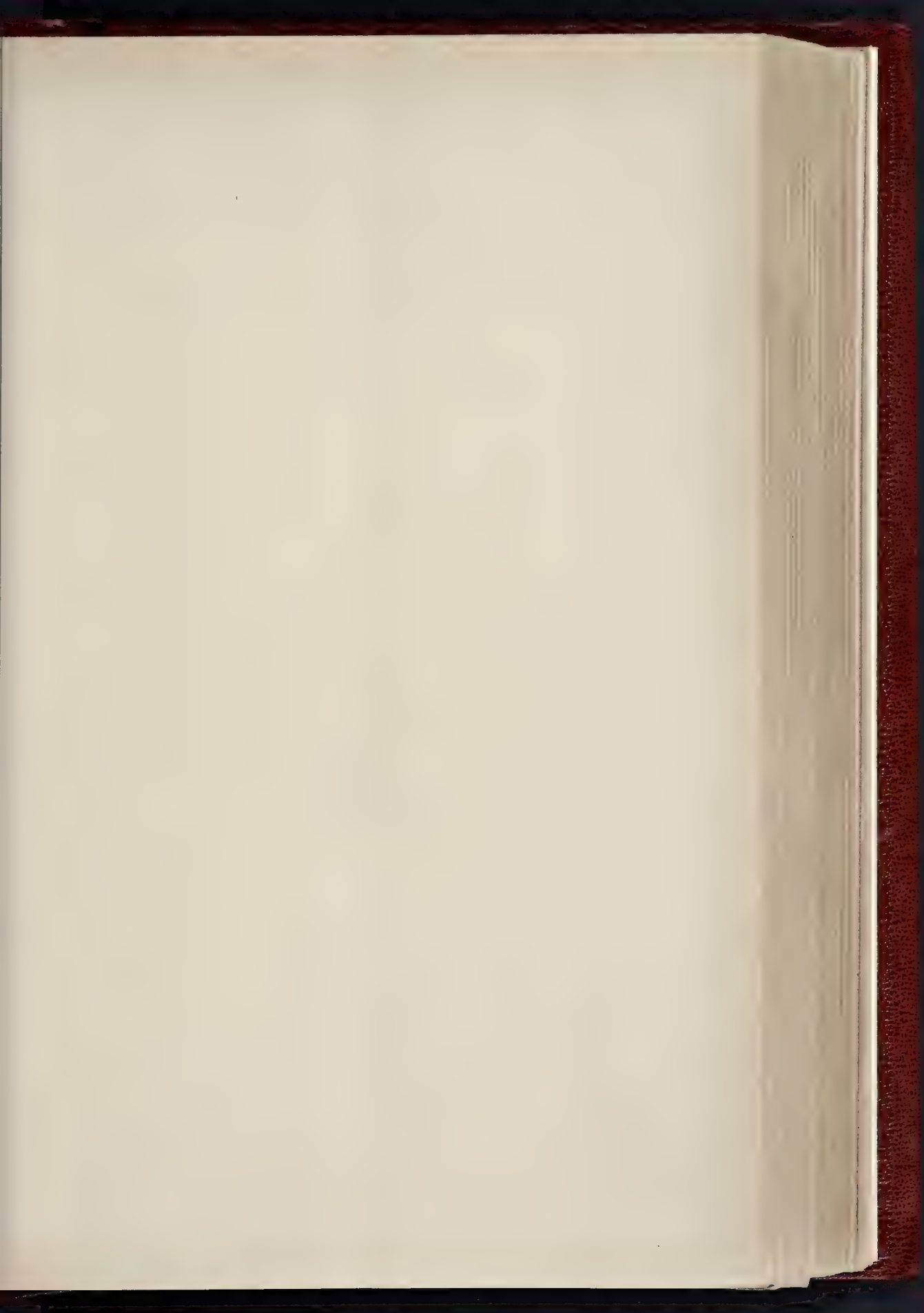
AR RAILWAY COMPANY'S TERMINUS, BOMBAY.

Mr. THOMAS EARP, Sculptor.

London.

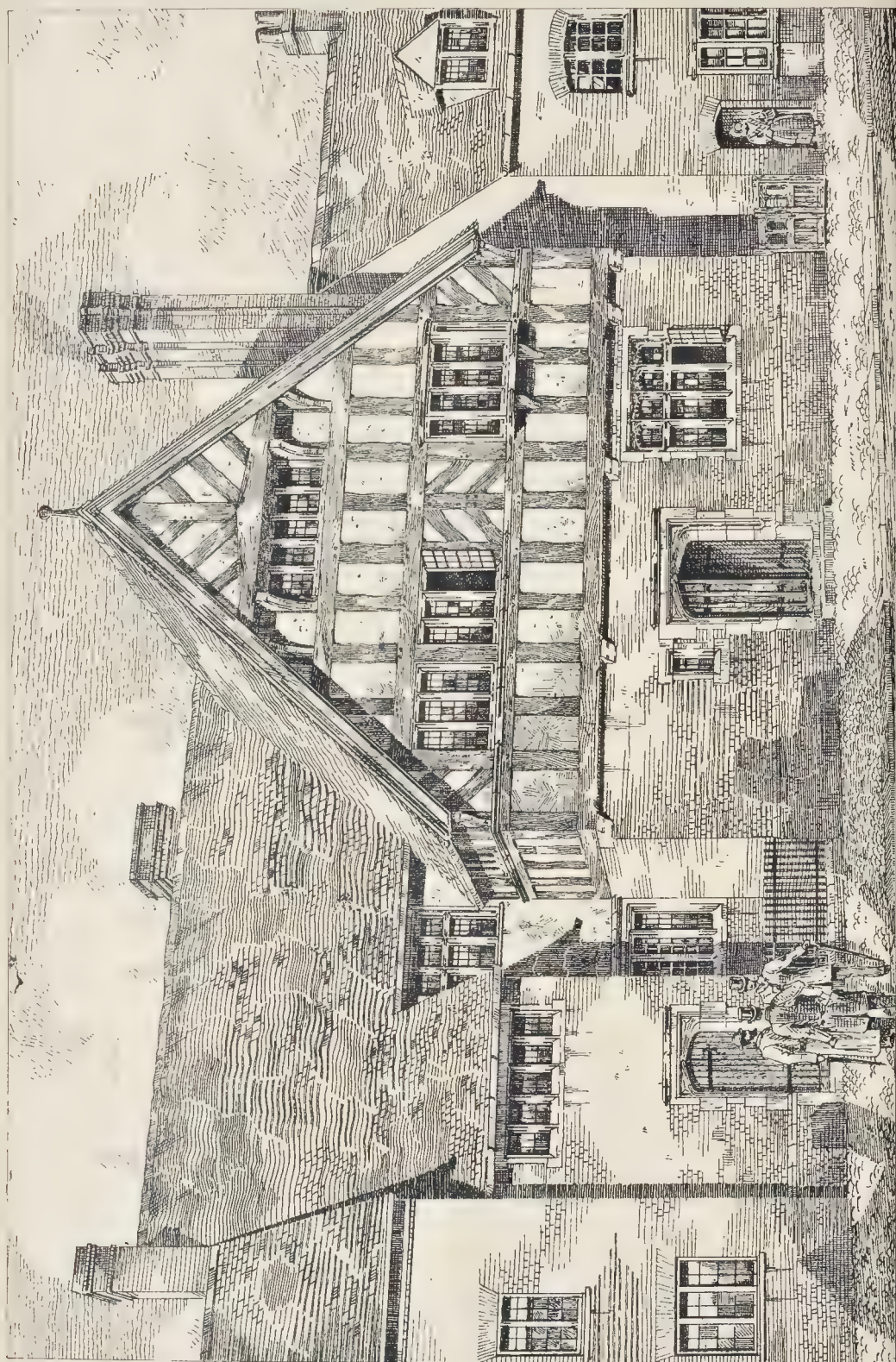


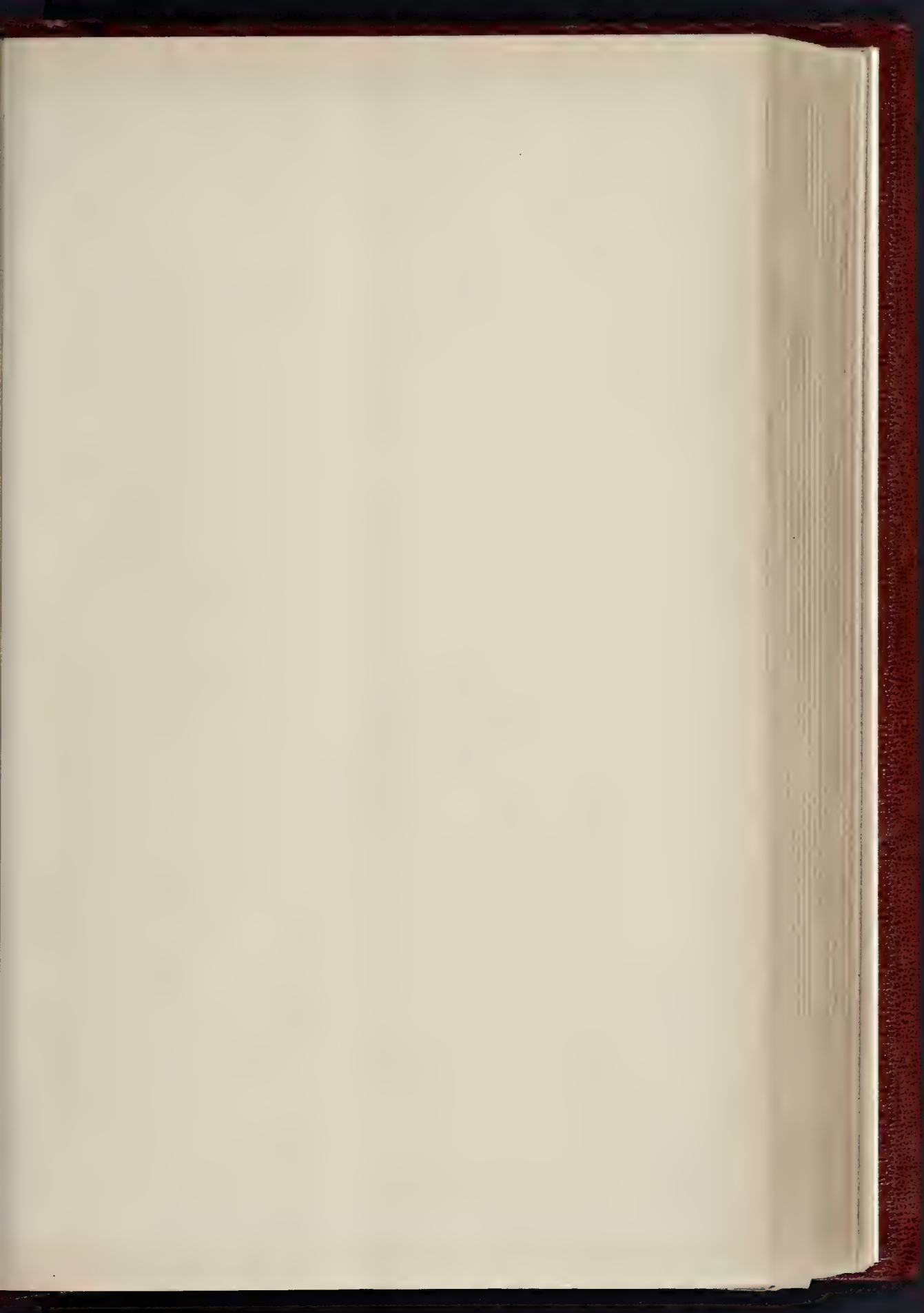






THE BUILDER, SEPTEMBER 10, 1887.

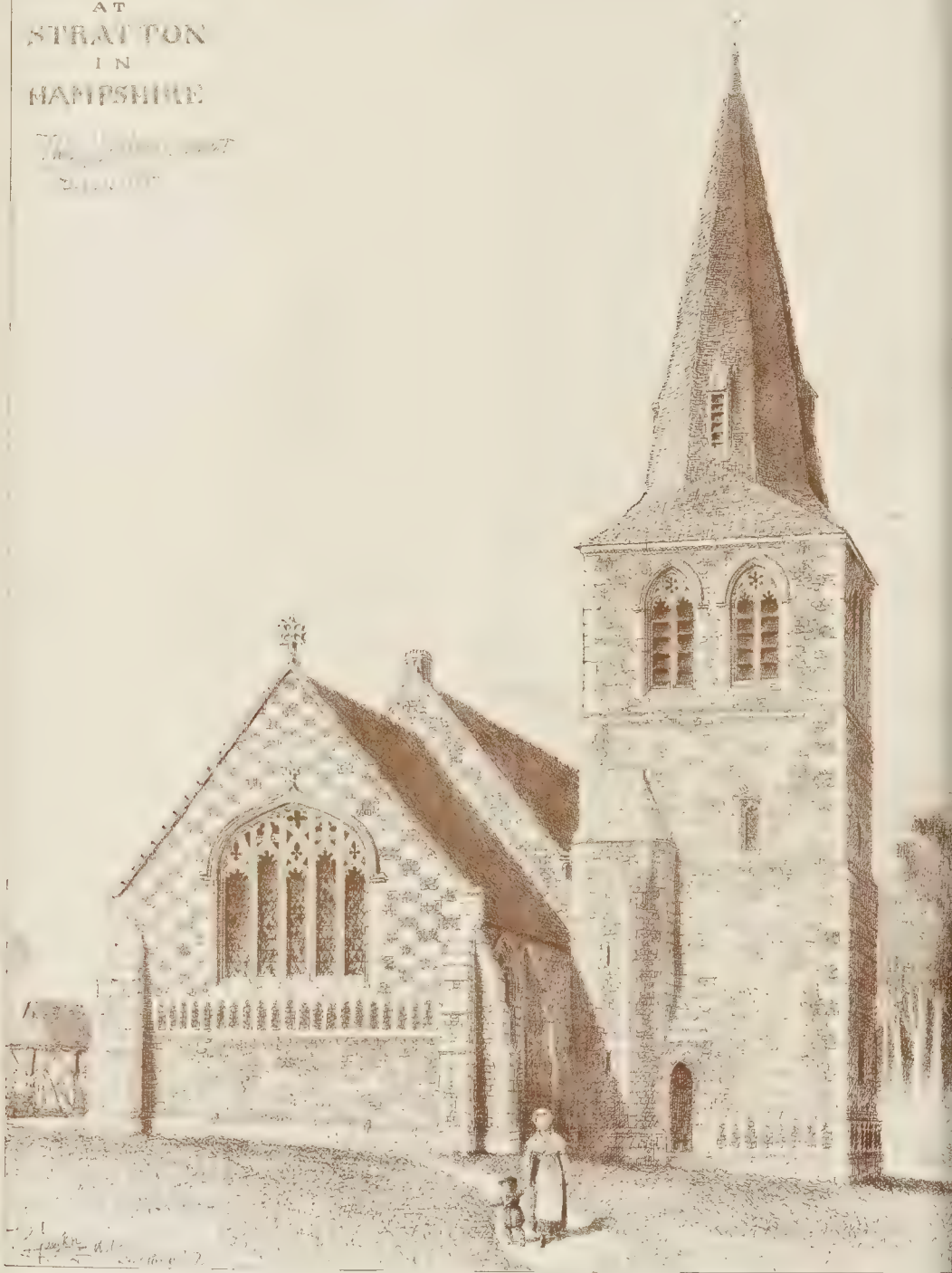






NEW CHURCH  
AT  
STRATTON  
IN  
HAMPSHIRE

*The Builder's cost  
£2,000*



NEW CHURCH  
AT  
BORTHINGTON  
IN  
GLoucestershire

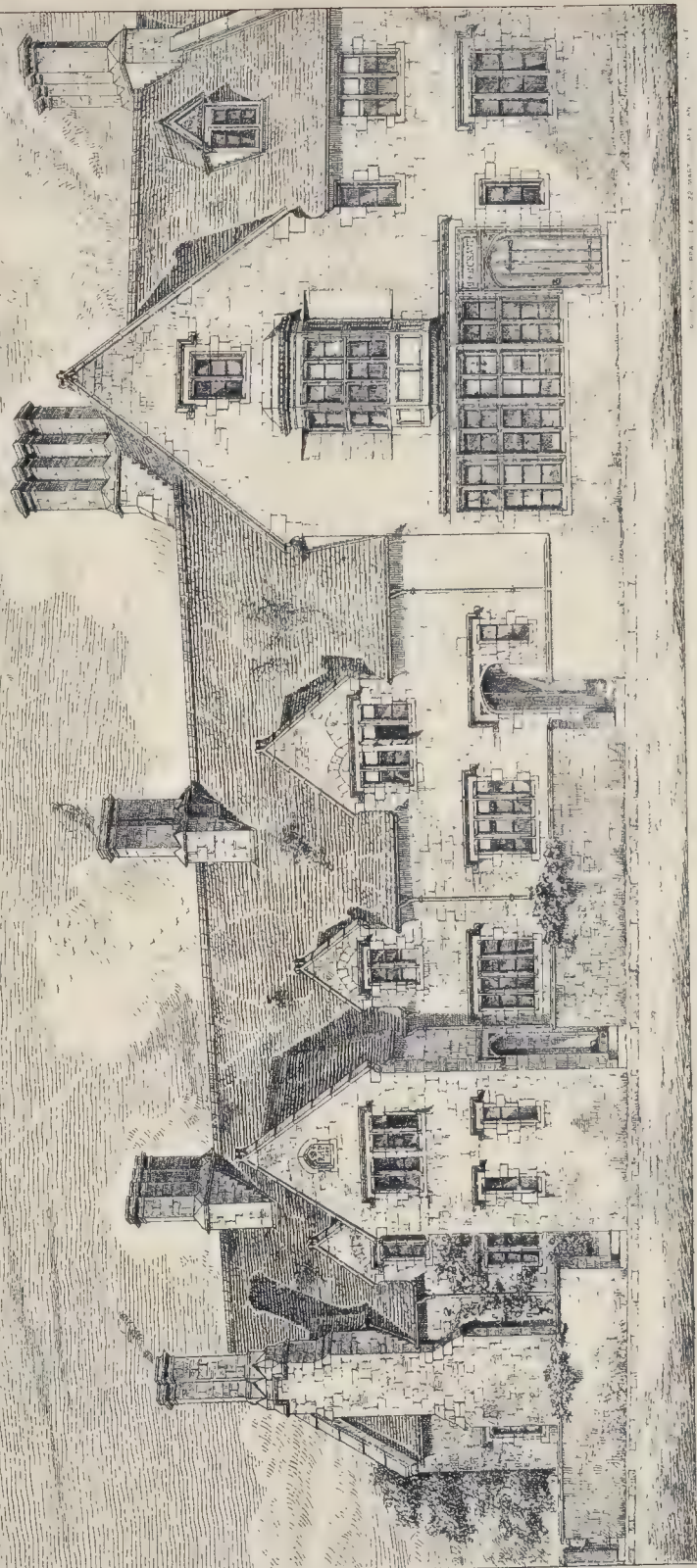
By J. J. N. P. S. 1887







A Village Shop & 4 Cottages-  
at Doulling, Somersetshire.  
for Sir Richard D Paget Bart M.P.  
George J Skipper Architect



THE BUILDERS' GAZETTE, SEPTEMBER 20, 1907.







*Alterations and Additions to a Cottage at Haslemere, Surrey.—Mr. W. A. Pitt, Architect.*

#### COTTAGE, HASLEMERE.

THE illustration shows additions made to an ancient cottage at Haslemere, for Mr. Rayner Storr, who has rescued the premises from continuing as a double tenement.

The ground story is stone, while the upper part and roofs are oak framed and tile hung. The house has many levels. The work was carried out under the superintendence of Mr. William A. Pitt.

The small drawing from which the cut is reproduced was hung in the Royal Academy Architectural Room this season.

#### MECHANICAL SCIENCE AND THE EDUCATION OF ENGINEERS.

IN the Mechanical Science Section of the British Association Meeting at Manchester last week, the President of the Section, Professor Osborne Reynolds, in the course of his inaugural address, reviewed the achievements in mechanical science accomplished since the last meeting of the Association in Manchester, twenty-six years ago. It was always difficult, he said, to arrive at a just appreciation of the relative importance of the events of our own time; and in any endeavour to review or take stock of the mechanical advance of the last quarter of a century, during which time things mechanical had divided the attention of the civilised world with matters political, it seemed very necessary to remember that as the mechanical age got older its relative activity was not to be gauged by the relative number and importance of such epoch-marking mechanical departures as compared with those which had distinguished past periods. However high or low an estimate we might form of the probable future importance of some of these inventions, and however much disappointment we may feel at the non-success which has attended some of the boldest and apparently most promising departures, such as the Crampton process for substituting a blast of coal dust for the ordinary furnace, or Sir Henry Bessemer's endeavours to prevent distressing motion at sea, there was still no ground for discouragement. For whether or not this period be

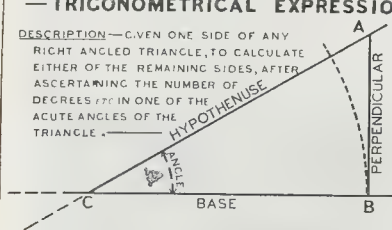
henceforth remarkable for what may be called the origination of new mechanical species, is a small matter compared with the fact that it had undoubtedly been remarkable for unprecedented achievements in the development of higher states of organisation in those mechanical species which were already in existence. There has never been a time in which mechanical revolutions had followed one another with such rapidity. In all the main departments of practical mechanics progress had been so rapid that appliances have been superseded long before reaching the term of their natural existence. . . . That the character and rate of recent mechanical advance were both exactly such as would be expected to follow, as the result of a deeper and broader knowledge of scientific methods and the principles involved, seemed to be the very best proof of advance in that other side of mechanical science in which this section took interest, or, more correctly, for which it exists,—the increase and spread of mechanical knowledge. Elementary education, whatever might be its subjects, must of necessity depend for its permanent existence on some source of higher knowledge in those subjects. Without raising such questions as whether there exist at present means of training efficient teachers in all the branches for which technical education is promised, or whether such means would be forthcoming as a result of the demand of teachers, he recalled the recent progress made towards a higher training in that branch of science which most directly relates to mechanical progress, and which, according to no less an authority than the late Professor Rankine, received its first impulse from the institution of Section G. Professor Gordon, who held the chair of mechanics in Glasgow University, was the first in this country to collect and embody in his lectures, and subsequently in a text-book, the important though scattered results of individual efforts to found the laws of practical mechanics on exact science. And at the time Rankine was speaking, the chair to which Rankine himself was called the same year was the only chair in this country from which such lectures were given. Since that time the appreciation of that science has steadily increased; other colleges took up the subject mostly as forming part of courses entitled engineering or naval

science. Amongst these was Owens College, in which, not till after the last meeting in Manchester of this Association, the leading engineers founded and endowed, which is more important, the chair which it has been my fortune to occupy for nineteen years. During the earlier part of this time both teachers and students were labouring under the disadvantage arising from the novelty of the subject,—the former having to make an almost arbitrary selection of what they would teach, and the latter not knowing exactly what it was they were going to learn. Gradually, however, by the help of experience from the somewhat earlier French schools and with the admirable works of Rankine as a foundation, the lectures or theoretical courses had become clear and distinct, while the advantage to be gained had become so generally recognised that of late years there had been almost a scramble to found new colleges to teach engineering, or to introduce such teaching into existing colleges; and most satisfactory to those engaged in the introduction of the subject was the fact that it was from engineers themselves that the interest and funds necessary for the work had come. Since 1867 the Owens College had received gifts and bequests from engineers, including those of the highest standing in the neighbourhood, of upwards of 150,000. It could not for one moment be doubted that this movement had been brought about by the conviction of the necessity of an education which, in its subjects and methods of teaching, was much more closely related than was the older system of the universities, to the actual work which the students may eventually be called upon to undertake,—that it was, in fact, evidence of the appreciation, by those having the greatest experience, of the necessity of higher scientific training for engineers. This was what engineering schools during their struggle for existence had endeavoured to supply. And in spite of the danger which seems to beset all schools as they become older, to fall into the academic or pure,—not because it was the most desirable to be learned, but because it is by far the easiest to teach,—in spite of this danger, such in this case is the pressure from without, that it may be hoped the schools of engineering and applied science might be kept up to the mark, both in extending our knowledge of the laws and principles



## —TRIGONOMETRICAL EXPRESSIONS—

DESCRIPTION.—GIVEN ONE SIDE OF ANY RIGHT ANGLED TRIANGLE, TO CALCULATE EITHER OF THE REMAINING SIDES, AFTER ASCERTAINING THE NUMBER OF DEGREES IN ONE OF THE ACUTE ANGLES OF THE TRIANGLE.



$$1. \quad \sin ACB = \frac{\text{PERP}}{\text{HYP}} = \frac{AB}{AC} = \cos CAB$$

$$AB = AC \times \sin ACB$$

$$2. \quad \cos ACB = \frac{\text{BASE}}{\text{HYP}} = \frac{CB}{AC} = \sin CAB$$

$$CB = AC \times \cos ACB$$

$$3. \quad \tan ACB = \frac{\text{PERP}}{\text{BASE}} = \frac{AB}{CB} = \cot CAB$$

$$AB = CB \times \tan ACB$$

$$4. \quad \sec ACB = \frac{\text{HYP}}{\text{BASE}} = \frac{AC}{CB} = \text{cosec CAB}$$

$$AC = CB \times \sec ACB$$

$$5. \quad \text{cosec ACB} = \frac{\text{HYP}}{\text{PERP}} = \frac{AC}{AB} = \sec CAB$$

$$AC = AB \times \text{cosec ACB}$$

$$6. \quad \cot ACB = \frac{\text{BASE}}{\text{PERP}} = \frac{CB}{AB} = \tan CAB$$

$$CB = AB \times \cot ACB$$

## TABLE OF NATURAL SINES

DEC	SINES	DEC	SINES	DEC	SINES
0	•00	31	•51503	61	•87461
1	•01745	32	•52991	62	•88294
2	•03489	33	•54463	63	•89100
3	•05233	34	•55919	64	•89879
4	•06975	35	•57357	65	•90630
5	•08715	36	•58778	66	•91354
6	•10452	37	•60181	67	•92050
7	•12186	38	•61566	68	•92718
8	•13917	39	•62932	69	•93358
9	•15643	40	•64278	70	•93969
10	•17364	41	•65605	71	•94551
11	•19080	42	•66913	72	•95105
12	•20791	43	•68199	73	•95630
13	•22495	44	•69465	74	•96126
14	•24192	45	•70710	75	•96592
15	•25881	46	•71933	76	•97029
16	•27563	47	•73135	77	•97437
17	•29237	48	•74314	78	•97814
18	•30901	49	•75470	79	•98162
19	•32556	50	•76604	80	•98480
20	•34202	51	•77714	81	•98768
21	•35836	52	•78801	82	•99026
22	•37460	53	•79863	83	•99254
23	•39073	54	•80901	84	•99452
24	•40673	55	•81915	85	•99619
25	•42261	56	•82903	86	•99756
26	•43837	57	•83867	87	•99862
27	•45399	58	•84804	88	•99939
28	•46947	59	•85716	89	•99984
29	•48480	60	•86602	90	1•00000
30	•50000				

$$\cosine A = \sin(90-A)$$

which more immediately underlie the results of practical experience in art, and in teaching the methods of most useful application; and that while encouraged to offer every inducement to the attainment of a sound knowledge of the principles, they would not be allowed to fall into the fatally easy errors of carrying the abstractions of this science outside all possible application, or blocking the way by the insistence on impossible preliminary attainments in mathematics and pure science. To be hailed as one of the greatest inducements to keeping alive in engineering schools a real scientific interest in the practical work which is going on around them was the introduction of what are now called engineering laboratories, in which students might familiarise themselves with the actual subjects for which the theoretical work was undertaken, and have placed before them in their most naked forms the data and mechanical actions in which practical achievements depend, as well as being taught the use of all those instruments and methods of measurement which it was one of the first objects of these laboratories to extend and to perfect, and which measurements are now, as the result of a better knowledge of principles, rapidly displacing the older methods of arriving at conclusions in engineering. During the erection and fitting of the Whitworth Laboratory in Owens College, which was now on the verge of completion, it had been very impressing to see the goodwill shown toward the work by everybody who had had to do with it. Everyone who had paid attention to the history of mechanical progress must have been impressed by the smallness in number of recorded attempts to decide the broader questions in engineering by systematic experiments, as well as by the great results which in the long run have apparently followed as the effect of these few researches. He said apparently, because it

was certain that there have been other researches which probably, on account of failure to attain some immediate object, have not been recorded, although they may have yielded valuable experience which, though not put on record, has, before it was forgotten, led to other attempts. But even discounting such lost researches, it was very evident that mechanical science was in the past very much hampered by the want of sufficient inducement to the undertaking of experiments to settle questions of the utmost importance to general advance, but which had not promised pecuniary returns, scientific questions which involved a greater sacrifice of time and money than individuals could afford. To what all this might lead us it was no part of his undertaking to consider, but he ventured to end his address on the progress of mechanical science during the past twenty-six years by what appeared to him the most satisfactory conclusion, viz., that to such mechanical progress there is apparently no end; for, as in the past so in the future, each step in any direction would remove limits and carry us past barriers which have till then blocked the way in other directions, and so what for the time might appear to be a visible end or practical limit would turn out but a bend in the road.

Mr. W. H. Barlow, Past-President of the Institution of Civil Engineers, moved a vote of thanks to Prof. Osborne Reynolds, which was seconded by Mr. J. Abernethy, who remarked that the subject of technical education touched upon in the address was of the utmost importance. If we were to compete successfully with foreigners and Americans, the engineers of the future must be instructed, more than they had been in the past, in technical science or applied mechanics.

The resolution was carried.

## The Student's Column.

## LAND SURVEYING AND LEVELLING.

## XI.—TRIGONOMETRICAL SURVEYING.

**I**F any two straight lines, such as A C and B C, intersect one another at the point C, and if, from any point in one of the lines such as B C, at any distance B from C upon the side forming an acute angle with the other line A C, we draw a perpendicular to meet the other line A C, a right-angled triangle will be formed, in which B C will represent the base, A B the perpendicular, and the A C the hypotenuse subtending the right angle.

Mathematical tables have been formed, giving the ratio between any two adjacent sides of a triangle, so that by the aid of these tables, when we know the length of any one side, and the value in degrees and parts of a degree of either of the acute angles A C B or C A B, we can arrive at the length of the adjacent side forming the angle, and then, having arrived at the length of two sides of the triangle, we can easily determine the length of the third side, either by a further use of these tables, or by the application of the 47th proposition of the first book of Euclid.

The trigonometrical values furnished by the tables are denominated as follows:—(1) the sine of the angle, found by dividing the length of the perpendicular by the length of the hypotenuse; (2) the cosine of the angle, found by dividing the length of the base by the length of the hypotenuse; (3) the tangent of the angle, found by dividing the length of the perpendicular by the length of the base; (4) the secant of the angle, found by dividing the length of the hypotenuse by the length of the base; (5) the cosecant of the angle, found by dividing the length of the hypotenuse by the length of the perpendicular; and (6) the cotan-

TABLE OF NATURAL COTANGENTS

DEC	COTAN	DEC	COTAN	DEC	COTAN
0	INFINITE	31	1.6642	61	.55432
1	57.2899	32	1.6003	62	.53170
2	28.6362	33	1.5398	63	.50952
3	19.0811	34	1.4825	64	.48773
4	14.3006	35	1.4281	65	.46630
5	11.4300	36	1.3763	66	.44522
6	9.5143	37	1.3270	67	.42447
7	8.1443	38	1.2799	68	.40402
8	7.1153	39	1.2348	69	.38386
9	6.3137	40	1.1917	70	.36397
10	5.6712	41	1.1503	71	.34432
11	5.1445	42	1.1106	72	.32491
12	4.7046	43	1.0723	73	.30573
13	4.3314	44	1.0355	74	.28674
14	4.0107	45	1.0000	75	.26794
15	3.7320	46	.96568	76	.24932
16	3.4874	47	.93251	77	.23086
17	3.2708	48	.90040	78	.21255
18	3.0776	49	.86928	79	.19438
19	2.9042	50	.83909	80	.17632
20	2.7474	51	.80978	81	.15838
21	2.6050	52	.78128	82	.14054
22	2.4750	53	.75355	83	.12278
23	2.3558	54	.72654	84	.10510
24	2.2460	55	.70020	85	.08748
25	2.1445	56	.67450	86	.06992
26	2.0503	57	.64940	87	.05240
27	1.9626	58	.62486	88	.03492
28	1.8807	59	.60086	89	.01745
29	1.8040	60	.57735	90	.0
30	1.7320				

$$\tan A = \cotan (90 - A)$$

TABLE OF NATURAL COSECANTS

DEC	COSEC	DEC	COSEC	DEC	COSEC
0	INFINITE	31	1.9416	61	1.4335
1	57.2986	32	1.8870	62	1.3257
2	28.6537	33	1.8360	63	1.2232
3	19.1073	34	1.7882	64	1.1260
4	14.3355	35	1.7434	65	1.0337
5	11.4737	36	1.7013	66	1.0463
6	9.5667	37	1.6616	67	1.08636
7	8.2055	38	1.6242	68	1.07853
8	7.1852	39	1.5890	69	1.07114
9	6.3924	40	1.5557	70	1.06417
10	5.7587	41	1.5242	71	1.05762
11	5.2408	42	1.4944	72	1.05146
12	4.8097	43	1.4662	73	1.04569
13	4.4454	44	1.4395	74	1.04029
14	4.1335	45	1.4142	75	1.03527
15	3.8637	46	1.39016	76	1.03061
16	3.6279	47	1.36732	77	1.02630
17	3.4203	48	1.34563	78	1.02234
18	3.2360	49	1.32501	79	1.01871
19	3.0715	50	1.30540	80	1.01542
20	2.9238	51	1.28675	81	1.01246
21	2.7904	52	1.26901	82	1.00982
22	2.6694	53	1.25213	83	1.00750
23	2.5593	54	1.23606	84	1.00550
24	2.4585	55	1.22077	85	1.00381
25	2.3662	56	1.20621	86	1.00244
26	2.2811	57	1.19236	87	1.00137
27	2.2026	58	1.17917	88	1.00060
28	2.1300	59	1.16663	89	1.00015
29	2.0626	60	1.15470	90	1.00000
30	2.0000				

$$\secant A = cosec (90 - A)$$

of the angle, found by dividing the length of the base by the length of the perpendicular. In the triangle A B C the hypotenuse C represents the radius of a circle equal unity, then the sine of the angle will be expressed by the length of the perpendicular, and the cosine of the angle will be expressed by the length of the base. If the length of the base be a radius, then the sine of the angle, as shown in the diagram, then the length of the perpendicular will express the sine of the angle, and the length of the hypotenuse will express the value of the angle. Hence the names sine, tangent, secant, applied to these expressions, sine signifying a line opposite the angle, and secant a line cutting the circle.

In the case of the angle C A B, the line C B would become the perpendicular drawn from point B, at a distance B A, from the point intersection A, to meet the line C A in the point C, and B A would become the base on which the perpendicular would be drawn. Hence the sine, tangent, and secant of angle A C B become respectively the cosine, cotangent, and the cosecant of the angle C A B; that is, of the angle C A B. Furthermore, it will be observed that in either angle the reciprocal of the sine is equal to the cosecant, the reciprocal of the tangent is equal to the cotangent, and the reciprocal of the secant is equal to the cosine.

It will also be observed that whatever the angle of the triangle, provided the angles remain the same, these ratios will by the principle of similar triangles remain the same; so that on the length of one side is known, the length of the other sides in any particular angle can be determined.

To facilitate the process of calculation, tables of logarithmic sines and cosines are published; to explain our subject, it will be sufficient

to refer only to the accompanying table of natural equivalents for whole degrees. Thus suppose we require the value of the cotangent for an angle of 62 degrees 27 minutes. By the tables,

$$\begin{aligned} \cot 62^\circ &= .53170 \\ \cot 63^\circ &= .50952 \end{aligned}$$

$$\text{Difference for } 1^\circ = .02218.$$

$$\text{Approximate difference for } 27' = \frac{27}{60} (.02218) = .00981.$$

$$\therefore \cot 62^\circ 27' \text{ approximately} = (.53170 - .00981) = .52179.$$

To calculate this accurately we must express the cotangent in terms of the sine and cosine, as the tables to which we have to refer only state, when single minutes are required, the values of the sines and cosines of angles; thus,

$$\begin{aligned} \cot 62^\circ 27' &= \frac{\cos 62^\circ 27'}{\sin 62^\circ 27'} = \frac{.4625225}{.8866075} \end{aligned}$$

The reduction of this vulgar fraction, which will be found equal to .521797, will show the value of the application of logarithms.

The approximate result, .52179, is seen to be correct for three places of decimals, but for application to the plotting of long base-lines the more accurate process must be applied.

**Caucasus Wood.**—A recent St. Petersburg journal comments on the increasing exportation of Caucasus wood, both nut-wood and palm-wood, which are sold by weight. The palm attains a height of 35 ft., and is not found in forests, but in isolated groups. The year 1883 showed exportations of nut-wood at 27,083 cwt., and palm-wood, 32,328 cwt.; while in 1885 the increase had run up to 36,370 cwt., and 61,252 cwt. respectively,—nearly double of the latter in the two years.

#### SANITARY CONGRESS AT BOLTON.

THE tenth Autumn Congress of the Sanitary Institute of Great Britain will be held at Bolton from September 20th to September 24th. In connexion with it there will, as usual, be an exhibition of sanitary apparatus and appliances, which will remain open until October 15th.

The following is the order of proceedings:—

*Tuesday, September 20.*

- 1 p.m.—Reception by the Mayor, at the Town-hall.
- 1.30 p.m.—Public Luncheon.
- 3 p.m.—Opening of Exhibition by the Mayor.
- 8 p.m.—First General Meeting; Opening Address by Right Hon. Lord Basing, F.R.S.

*Wednesday, September 21.*

- Section I.—“Sanitary Science and Preventive Medicine.”
- 10.30 a.m.—Address by Prof. J. Russell Reynolds, M.D., F.R.S., F.R.C.P.
- 11 a.m. to 1 p.m.—Papers and Discussions.
- 8 p.m.—Conversations in the Town-hall.

*Thursday, September 22.*

- Conference of Medical Officers of Health.
- 10.30 a.m.—Papers and Discussions on matters which come specially within the province of Medical Officers of Health.

Section II.—“Engineering and Architecture.”

- 10.30 a.m.—Address by Prof. T. Hayter Lewis, F.R.S., F.R.I.B.A.
- 11 a.m. to 1 p.m.—Papers and Discussions.
- 2 to 5 p.m.—Ditto.
- 8 p.m.—Lecture to the Congress by Arthur Bannan, M.D., F.R.S.

*Friday, September 23.*

- Section III.—“Chemistry, Meteorology, and Geology.”
- 10.30 a.m.—Address by August Dapré, Ph.D., F.R.S., F.R.S.
- 11 a.m. to 1 p.m.—Papers and Discussions.
- 2 to 4 p.m.—Ditto.
- 5 p.m.—Closing General Meeting of Congress.

*Saturday, September 24.*

- Excursions in the morning.
- 8 p.m.—Addresses to the Working Classes by Major Lemoine, F.R.S., and Henry Law, M.Inst.C.E.



## IS A CONSERVATORY OR GREENHOUSE A BUILDING?

KNIGHTLEY V. COLLINS.

This question was once more determined in the affirmative. The District Surveyor for Hammer-smith, Mr. Knightley, summoned Mr. Collins, of Cumberland Park, for erecting a large glass house, and omitting concrete foundations to the supporting walls. It seemed that Mr. Collins had erected the house in question for his sons, who are florists, and contended that such structures were not buildings, but trade fixtures. The building in question is in the shape of the letter L, with a frontage towards the High-road of 27 ft., and a depth of 65 ft. The enclosing walls are of various heights, some 2 ft. 9 in., others 3 ft. 9 in., and some nearly 7 ft., with piers here and there 13 ft. above the surface of the ground.

Mr. Knightley presented a drawing of the structure, with a figure drawn by the side to serve as a scale of comparison, and called the attention of the Magistrate to section 6 of the Act of 1855, and contended that although it is a building, in this case that difficulty did not arise, as such structures as this were defined to be buildings, and as such partially exempted. He quoted the first part of sec. 6, and the 15th rule of the same section, and by-law No. 3, in support of his contention as to its being a building, and in justification of his demand for concrete.

Mr. Collins quoted the first rule of the first schedule, and contended he had complied with the law.

Mr. Knightley replied that the by-law directing concrete to be used, except the site be a natural bed of gravel, repeated the rule quoted by Mr. Collins. He also said that builders in his district could not plead ignorance of the law, as when the by-law was first published by the Metropolitan Board of Works he had copies struck off, and when builders gave notice a copy was handed to them; he had distributed many hundreds, and Mr. Collins had had his copy. When the trenches were dug, Mr. Collins complained of being asked to use concrete. Mr. Knightley advised him to apply to the Board, who had relaxing powers, but he refused. Mr. Knightley then said, Mr. Collins, you must put in the concrete, but he refused that also; but when the decision was given against him, he then said he should apply to the Board. Mr. Knightley said he objected, as he was out of court by the effluxion of time, and asked for an order in the terms of the summons, which Mr. Bennett, the magistrate, granted.

## ARCHITECTS' PLANS DETAINED.

CLARKE V. COUSINS.

UPON the application last Monday, at Bow-street, of Mr. Luke, counsel for the complainant, an architect, at 3, Gordon-square, Mr. Bridge, after some discussion of the point of law, decided that an architect's plans of buildings about to be erected in South wark are not "papers relating to land" within the exception mentioned in 2 and 3 Vict., cap. 37, sec. 40, and accordingly ordered the defendant, a builder, who had detained the plans, to deliver them up (or pay 14s., their value), and 3s. costs.

## "DUTIES OF A CLERK OF WORKS."

Str. Having had my money's worth in "Leaning's Quantities," I bought lately and have been reading Mr. Leaning's last little (very little, equal to about three leaves of the *Builder*) and dear (very dear) book, "The Duties of a Clerk of Works."

The following items and extracts appear to me to require some further explanation from the author, if he will kindly so far favour us; or perhaps comment from yourself and your readers might be useful:—

P. 25, *Lime Mortar*.—"Have it mixed in quantities sufficient only for daily use." It used to be "mixed fresh and used hot" in the specifications of my youth, but now most people more wisely prefer a large quantity of mortar to be made up, well heaped or covered, cooled as long as possible, rebated, and used stiff. The boasted Roman mortar was not made from day to day as required, and used sloppy, as newly-made mortar must be.

P. 36, "Avoid use of silicious lime for lathed work." I have heard of silicious lime for lathed work, but I have heard of silicious lime for lathed work, but I have never heard that it is to be avoided for the laying or pricking-up coat and the floating coats. Indeed, it is specially recommended by some for these purposes.

P. 36, "If floors are not strongly timbered, the laying of the floor-boards will often break the key of plastering of ceilings, and many of them will fall; but there is less danger of this if there are no ceiling joists." Mr. Leaning does not surely mean what is printed, from which his readers might infer that there would be less danger to the ceiling below from the vibration caused by nailing the floor-boards above the ceiling laths and nailed directly to undersides of floor joists, instead of to ceiling joists intervening between the plaster and the floor joists. At

any rate, we have always been taught to the exact contrary.

P. 43, *Painter*.—"Do not allow too much oil and turps to be mixed with the colours" (no mention here of lead, only colours), "especially regard this for surfaces to be varnished." Most people know that varnish cannot be properly applied over a full oil coat. The coat immediately under the varnish should be a flat one, containing little or no oil.

P. 44, "See that varnish is not diluted by the addition of turpentine." Would not this take off its gloss, which might be required in some exceptional instances? Is not the usual method to dilute with oil, not turps?

P. 44, "Where work is varnished, special attention to sising will produce best results." This requires the explanation that it applies only to unpainted work, or in some exceptional cases to old work painted or varnished, or both, when not re-painted or re-varnished. In new work, size between paint or varnish may save a coat of varnish, but is bad work. Is the idea to neutralise the oil in the undercoat of paint, which oil should not have been applied? ARCHITECT.

## PROVINCIAL NEWS.

**Chester-le-Street.**—The extensive building works commenced by the Chester-le-Street Co-Operative Society two years ago are now on the point of completion. New shops, &c., for the following departments have been provided, viz.:—Drapery; boots, shoes, and hardware; tailoring, millinery, furnishings, butcherery, and groceries; besides cocoa-room and restaurant, reading-room, library, and lavatories for ladies and gentlemen. Extensive stabling and cart-shed accommodation have been provided, together with cattle lairs and slaughter-house. Thirty-one cottages have also been erected, containing four and five rooms each, and the adjoining streets paved and sewered. The total cost has been about 14,000*l.*, excluding value of land. The work has been divided among various contractors, the principal being Messrs. J. Burnett & Son, of Birtley; Mr. Wm. Thompson, of Chester-le-Street; and Mr. John Yeoles, of Jarrow. The architects from whose plans and under whose superintendence the whole has been carried out are Messrs. S. Oswald & Son, of Newcastle-on-Tyne.

**Chichester.**—Major Hector Tulloch, Inspector for the Local Government Board, held an inquiry on Tuesday last respecting an application made by the Corporation of Chichester for sanction to borrow the sum of 2,250*l.* for the erection of an Infectious Diseases Hospital. The City Surveyor, Mr. Stringfellow, produced the plans, which the Inspector stated, had received the approval of the Local Government Board. Considerable opposition was raised by members of the Ratepayers' Association and others as to the site selected by the Council, and alternative sites were suggested, which, however, did not appear to favourably impress the Inspector.

**Heydon (Norfolk).**—Colonel W. E. G. Lytton-Bulwer, J.P., of Heydon Hall, is erecting, in commemoration of Her Majesty's Jubilee, a canopy over the well on Heydon village green. The moulded jambs, arches, and buttresses are of special made brickwork, from the works of Mr. G. Gunton, of Costessey; the roof is covered with pressed Broseley tiles, and is surmounted at its apex by a cut and shaped terminal covered with lead. A panel bearing an inscription, and a seat, will be provided in one of the sides. Mr. George J. Skipper is the architect.

**Street (Somerset).**—The Jubilee Committee of Street decided to commemorate the fiftieth year of Her Majesty's reign by erecting a new vestry-room for the parish. Mr. George J. Skipper, architect, of Norwich, designed the building, and Mr. F. Huish, builder, has taken the contract for carrying out the works. Provision is made on the first floor for the vestry-room, committee, and strong rooms; on the ground floor are the entrance, waiting-room, lavatory, and w.c.; also fire-brigade station, and stores, and hearse-house adjoining. A caretaker's house is attached to and communicating with the rest of the building. The whole is built of local Blue Lias Lime stone with Ham Hill stone dressings, and is of late Gothic style.

**Competition for the New Government Buildings at Christiania.**—Nearly one hundred applications have been received from architects for prospectuses and plans of the new Government buildings to be erected at Christiania, to which we recently referred.

## RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

10,298, White Pigments. F. W. Lyte.

This invention relates to an improvement upon a process described in a previous specification, and has for its basis the use of soluble compounds of lead which are chemically combined with other lead bye-products so as to greatly increase the covering power of the paints made from it.

11,454, Kitchen Ranges. R. Hunter and John Turnbull.

This invention consists in providing in connexion with the fire-grate a movable bottom with improved devices for vertically raising or lowering and sustaining the same, so that the depth of the burning fuel may thereby be regulated, and a shallow fire be maintained in proximity to cooking utensils placed over it on the level of the hob by raising the movable bottom, and a deep fire, adapted for roasting and cooking in front of the grate, being obtained by lowering the bottom and filling up the grate with fuel. Suitable mechanism for raising and lowering the bars is fitted to each range for the above-mentioned purposes.

12,397, Fanlight and Casement Opener. H. Whiteley.

The opener for fanlights and casements, which is the subject of this invention, consists of a pivoted slotted bracket attached to the fixed frame of the casement or window. In the slot of the bracket is a runner attached to a bar or arm; at the other end of the bar or arm is formed a toothed quadrant, which is operated by a worm carried in suitable brackets and attached to the casement to be opened or shut. The worm is operated by a pulley and cord, and the action is as follows:—

—When the window is closed the bar lies close to the casement, clear of the window to be opened; on turning the worm one way it opens the casement by forcing out the end of the bar upon which the runner is carried, the runner passing along the pivoted bracket. By reversing the revolution of the worm the end of the bar carrying the runner is forced inwards, and the window is thereby closed.

12,401, Fastening Casements, &amp;c. E. W. Taylor.

A rack or toothed bar with an automatic catch or clutch are the main features of this invention, which is described in minute detail in the specification.

12,526, Step-Ladders. R. Baird.

A step-ladder made in accordance with this patent is jointed or hinged in the middle; underneath the top step of the bottom or first half of the ladder are two sliding bolts, fastened together by a spiral spring, and shooting into sockets when the ladder is extended, so as to ensure its being rigid. When the ladder is to be used as steps the bolts are drawn inward, and the ladder then doubled; a quadrant keeps the two halves of the steps firm.

16,294, Sash-Fasteners. H. T. Bassett.

The object of the contrivance which is the subject of this patent is to prevent the window being forced by a knife or other instrument from the outside, and to draw the sashes closer together to prevent rattling. A screw is fixed so that when it is screwed up against the lever it cannot be moved nor the window opened.

9,246, Moistening Air and Ventilation. W. Thompson.

The improvements which are included in this patent refer to the use of special arrangements for injecting a jet or jets of water for ventilation and air-moistening purposes, applicable to the U-shape as well as to the flat cup-shaped ventilating apparatus. One's strong jet is used, but is divided or disintegrated so as to ensure the full force of the spray. One cloud or sheet of water is formed by all the patterns of jets. This is afterwards broken up into spray, which moistens thoroughly the air passing near it.

## NEW APPLICATIONS FOR PATENTS.

Aug. 26. 11,587, J. Holt, Latches and Bolts for Doors.—11,624, J. Hanna and T. Shillington, Stoves.

Aug. 27.—11,664, J. Munier and N. Salvaire, Colouring or Staining Wood.—11,671, G. and A. Needham, Window-fasteners.

Aug. 28.—11,684, J. Tomkys, Attaching Door Knobs and Spindles.—11,703, A. Ross and R. Hunter, Safety Fasteners for Window-sashes.—11,713, B. Russell, Radiators for Heating and Ventilating.

Aug. 30.—11,742, J. Honeyman, Drain Pipes.—11,744, T. Crook and W. Ormrod, Brickmaking Machines.—11,745, W. Ormrod, Self-lubricating Mould for Brickmaking Machines.—11,752, J. Goodman, Bricks for the better Firing of Woodwork, &c.—11,772, S. Spencer, Window Fastening.

Aug. 31.—11,787, E. Bailey, Cupboard Turn.—11,829, W. Crozier, Looking Sash-fasteners.

Sept. 1.—11,833, R. Herrmann, Wall-Papers, &c.

## PROVISIONAL SPECIFICATIONS ACCEPTED.

10,114, J. Wallas, Heads of Rainwater Pipes, &c.—10,446, C. Howe, Plaster of Paris.—10,481, S. Alley, and J. MacLellan, Water Meters.—10,562, W. Sargent, Water-waste Preventer for giving a



sh and After Rush.—10,608, F. Hemming, Wood  
rooms.—10,461, T. Bray, Syphon Water-waste  
Inventor Cistern for Water-closets.—10,704, C.  
Ger, Combined Door Fastener and Indicator.—  
1358, J. Gill, Machinery for Making Pottery,  
Pressing Bricks, &c.

#### COMPLETE SPECIFICATIONS ACCEPTED.

##### Open to Opposition for Two Months.

1,121, H. Harris, Window Fastenings.—12,330,  
Tylor, Waste Preventing Cistern for Water-  
closets.—13,537, D. Lyon, Flushing Apparatus and  
Water-waste Preventer for Water-closet Cisterns.—  
1119, P. Richards, Trapping Drains or Sewers.—  
80, C. Lattor, Fixing Sheets and Roll Caps of  
roofs, &c., for Roofing Purposes.—9,521, J.  
Stachmann and J. Goulson, Flushing Cisterns for  
Water-closets, &c.—9,800, A. Boulton, Window  
fasteners.—9,966, A. Earl, Door Bolts, &c.—13,597,  
Parsons, Fall Pipes and Fixing same.—13,692,  
Popplewell, Clamping Devices.—14,045, W.  
Anville, Electric Bells and Indicators.

#### RECENT SALES OF PROPERTY.

##### ESTATE EXCHANGE REPORT.

AUGUST 26.

##### By REYNOLDS & RASON.

Lebury, Clifton-street.—Ground-rent of 101. 16s.,  
reversion in 18 years. 250  
Ground-rent of 82. 16s., reversion in 27 years. 820  
Broomsby—26, Gloucester-street, freehold. 1,400  
Gwara-road.—Ground-rents of 85s., terms of 14  
and 11 years. 500

AUGUST 30.

##### By C. & H. WHITE.

uth Lambeth—46, 48, and 50, Wilcox-road; and  
1 to 4, Little Spring-place, 36 years, ground-rent  
30. 10s. 600  
apham-rise—13, 15, and 17, Fenwick-place; and  
a ground-rent of 16s. term 80 years, ground-rent  
11s. 580

AUGUST 31.

##### By W. & F. HOUGHTON.

d Ford—76, 78, and 80, St. Stephen's-road, with  
yards, stabling, and sheds in rear, freehold. 850

SEPTEMBER 1.

##### By FORBES & CLAYFIELD.

omley-by-Bow—8 to 18, even, Cobden-street, 63  
years, ground-rent 18s. 875

#### Miscellaneous.

**Remuneration to Architects for Com-  
petitive Designs.**—Towards the close of the  
last year the following architects were invited by  
the trustees of the "Shannon Fund" to send  
designs for a new Church of St. Kevin, at  
Ingelard Park, viz., Thomas Drew, R.H.A.;  
E. Murray, F.R.I.A.I.; J.F. Fuller, F.R.I.A.I.;  
R. Carroll, F.R.I.A.I.; and A.G. Jones. The  
and being under the control of the Court of  
chancery, a formal application was made to the  
Lord Chancellor (Ashbourne) to the effect that  
if unsuccessful competitors should be remunerated  
for their time and trouble in preparing  
drawings. His Lordship, in response, expressed  
his opinion that professional men should not be  
asked to give their time and expense without  
being fairly remunerated, and he accordingly  
made an order that the unsuccessful architects  
be paid fifteen guineas each out of the funds in  
court. As we have already stated, Mr. Drew  
took first place, and Mr. Murray second.—*Irish  
Builder.*

**Douglas (Isle of Man).**—The proprietors  
of the Twemlow's Yard Property have awarded  
the first premium of 35s. to Mr. Clarke, archi-  
tect, of Liverpool, for the best scheme sub-  
mitted for developing the property to the best  
advantage for building purposes. The second  
premium of 15s. has been awarded to Messrs.  
Stephen J. Holliday, architect, and H. Bertram  
Nichols, A.M.I.C.E., of Birmingham, joint  
authors of the plans placed second in order of  
merit.

**The Standard Measure of Length in  
India.**—A Renter's telegram, dated Simla,  
September 1, says that the Government of  
India has under consideration legislation fixing  
the English yard as the standard measure of  
length for British India, and also legislation for  
the punishment of false trade descriptions, on  
the lines of the Bill promoted by the British  
order of Trade regarding fraudulent marks on  
merchandise.

**St. Edmund's Church, in Lombard-street,**  
has been lately improved by the removal  
of the old stone steps in the chancel. These  
have been replaced by steps of white marble,  
and the floor has been relaid with black and  
white marble tiles. The work has been carried  
out by Messrs. Arthur Lee & Bros., of Bristol.

**M. Chevreuil,** the distinguished French  
naturalist, whose researches in connexion with  
flowers are known to many of our readers, has  
just entered upon his one-hundred-and-second  
year.

**Rapid Construction of a Chimney.**—  
*Dingler's Journal* records the construction, in  
the short space of fifteen days, of a factory  
chimney at Belgium, 92 ft. high, 5 ft. 6 in. in  
diameter at the bottom, 3 ft. 6 in. at the top,  
on the system known as Max Ferbeck's. The  
mode of construction is described as follows:—  
At the bottom of a pit 21 ft. 6 in. deep, 18 ft.  
long, and 16 ft. 6 in. wide, a layer of concrete  
1 ft. 4 in. deep, and consisting of equal parts of  
sand and cement, was spread out, and upon this  
bed fir beams 7 in. square were laid. Then fol-  
lowed another layer of cement 1 ft. 6 in. deep,  
but consisting of one-third cement and two-  
thirds sand. Upon this foundation the base of  
the chimney was constructed of ordinary bricks  
up to 6 ft. above the ground, after which  
the work was handed over to the contractor,  
M. Max Ferbeck, who completed the chimney  
in twelve days with a workman and a  
labourer. Four different shapes of hooklike  
radial bricks in five sizes were employed, the  
bricks locking into each other two ways with  
their hooks. The mortar used was partly  
ordinary mortar, partly mortar mixed with  
cement; the pointing was done with cement  
mortar. The shaft was constructed without  
outside scaffolding. The sides of the chimney  
have a thickness of only 13 in. at the bottom  
and not quite 7 in. at the top. The total  
weight of the brickwork is estimated at 60 tons,  
and the total cost was 93s., of which 27s. was  
for freight and duty. It may be doubted  
whether the employment of a chimney base  
of the nature described, the use of different  
kinds of mortar setting at various degrees of  
quickness, and the rapid method of construction  
are to be recommended in building high  
factory chimneys.

**Sale of Properties.**—By direction of Lord  
Rodney will be put up for auction, on the 14th  
instant, at Hereford, the property known as  
Berrington, near to Leominster. The Hall is a  
fine mansion, built of stone lined with brick,  
in the Italian style, and stands in a park of about  
350 acres. The rest of the estate, corre-  
sponding to what is known as the "Home of  
the Herefords," includes some twenty-two  
farms, about 4,300 acres of land in all. The  
rental value is estimated at nearly 6,500l. per  
annum. On a later date will be offered also the  
two Yorkshire (North Riding) properties of  
Hilton Manor and the Hall, Sutton-on-the-  
Forest. The latter, consisting of a good old  
red brick house, and 3,600 acres of land, valued  
at 4,100l. a year, is of interest as associated  
with the memory of Sterne, who was for a  
while vicar of the parish. The parish, situated  
eight miles north from York, lies within the  
ancient Galtres forest. Hilton, between Yarm  
and Stokesley is a former residence of the  
Earl of Burlington and the Duke of Devon-  
shire. The estate, watered by the Leven,  
comprises the whole parish of 1,360 acres, and  
yields a rental of 2,000l. a year. The advow-  
son of the living, worth 140l. per annum, goes  
with the freehold.

**A New Building Estate at Lowestoft.**—  
A property designated the Kirkley Cliff Estate,  
at South Lowestoft, has recently been laid out  
for building upon, and last week the first  
portion of the property, containing fifty-six  
plots, was offered for sale in a marquee erected  
on the estate by Mr. A. G. Noddy. Several of  
the plots submitted, having frontages to the sea  
of 20 ft., and depths of 135 ft., were sold at  
from 60l. to 700l. each, two corner plots of  
larger dimensions being sold for 150l. and 80l.  
each. The sale also included several marine resi-  
dences, and a number of shops and dwelling-  
houses erected on the estate by Messrs. Lucas  
Bros. of London. The marine residences, seven  
in number, on Cliff-terrace, facing the sea, said  
to be let at rentals of 75l. and 80l. per  
annum, were sold for 1,500l. each, two other  
villas realising 800l. and 500l. respectively.  
Eight residences, designated Kirkley Cottages,  
were sold at prices varying from 300l. to 860l.  
each, whilst fifteen shops and dwelling-houses  
realised 420l. and 450l. each. The total  
proceeds of the sale amounted to upwards of  
19,000l.

**New Museum at Brussels.**—The city of  
Brussels has acquired a new museum building  
by the reconstruction of the handsome Maison  
du Roi, on the Grande Place. The museum  
contains a vastly valuable collection of civic  
paintings and other *objets d'art* of the same  
nature, acquired by the city from time to  
time.

**The Increasing Use of Cement in  
Germany.**—The *Sprechsaal* remarks that  
scarcely any German industry has made such  
progress within the last twenty years as the  
manufacture of Portland cement. Not only  
have cement tests and kindred topics been dis-  
cussed in trade journals from all points of view,  
but each factory has been trying to increase its  
output. With increased production comes the  
necessity for an extended sale, and thus  
attempts have been made to use cement for the  
entire construction of work in which it normally  
is only used as a binding agent. It is, however,  
urged that no substances are more liable to be  
affected by atmospheric influences than cement  
and cement concrete; and, moreover, that no  
other building materials are more dependent upon  
the conscientiousness of the contractor, sand  
and small stones being cheap and cement dear.  
About the end of 1885 the Prussian Govern-  
ment issued regulations enjoining as restricted  
use as possible of cement for elevated building  
purposes. This measure seems, however, to  
have had but little practical result. While  
defects in ordinary masonry can be seen during  
the period of construction or before the com-  
pletion of a building, such is not the case with  
cement work. A single cask of insufficiently  
binding cement may bring about the destruc-  
tion of an important structure, various in-  
stances being adduced in support of these  
assertions. The most serious point in con-  
nexion with this question is considered to be  
the use of cement concrete for purposes of  
drainage, special danger arising from the de-  
structive acids and alkaline influences to which  
such work is necessarily subjected. The favour-  
able reports which have from time to time been  
circulated as to the satisfactory results obtained  
in such cases by the use of cement are considered  
by the *Sprechsaal* to demand a searching in-  
vestigation, it being considered that the work is,  
in many cases, too new to allow of its merits  
being decided upon the basis of present expe-  
rience. This article has given room to some  
interesting controversy in German technical  
circles, the importance of the interests ranged  
on each side of the question giving a practical  
force to the discussion.

**Protection of Theatres from Fire.**—  
Since the burning of the Opéra Comique, French  
and German technical journals have been  
largely discussing the best means to be adopted  
for preventing the spread of fire in theatres,  
and some of the suggestions set forth may be  
of interest and value in view of the terrible  
catastrophe at Exeter. Thus most of the  
French journals advocate the compulsory in-  
troduction of electric light in theatres, and that  
the scenery, &c., be made of fireproof materials,  
whilst one, the well-known *Génie Civil*, recom-  
mends the adoption of flock silk instead of  
canvas for the scenery. This material, the  
journals say, is somewhat more expensive than  
canvas, but possesses in return the advantage  
of being more durable and burning slower,  
almost like tinder. It further states that the  
Theatrical Committee appointed in Paris after  
the Opéra Comique catastrophe applied to a  
Dr. Gehring, an engineer, and mayor of  
Landshut, inviting him to furnish particulars  
of the theatrical scenery invented by him and  
patented some years ago. Dr. Gehring's  
scenery is made of metallic and semi-metallic  
wire netting, which may be painted on with the  
same facility as canvas, whilst being incom-  
bustible. Even under the greatest heat the  
material only glows and becomes charred. The  
Committee has since decided upon recommending  
the material for the scenery at the new Opéra  
Comique. The journal further draws attention  
to the automatic extinguishing apparatus  
adopted in certain American theatres, consisting  
of a great cistern of water, from the bottom of  
which pipes run in various directions. The  
latter are closed at the other end by means of a  
composition consisting of lead, tin, and bismuth,  
which melts at a temperature of 75°C., whereby  
water is immediately poured down in torrents  
on the place on fire. At the same time an  
automatic alarm bell warns the attendants of  
the danger threatening.

**M. Hugo Birger.**—The death is announced,  
at the early age of thirty-seven, of the cele-  
brated Swedish painter, M. Hugo Birger.  
Having studied at the Academy of Arts in  
Stockholm, he gained, in 1877, the Royal Gold  
Medal for his painting, "The Fall of Adam."  
Since then Birger studied in France and Spain,  
where he produced a number of works, which  
realised large sums in his native country.



**Hygienic Investigation in Stockholm.**

An article in the last reports of the Hygienic Board of the city of Stockholm contains a paper by Herr K. Sonden on a series of researches carried out last year on the purity and temperature of the air in a number of public buildings in that city, particularly where the electric light has superseded gas, which are highly interesting. In all twenty buildings were visited, —some two, three, or four times,—the method adopted in the research being the so-called Pettenkorf, a method whereby the purity of the air is determined by the amount of carbonic acid it contains. Beginning with the theatres, we find that in the Royal Grand Theatre, on the electric light being partially introduced instead of gas, there was a great improvement of the air both as regards purity and temperature, although the improvement was not so complete as in other theatres examined, as, for instance, the Court Theatre of Munich, where the electric light has entirely superseded gas. In the Dramatic Theatre, too, great improvement appears manifest since the gas-burners in the building were reconstructed so as to promote ventilation instead of, as before, increasing the volume of carbonic acid and raise the temperature. Thus, whilst four years ago, five per cent. of carbonic acid was not unusual with a temperature of about 30° C., the greatest amount noted last year was only 2.6 per cent., and the highest temperature 24° C. In the New Theatre, on the other hand, where a similar system of gas-lighting has also been introduced, and where, moreover, there is an air-fan, no improvement of the air has been effected, a result which the analysts cannot as yet explain, although they ascribe it to a bad circulation of air. However, of all the Stockholm theatres, the so-called Southern Theatre was found the worst, the amount of carbonic acid in the air on the second tier rising sometimes to six per mille, and the temperature to 30° C. This theatre is, however, situated in a part of Stockholm where the hygienic arrangements are very inferior. Turning to the churches and lecture-room, we find that in one of the former, during a meeting of the Salvation Army, the amount of carbonic acid rose to 6.22 per cent. In another church during evening service, the carbonic acid rose to 5.41 per cent., with a temperature of 24.8° C. In the Klara Church, the principal church in Stockholm, an analysis was made when the church was crowded, showing that whilst the temperature only varied from 16.3° at the beginning of the service to 19.5° at the end, the amount of carbonic acid rose from 1.75 to 5.7 per cent. Of other buildings examined may be mentioned one at the lecture-hall in a public college, where the amount of carbonic acid in the air at the close of the lecture was 2 per cent., and one of the superior courts, where it was 6.25 per cent. The researches in factories, &c., embraced three snuff and tobacco manufactories, and seven printing-offices, and in the former the air was naturally greatly mixed with tobacco dust, whilst in one snuff factory every cubic metre of air contained half a gramme of fine snuff. In another tobacco manufactory, where the electric light had everywhere superseded gas, the amount of carbonic acid in the so-called rolling-room was, nevertheless, from 4 to 5.3 per cent. In some of the printing-offices the air was very bad, in one containing over 5.41 per cent., but in another, that of the *Stockholm Daily Journal*, it was only 0.5 per cent., viz., almost pure. It was found that where good ventilators had been introduced the improvement of the air was very marked. It is intended to continue these researches, as the Hygienic Board is of opinion that they will greatly tend to improve the sanitary condition of buildings where large numbers of people are occupied.

**Codnor Sewerage.**—A meeting of the ratepayers of this Derbyshire district was held on the 5th, to consider a scheme of sewerage submitted by Mr. W. H. Radford, C.E., of Nottingham, as an alternative to one previously drawn out by the Surveyor to the Basford Guardians, who are the Authority in the district. The ratepayers approved Mr. Radford's scheme as the cheapest and most efficient in their opinion: cost of works, 3,900l. The Basford Guardians, last Tuesday decided to send the two schemes to the Local Government Board, accompanied by an intimation that the local vestry preferred Mr. Radford's, and asking them to choose the best scheme.

**The Russian Portland Cement Trade.**

An article in the *Journal du Céramiste et du Chauxfournier* quotes a statement of the French Consul at Moscow that English, German, and Swedish cements are imported in relatively large quantities into Northern and Central Russia. Stettin cement is in special demand, and the Swedish mark, "three crowns," from Lomma, in the province of Skanska, is largely sold. English Portland cement sells at a price about equal to 3s. 1d. to 3s. 4d. per cwt. gross; the duty forming about a quarter of the price (10½d. per cwt.). German and Swedish cements range from 3 per cent. to 5 per cent. below the price of the English article. Russian cement is considered superior to English in quality. Government contracts stipulating its exclusive use. The principal markets for the sale of imported cement are St. Petersburg and Riga. Importation at the latter point has, however, sensibly diminished. At Moscow, the consumption of foreign cement is limited, on account of the competition of factories situated in the industrial district of the city. Amongst the principal Russian factories are the following:—

	Annual production.
	Barrels.
1. Company succeeding O. C. Schmidt, Riga...	120,000
2. Cement Company, Podolsk .....	80,000
3. Cement Company, Port Kund, Veenberg...	55,000
4. H. Liphart & Co., Moscow at the Tsinzora .....	20,000
5. Stanislas Cjchanorsky, Grodzetz (Poland) ..	60,000

By the Customs returns it would seem that the total imports in 1885 were 46,814 tons, against 53,289 tons in the preceding year.

**Extensive Building Operations in Hamburg.**—It is now four years ago, says a Hamburg journal, since the extensive building operations necessitated by this city joining the German Customs Bund were commenced, when, in order to provide sufficient space for the free trade harbour on one side and the duty dock on the other, some 20,000 inhabitants had to quit their dwellings. This great revolution took place in the old part of the town. From the returns now furnished for the four years to the end of 1886, it appears that a sum of 5,300,000l. has been expended in this undertaking, of which the German Empire pays 2,000,000l., extended over five years. Of the above-mentioned sum 3,350,000l. have been expended in erecting new buildings, and 200,000l. as interest on loans, making a total of 3,550,000l. The greatest outlay appears to have been in purchase of ground, under which item a sum of 2,000,000l. was expended on the Hamburg side of the Elbe alone. On the other hand, it may be mentioned that the "golden times" anticipated four years ago by our building speculators, artisans, and workmen have failed to put in an appearance, a circumstance which may be ascribed to the severe competition offered from beyond the city, the great influx of workmen from Silesia, Poland, and even Italy,—the latter working for a minimum of wages, though being excellent and reliable workmen,—and the means of transport becoming every day easier, which have the effect of lowering the price of labour as well as material. A large number of houses have been sold below their cost. For excavations and foundation work almost only foreign labourers were employed, chiefly Italians, their Hamburg confrères showing a decided objection to hard work.

**Folding Steel Gates and Shutters.**—These, which are patented by the "Bostwick Folding Steel Gate and Shutter Co.," consist of steel shutters with the vertical bars connected by two or three series of short bars arranged trolis-wise, working on centres at the point where they intersect each other and the vertical bar, but with the ends of the cross pieces working loose in channels in the vertical bars. By this arrangement it is possible to push the whole of the vertical bars close up together, into a space of a few inches, and if necessary the whole, when closed up, can be further turned round on a hinge and lie against the window or door jamb, like an ordinary shutter. Among the advantages are security combined with ventilation, as the shutter can be drawn out and locked across a door or window without obstructing air or much light. The straight backwards and forwards motion in one plane, in closing up or pulling out the shutter, is a convenience, as the shutter does not interfere with curtains or blinds in process of being closed. The invention seems likely to be a useful one.

**Malthouse, Cardiff.**

A large malthouse now being completed for the Cardiff Malt Company, on the East Moors, Cardiff, contains four growing-floors, 110 ft. long 50 ft. wide, and two double-floor kilns, 35 ft. by 31 ft. The building is designed to work on the improved system introduced by Mr. Stopes, the well-known maltsters' engineer, London. The ground, first, second, and third floors, are to be used as growing floors; the fourth floor as a barley-loft, and the roof a malt-store, containing 30,000 cubic feet storage space, besides a 10-ft. wide gangway running down the middle, the bays at each end being used for screening-loft, store-tank, &c. In the barley-loft is placed a 6 h.p. Griffin patent gas engine, and the shafting for driving a hand-conveyor in the roof, elevators, sack-hoists. Four of Free's patent conical bottomed steeping cisterns are also in the loft, and between each pair is a small elevator for raising barley into the loft above, where it passes over screens into the steeping-tanks. Under these tanks are trap-doors in all the floors, whereby the steeped grain can be let to grow on any floor at the kilns contains 2 furnaces, coal-store, &c.; also an office for the manager, a mess-room for the men, lavatories, &c. The floor above is a malt-store, containing 15,000 cubic feet of storage space, and over this again is the top of the furnace shaft, a hot-air dispersing chamber. Above this, at level with the top growing floor, is the low drying floor, of Fison's perforated tiles; at level with the barley loft is the upper drying floor, of Hermann's patent wedge-shaped wood. No cowl is fixed on the outlets above, which are left open, except for pyramidal roofs supported on posts, to keep the rain from entering the kilns. The upper kiln floors are loaded by an elevator, and emptied by openings communicating with the lower kiln-floors. Thence the malt can either be passed through spouts into the malt-store beneath, or raised by another elevator to the hand-conveyor in the roof, by which it can be delivered over screens into the bins. The building is very substantially erected in brickwork, faced with red Penned bricks. The floors throughout are of concrete, supported on rolled iron joists and cast-iron stanchions. The roof is arranged with a special view to storing malt, and is lined inside and out with boarding. Upon the outside boarding is laid tarred felt, and upon that the battens and slates. The steeping-tanks are supplied and fixed by Messrs. Goddard & Massey, of Nottingham; the kiln-floors by Messrs. Stopes & Co., of London; the machinery and gas-engine by Messrs. Spencer & Co., of Melksham; the architect's advising engineers being Mr. J. Gillett, of Penarth; the gas and water services by Messrs. Cross Bros., of Cardiff; the iron construction by Messrs. Williams & Sons, of Cardiff, under the general contractors, Messrs. Shepherd & Son, of Cardiff. The architect is Mr. F. Baldwin, 17, Church Street, Cardiff; and the clerk of work's duties have been very efficiently discharged by Mr. David Owen.

**Discovery of Sculpture by Thorwaldsen.**—During the recent repairing of a house at Neuerwall (in Hamburg), one of the most important business quarters of the town, two original works of art by Thorwaldsen have been discovered. The former owner of the house, Herr Hartzen, a dealer in artistic objects, was a friend of the famous Danish sculptor, and when the former, after the destruction of Hamburg by fire some forty years ago, rebuilt his house, Thorwaldsen presented him with four *hauts-reliefs*, representing the arts of painting, sculpture, architecture, and music, for the purpose of ornamenting the front of the building. Time and weather have, however, destroyed the two former, but the discovery of the latter has saved them from destruction, their restoration having now been taken in hand. There cannot, from the facts stated, be the slightest doubt as to the genuineness of these works of art.—*Hamburger Nachrichten*.

**Extension of the Metropolitan Railway.**—A further extension of the Metropolitan Railway was opened on the 1st inst. from Pinner to Kingswood and Rickmansworth for passenger traffic. The line is in course of construction to St. Albans, Aylesbury, Oxford, &c. The company intend, it is said (in the daily papers), to extend their system as far as Birmingham. Can this possibly be true? If so, the company will require re-naming.



**Strike of Joiners at Elswick.**—On the 1st inst. about 200 joiners employed at the Elswick Shipyard of Messrs. Armstrong, Mitchell, & Co. came out on strike in consequence of a dispute as to the carpentering and joining work, the carpenters receiving a week more than the joiners.

**"New Premises in the Haymarket."**—With reference to these premises, described and illustrated in our last, we are asked to mention that all the stoves, chimney-pieces in marble and American walnut, as also the tile-hearths, &c., were supplied by Mr. N. Maurice, of Tremar-road, Tottenham.

**Exhibition of Painting and Sculpture at Brussels.**—On the 1st inst. the king, accompanied by the Count of Flanders and Prince Baudouin, opened an exhibition of painting and sculpture in the galleries formerly occupied by old pictures. It will remain open until Nov. 1.

#### PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. .... ton	5 10 0	7 10 0
Oak, B.I. .... load	8 10 0	13 0 0
Logan, U.S. .... foot cube	0 2 3	0 3 0
Sh. Canada .... load	3 0 0	4 10 0
Redwood, U.S. .... foot cube	0 2 0	0 10 0
Im. ....	3 10 0	4 10 0
Ir. Dantio, &c. ....	1 10 0	4 0 0
Al. ....	2 10 0	4 10 0
Canada, 1st yellow ....	2 0 0	3 10 0
Canada, 2nd yellow ....	2 0 0	4 0 0
Canada, 3rd yellow ....	2 0 0	4 0 0
Canada, 4th yellow ....	2 0 0	4 0 0
Canada, 5th yellow ....	2 0 0	4 0 0
Canada, 6th yellow ....	2 0 0	4 0 0
Canada, 7th yellow ....	2 0 0	4 0 0
Canada, 8th yellow ....	2 0 0	4 0 0
Canada, 9th yellow ....	2 0 0	4 0 0
Canada, 10th yellow ....	2 0 0	4 0 0
Canada, 11th yellow ....	2 0 0	4 0 0
Canada, 12th yellow ....	2 0 0	4 0 0
Canada, 13th yellow ....	2 0 0	4 0 0
Canada, 14th yellow ....	2 0 0	4 0 0
Canada, 15th yellow ....	2 0 0	4 0 0
Canada, 16th yellow ....	2 0 0	4 0 0
Canada, 17th yellow ....	2 0 0	4 0 0
Canada, 18th yellow ....	2 0 0	4 0 0
Canada, 19th yellow ....	2 0 0	4 0 0
Canada, 20th yellow ....	2 0 0	4 0 0
Canada, 21st yellow ....	2 0 0	4 0 0
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Canada, 28th yellow ....	2 0 0	4 0 0
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Canada, 31st yellow ....	2 0 0	4 0 0
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Canada, 81st yellow ....	2 0 0	4 0 0
Canada, 82nd yellow ....	2 0 0	4 0 0
Canada, 83rd yellow ....	2 0 0	4 0 0
Canada, 84th yellow ....	2 0 0	4 0 0
Canada, 85th yellow ....	2 0 0	4 0 0
Canada, 86th yellow ....	2 0 0	4 0 0
Canada, 87th yellow ....	2 0 0	4 0 0
Canada, 88th yellow ....	2 0 0	4 0 0
Canada, 89th yellow ....	2 0 0	4 0 0
Canada, 90th yellow ....	2 0 0	4 0 0
Canada, 91st yellow ....	2 0 0	4 0 0
Canada, 92nd yellow ....	2 0 0	4 0 0
Canada, 93rd yellow ....	2 0 0	4 0 0
Canada, 94th yellow ....	2 0 0	4 0 0
Canada, 95th yellow ....	2 0 0	4 0 0
Canada, 96th yellow ....	2 0 0	4 0 0
Canada, 97th yellow ....	2 0 0	4 0 0
Canada, 98th yellow ....	2 0 0	4 0 0
Canada, 99th yellow ....	2 0 0	4 0 0
Canada, 100th yellow ....	2 0 0	4 0 0

TIMBER (continued).	£. s. d.	£. s. d.
New Brunswick, sq. ....	5 0 0	6 10 0
Battens, all kinds ....	4 0 0	10 10 0
Flooring Boards, sq., 1 in. prepared, First ....	0 8 0	0 11 0
Second ....	0 6 0	0 7 6
Other qualities ....	0 4 0	0 6 0
Cedar, Cuba .... foot	0 0 3	0 0 3
Honduras, &c. ....	0 0 3	0 0 3
Australia ....	0 0 3	0 0 3
Mahogany, Cuba ....	0 0 4	0 0 6
St. Domingo, cargo average ....	0 0 4	0 0 5
Mexican ....	0 0 3	0 0 3
Tobacco ....	0 0 3	0 0 5
Honduras ....	0 0 3	0 0 5
Maple, Bird's-eye ....	0 0 5	0 0 7
Rose, Rio ....	8 0 0	11 0 0
Bahia ....	7 0 0	9 0 0
Box, Turkey ....	5 0 0	12 0 0
Satin, St. Domingo .... foot	0 0 5	0 0 9
Porto Rico ....	0 0 6	0 0 10
Walnut, Italian ....	0 0 3	0 0 5

METALS.	£. s. d.	£. s. d.
Iron—Bar, Welsh, in London .... ton	4 7 6	4 15 0
do. in Wales ....	4 2 6	4 7 6
Staffordshire, London ....	5 10 0	6 0 0
COPPER—		
British, cake and ingot .... ton	43 10 0	44 0 0
Best selected ....	44 10 0	45 10 0
Sheets, strong ....	50 0 0	0 0 0
Chili, bars ....	40 0 0	40 10 0
LEAD—		
Pig, Spanish .... ton	12 1 3	0 0 0
English, common brands ....	12 5 0	12 7 6
Sheet, English ....	13 8 0	0 0 0
SPECIAL—		
Kiln, special .... ton	15 0 0	15 2 6
Ordinary brands ....	14 17 6	0 0 0
TIN—		
Swedish .... ton	102 10 0	0 0 0
Australian ....	103 5 0	0 0 0
English ingots ....	106 10 0	0 0 0

OILS.	£. s. d.	£. s. d.
Linseed .... ton	20 10 0	20 15 0
Cocconut, Cochin ....	30 0 0	33 0 0
Ceylon ....	23 15 6	21 0 0
Palm, Langk ....	22 10 0	0 0 0
Rapeseed, English pale ....	24 0 0	24 5 0
do. brown ....	22 15 0	0 0 0
Cottonseed, refined ....	20 15 0	21 0 0
Tallow and Oleine ....	25 0 0	45 0 0
Lubricating, U.S. ....	5 0 0	6 0 0
do. refined ....	5 0 0	13 0 0
TURPENTINE—		
American, in casks .... cwt.	1 5 3	0 0 0
TAR—		
Stockholm .... barrel	0 14 0	0 14 8
Archangel ....	0 9 6	0 9 9

#### CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

##### CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
oad Materials ....	Bromley Local Board .....	Official .....	Sept. 13th .....	ii.
roken Granite and Granite Curb .....	East Ham Local Board .....	W. H. Savage .....	do. ....	ii.
sking-down and Rebuilding Bridge .....	Kent Justices .....	F. W. Ruck .....	Sept. 14th .....	ii.
oad Materials .....	S. Hornsey Local Board .....	K. Fry .....	do. ....	x.
emoval of Dust and House Refuse .....	do. ....	do. ....	do. ....	do.
rection of Station Buildings, Gospel Oak .....	Midland Railway Co. ....	A. A. Langley .....	Sept. 16th .....	ii.
ilitary Shed, &c. ....	Leicester Corporation .....	J. Gordon .....	do. ....	ii.
rection of the Railway, Stratford .....	do. ....	S. Monson, Junr. ....	Sept. 16th .....	x.
ine-Drain Connectors .....	Finchley Local Board .....	G. W. Brunell .....	Sept. 18th .....	x.
oundations of Proposed Buildings .....	The Imperial Institute .....	T. B. Colcutt .....	do. ....	x.
ewage Works .....	Burham Local Board .....	J. H. Palmer .....	Sept. 20th .....	ii.
erching, Metalling and Channelling Works .....	Levensham Rd. of Wks. ....	Official .....	do. ....	ii.
oad-making and Paving Works .....	Fulham Vestry .....	do. ....	Sept. 21st .....	x.
ewering and Making-up Roads, &c. ....	Hendon Local Board .....	S. S. Grimley .....	Sept. 23rd .....	x.
Water Fittings .....	Mortley Corporation .....	Official .....	Sept. 26th .....	x.
ores and Materials .....	Great Western Ry. Co. ....	do. ....	October 3rd .....	x.
leaning, &c., Margin of Pond, Peckham .....	Met. Board of Works .....	do. ....	October 4th .....	x.
ouses and Shops, Homerton .....	do. ....	R. Stapleton .....	Not stated .....	x.

##### PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Assistant Surveyor of Buildings .....	Civil Service Com. ....	Not stated .....	Sept. 27th .....	xiv.
Draughtsman and Assistant Surveyors .....	do. ....	do. ....	do. ....	xiv.

##### TENDERS

ACTON.—For the erection of the first portion of the proposed Church of St. Alban the Martyr, Acton Green, London, Mr. Edward Monson, Junr., A.R.I.B.A., architect, J. Dorcy, Brentford (accepted) ..... £3,650 0 0	BARNET.—For alterations at Lyonsdown, Barnet. Mr. A. Allen, architect:— Danton ..... £1,965 0 0 Ellwood ..... 1,798 0 0 Wilkins ..... 1,565 0 0 Marriott Bros. .... 1,650 0 0 Ansell ..... 1,550 0 0 Mott ..... 1,491 0 0 Noble ..... 1,472 0 0 Harris ..... 1,247 0 0 Richardson ..... 1,221 0 0	BERMONDSEY.—For the erection of new shop on forecourt, and sundry alterations and repairs to house and shop, No. 234, Southwark Park-road, for Mr. Jacks. Mr. Edward Crose, architect, 33, Bermondsey-square:— A. White & Co., Rotherhithe ..... £195 0 0 J. Almond, Bermondsey ..... 185 0 0 G. Smithers, Bermondsey (accepted) ..... 180 0 0	BERMONDSEY.—For rebuilding two back additions and underpinning walls and piers, and new water supplies, to Nos. 46 and 48, Camilla-road, for Mr. H. Hankin. Mr. Edward Crose, architect:— A. White & Co., Rotherhithe ..... £196 0 0 G. Smithers, Bermondsey ..... 187 0 0 J. Almond, Bermondsey (accepted) ..... 185 10 0
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**BLACKHEATH.**—For alterations and decorations at St. John's Church, Blackheath, Kent. Messrs. Drury & Lovejoy, architects, Bucklebury:—  
H. L. Holloway ..... £598 0 0  
G. F. Havell ..... 650 0 0  
Smith & Son (accepted) ..... 474 0 0

**BROMLEY (Kent).**—For alterations and additions at 147 and 148, High-street, Bromley, for Mr. George Pyke. Mr. G. S. W. Tappen, architect. Quantities by Messrs. Duffield & Player, High-street, Bromley, Kent:—  
J. Crossley ..... £740 0 0  
Arnaud ..... 672 0 0  
D. Payne ..... 676 0 0  
J. Maddington, Sydenham ..... 619 0 0  
W. A. Grubb (accepted) ..... 675 0 0  
[All of Bromley.]

**BROOKE (I.W.).**—For making a new road at Brooke, I.W., for the Royal National Lifeboat Institution. Mr. J. E. Haynes, surveyor:—  
J. Kingwill (accepted) ..... £135 0 0

**BROOKE (I.W.).**—For making a new road, at Brooke, I.W., for the Highway Commissioners. Mr. J. E. Haynes, surveyor:—  
F. Coker ..... £135 0 0  
J. Kingwill (accepted) ..... 122 0 0

**CHELSEA.**—For works at 269, King's-road, for Mr. Lockyer. Mr. H. W. Budd, architect, 76, Vincent-square:—  
Alterations ..... £95 0 0  
Frestige & Co. (accepted) ..... 180 0 0  
Shop Fittings, &c. ....

**CHELSEA.**—For the erection of business premises, warehouses, and stabling, at King's-road, Chelsea, for Mr. Chas. Knowles. Mr. W. H. Colbran, architect, 54, Gloucester-road, South Kensington. Quantities by Mr. E. Parker:—  
Higgs & Hill ..... £8,444 0 0  
Martin Wells & Co. .... 6,082 0 0  
Hy. Smith & Son ..... 5,967 0 0  
Holliday & Greenwood ..... 5,887 0 0  
Stimpson & Son ..... 5,886 0 0  
Holloway Bros. .... 5,824 0 0  
Hearn & Co. .... 5,683 0 0  
Lorden & Son ..... 5,495 0 0  
Green & Les ..... 5,385 0 0  
Chas. Wall ..... 5,340 0 0

**CHERTSEY (Surrey).**—For repairs to Cowley Farm and Estate.  
G. Marsh, Woking ..... £162 3 0  
C. Fildes ..... 147 15 0  
H. Brown, Addlestone ..... 143 0 0  
H. G. Nesmyth, Chertsey (accepted) ..... 140 0 0

**CLERKENWELL.**—For Conservative club premises and Hall, Fenton-street, Clerkenwell. Mr. H. C. Leete, surveyor. Quantities supplied:—  
E. C. Howell & Son ..... £3,762 0 0  
G. Stephenson ..... 3,733 0 0  
G. F. Mills ..... 3,657 0 0  
F. R. Turtle ..... 3,699 0 0  
W. & R. Castle ..... 3,440 0 0  
A. G. Aillard ..... 3,410 0 0  
W. L. Kellaway, Clerkenwell ..... 3,388 0 0  
J. Beale, Westminster ..... 3,212 0 0

**DEPTFORD.**—For alterations and additions to Deptford Lower-road Schools, for the School Board for London. Mr. Thos. J. Bailey, architect:—  
W. Smith ..... £4,374 0 0  
J. P. Kealey ..... 4,250 0 0  
B. E. Nightingale ..... 4,167 0 0  
J. & J. Greenwood ..... 4,160 0 0  
W. Downes ..... 4,133 0 0  
C. Cox ..... 4,080 0 0  
Kirk & Randall ..... 3,943 0 0  
W. Johnson ..... 3,873 0 0  
Stimpson & Co. .... 3,770 0 0  
Atherton & Lattis ..... 3,686 0 0  
H. L. Holloway ..... 3,619 0 0

**ENFIELD.**—For alterations and additions to the Pied Bull public-house, Bull's Cross, for Mr. G. Gripper. Messrs. Searle, Halton, & Bowyer, architects, Tottenham:—  
Additions Repairs to New to House, Old part. Stables.  
Patman, Enfield ..... £479 ..... £110 ..... £260  
Porter, Tottenham ..... 395 ..... 87 ..... 227  
Lawrence, Waltham ..... 325 ..... 88 ..... 181

**FOREST GATE.**—For the erection of three shops, with dwellings, situated on premises adjoining the Princess Alice public-house, Romford-road, for Mr. Charles J. Knowles. Mr. James F. Wesley, architect. Quantities by the architect:—  
J. & J. Greenwood ..... £4,140 0 0  
W. Shummar ..... 3,897 0 0  
W. Greger ..... 3,733 0 0  
J. Morter ..... 3,673 0 0  
Harris & Wardrop ..... 3,666 0 0  
M. Gentry ..... 3,550 0 0  
W. Watson ..... 3,520 0 0

**HAVERFORDWEST.**—For the erection of additional class-rooms, dormitories, and other additions and alterations to the Haverfordwest Lloyd's Free Grammar School, for the Governors. Mr. D. Edward Thomas, architect, Haverfordwest. Quantities by the architect:—  
Jenkins Bros., Swansea ..... £3,756 0 0  
W. Summons, Hakin, Milford Haven ..... 3,018 0 0  
Codd & Davies, Haverfordwest ..... 2,558 0 0  
Joseph Lewis, Haverfordwest ..... 2,463 0 0  
Thos. Jenkins, Felcomb, near Haverfordwest (accepted) ..... 2,241 0 0

**KILBURN.**—For completion of block of flats, Priory Park-road, for Mr. John Harris. Quantities supplied by the architect, Mr. Richard D. Hanson, High-road, Kilburn:—  
William Smith ..... £2,995 0 0  
Turtle & Appleton ..... 2,825 0 0  
Marsy & Sons ..... 2,375 0 0  
G. Neal ..... 2,275 0 0  
H. Beckett ..... 2,161 0 0  
J. M. Goodwin ..... 2,110 10 0  
Carlin ..... 2,094 0 0



**LEE (Kent).**—For the erection of a villa residence at Lee-road, Lee, for Mr. W. E. Hill. Mr. A. H. Kersey, architect. Quantities supplied:—  
 Holiday & Greenwood ..... £1,729 0 0  
 R. L. Holloway ..... 1,724 0 0  
 Delby ..... 1,710 0 0  
 Burman & Son ..... 1,654 0 0  
 F. & F. Higgs ..... 1,617 0 0  
 Castle ..... 1,402 0 0

**LEICESTER.**—For new streets and sewers on the Westcotes Estate, Narborough-road, for the Rev. Joseph Harris, Messrs. W. Millican & H. Gibson, surveyors:—  
 Jones & Fitzmaurice, Birmingham £1,820 17 5  
 E. T. Hutchinson, Leicester ..... 1,524 0 0  
 J. Lee, Balby ..... 1,416 0 0  
 J. Smith, Belgrave ..... 1,348 16 2  
 W. Gordon, Nottingham ..... 1,324 16 0  
 B. W. Ward, Whetstone ..... 1,299 12 11  
 J. D. Gibbins, Leicester ..... 1,274 10 0  
 S. & E. Bentley, Leicester ..... 1,226 0 0

**LONDON.**—For alterations and repairs, painting, &c., to the Pitt's Head public-house, corner of Old-street, E.C., for Mr. J. Jay. Mr. Joseph G. Needham, architect, No. 11, Powerscroft-road, Lower Clapton, N.:—  
 King ..... £290 0 0  
 Harrison & Co. .... 254 0 0  
 J. Walker ..... 247 18 0  
 S. W. Hawkins ..... 242 0 0  
 J. Long ..... 240 0 0  
 Watson ..... 227 17 0

**LONDON.**—For the erection of a new club-house at Bettle-street, Commercial-road, for the Rev. Harry Wilson, M.A. Mr. Henry Wilson, architect. Quantities by Mr. Thornicroft:—  
 Dove Bros. .... £1,045 0 0  
 E. Laurence ..... 981 0 0  
 H. L. Holloway (accepted) ..... 969 0 0

**LONDON.**—For alterations and repairs to the Old Cook Tavern, Highbury, for Mr. Richard Baker. Quantities by the architect, Mr. Arthur W. Saville, 99, Strand:—  
 Drew & Cadman ..... £2,885 0 0  
 C. H. & A. Bywaters ..... 2,807 0 0  
 G. B. Williams & Son ..... 2,720 0 0  
 W. Oldrey & Co. .... 2,650 0 0  
 Ward & Lambie ..... 2,641 0 0  
 J. T. Chappell ..... 2,476 0 0  
 Spencer & Co. .... 2,376 0 0

**Peutner's Fittings.**  
 Watts & Co. .... 284 0 0  
 Helling ..... 245 0 0  
 Helling ..... 217 0 0

**LONDON.**—For rebuilding the Goldsmiths' Arms, Bartholomew-cloose. Mr. H. W. Budd, architect, 76, Vincent-square.  
 Bush (accepted) ..... £1,800 0 0

**Peutner, &c.**  
 Moody (accepted) ..... 187 10 0

**Gus Fittings.**  
 Sugg & Co. (accepted) ..... 120 0 0

**LONDON.**—For the erection of a warehouse in Theobald's-road, W.C., for Messrs. A. & H. Rowley. Messrs. Isaacs & Florence, architects:—  
 H. D. Williams ..... £1,676 0 0  
 B. Wire ..... 1,554 0 0  
 Jackson & Todd ..... 1,349 0 0  
 J. A. Taylor ..... 1,340 0 0  
 Wilkinson Bros. .... 1,316 0 0  
 J. Wells & Son (accepted) ..... 1,287 0 0

**MANCHESTER.**—For house for Mr. J. T. Doyle at Kersal, Manchester. Messrs. E. & F. Hewitt, architects, 9, Albert-square, Manchester:—  
 Robert Neill & Sons ..... £1,230 0 0  
 Edward Wood ..... 1,130 0 0  
 Wm. Brown & Son ..... 1,117 0 0  
 Wm. Southern & Sons (accepted) ..... 1,115 0 0  
 Wm. Shaw ..... 1,100 0 0

**PLUMSTEAD.**—For erecting premises for the Royal Arsenal Co-operative Society. Mr. J. O. Cook, architect:—  
 Proctor ..... £2,095 0 0  
 Bishop Bros. .... 2,850 0 0  
 Combs ..... 2,846 0 0  
 Turtle ..... 2,732 0 0  
 F. Johnson ..... 2,695 0 0  
 Sharpe ..... 2,660 0 0  
 R. G. Batley, Old Kent-road\* ..... 2,634 0 0

**PUTNEY.**—For Portland stonework to the elevation of White Lion Hotel, Putney Bridge, for Mr. W. G. Silcock. Mr. Geo. Treacher, architect, 23, Carter-lane:—  
 Herridge (accepted) ..... £475 0 0

**ROEHAMPTON.**—For new drains, manholes, plumbers' work, ventilation, and other improvements, alterations, and additions to Tregeur, Roehampton Park, for Miss Grant Suttie. Mr. Charles Edward Gritton, A.M. Inst. C.E., architect, London:—  
 R. Arvis & Co., Putney Bridge (accepted) ..... £126 0 0

**ROMFORD.**—For new Wesleyan chapel at Romford, Mr. Charles Bell, architect. Quantities by Messrs. Northcroft, Son, & Neighbour:—  
 Staines & Son ..... £3,344 0 0  
 Hoskins ..... 3,323 0 0  
 Higgs & Hill ..... 3,200 0 0  
 Harris & Wardrop ..... 3,079 0 0  
 Hammond ..... 3,030 0 0  
 Green & Lee ..... 3,020 0 0  
 G. Sharg ..... 2,813 0 0  
 J. Allen & Sons (accepted) ..... 2,750 0 0

**STRENEY.**—For making sundry alterations and additions at The Star (formerly) beerhouse, Commercial-road, E., for Mr. H. W. Baxter. Mr. James F. Wesley, architect, 277, Romford-road, Forest Gate:—  
 Heaser ..... £830 0 0  
 Self ..... 537 0 0  
 Lusk ..... 547 0 0  
 Harris & Wardrop ..... 540 0 0  
 Treat Bros. .... 539 0 0  
 Marchant ..... 533 10 0  
 J. H. Johnson ..... 523 0 0  
 Hearle & Son ..... 493 0 0  
 John Walker (accepted) ..... 464 0 0

**STOKE NEWINGTON.**—For additions to the Presbyterian Church, Stoke Newington. Messrs. Potts, Sulman, & Hennings, architects. Quantities by Mr. G. Fleetwood:—  
 Roberts ..... £1,545 0 0  
 Colwell ..... 1,528 0 0  
 Grover & Sons ..... 1,520 0 0  
 Chessum ..... 1,490 0 0  
 Scrivenor ..... 1,480 0 0  
 Nordall ..... 1,445 0 0  
 Mattock Bros. .... 1,354 0 0  
 Oliver ..... 1,347 0 0  
 Dabbs ..... 1,340 0 0  
 Harris & W. Gordon ..... 1,293 0 0  
 J. Allen & Sons (accepted) ..... 1,293 0 0

**STREATHAM.**—For stabling at Streatham, for Sir A. Kirby. Mr. W. T. Hollands, architect, 27, Chancery-lane:—  
 Ling, Deptford ..... £1,500 0 0  
 Redman ..... 1,400 0 0  
 Holloway ..... 1,359 0 0  
 Mason, Streatham ..... 1,293 0 0  
 Deacon, Lord Norwood and Haywards Heath ..... 1,275 0 0

**TULSE HILL.**—For repairs and decorations at Nottingham Cottages, 123, Upper Tulse Hill, for Mr. G. Dormer. Mr. Edward Crosse, architect, 32, Berners'-square:—  
 S. Kippa, Borough ..... £100 9 8  
 F. & H. F. Higgs, Loughboro' Junction 81 0 0  
 Peacock Bros., Tulse Hill (accepted) 89 0 0

**TUNBRIDGE WELLS.**—For building a cottage residence at Hadlow Down, near Tunbridge Wells, for Mr. F. Huggins. Mr. T. Gordon, architect, 3, Courtfield-gardens, S.W. Quantities supplied by Mr. J. Rookwood, 33, Argyll-street, W.:—  
 Moon, Rotherfield (accepted) ..... £1,247 0 0

**WHETSTONE.**—For erecting a Congregational school chapel at Oakleigh Park, Whetstone. Mr. Geo. Baines, 4, Great Winchester-street, E.C., architect:—  
 Pryor ..... £2,972 0 0  
 Jerrard ..... 2,934 0 0  
 H. L. Holloway ..... 2,890 0 0  
 Harris & Wardrop ..... 2,738 0 0  
 H. & H. F. Higgs ..... 2,735 0 0  
 Staines & Son ..... 2,673 0 0  
 Lawrence & Sons ..... 2,672 0 0  
 Neave & Neave ..... 2,635 0 0  
 Holliday & Greenwood ..... 2,590 0 0  
 Grover & Son ..... 2,469 0 0  
 W. Johnson ..... 2,550 0 0  
 J. Gregory & Co. .... 2,487 0 0  
 G. Dobson ..... 2,475 0 0  
 S. J. Scott ..... 2,375 0 0  
 R. G. Batley, Old Kent-road\* ..... 2,372 0 0

**WILLESDEN.**—For repairs, painting, &c., to the chapels at Paddington Cemetery, Willesden. Mr. R. Gadsden, surveyor:—  
 Plumber, Harrow-road ..... £109 0 0  
 Davey & Co., Paddington ..... 78 0 0  
 O'Neil, Paddington ..... 65 0 0  
 John Butcher, Paddington ..... 59 18 4  
 Siggers, Maiden Vale ..... 59 0 0

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# The Builder.

VOL. LIII. No. 2328

SATURDAY, SEPTEMBER 17, 1897.

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### Greek Sepulchral Monuments.



F the minor works of art that ancient Greece has left us, perhaps none have commanded such ready attention or such universal admiration as the large and constantly increasing number of grave reliefs. Their full beauty can only be realised, it is true, at Athens itself, in the large collection in the Central Museum; and still better at the Hagia Sophia, where a number of the best specimens still remain *in situ*, and where the specialist will necessarily study them; but the general public need not wander further (the cellars of) the British Museum, or, if he desire full daylight, he may see in the South Kensington Museum casts of upwards of twenty well-selected instances.

Any one who looks at these reliefs for the first time will be struck, not only by their beauty, but by their extreme simplicity; here, at least, he will think, there can be little difficulty of interpretation,—we are in the presence of no recondite mythology. We have one a citizen with his dog; on another a mother and child; another, a lady with her reticule-box; another, a youth mounted on his horse,—everywhere humanity in its simplest, most natural aspects. If it were so, the present relief would not be needed, except, perhaps, as a copy to call attention to certain special difficulties of execution, and to fix an easily-ascertained chronological sequence. The case is far otherwise; grave archaeological difficulties have arisen on the mature consideration of these apparently simple designs,—difficulties, the solution of which is necessary to their full understanding and realisation, and also, in addition, to their artistic appreciation.

As is well known, it is the intention of the Russian Archaeological Institute to collect together in one vast corpus all the available material, *i.e.*, the whole series of Attic grave reliefs. Till this is done no doubt a number of important parts must remain obscure, but fortunately we need not wait for the completion of this important work to lay down broadly the outlines of interpretation, though these may leave a wide margin for future notation and correction.

If we desire to understand the meaning of the later and finer reliefs (such as 5, 6, 7), we must go back to earlier work (*e.g.*, 1, 3), in which, while the technical dexterity is less, the utterance of thought is clearer and more precise. We have advisedly selected for our

series of illustrations, not in all cases specimens of the greatest beauty, but rather such a series as shall exemplify certain tendencies of thought and developments of tradition. We can, in a brief article, only summarise certain conflicting views, and register what we believe to be the present high-water mark of archaeological opinion. Those who desire a fuller conspectus will do wisely to read two papers on the subject, to both of which we and all who subsequently write on the subject must be deeply indebted:—(1) A paper on "A Sepulchral Relief from Tarentum," in vol. v. of the *Hellenic Journal*, by Professor Percy Gardner, who, in connexion with one particular monument, takes occasion to discuss the interpretation of the whole class to which it belongs; (2) Dr. Furtwängler's introduction to "La Collection Sabouroff,—Sculptures." In these two papers will be found references to the whole previous literature of the subject.



Fig. 1.

We turn to the first of our reliefs (fig. 1), a monument in itself quaint and curious enough to awaken curiosity. This relief is the earliest in style, the finest and the best preserved of a series of similar slabs found in 1877 in the neighbourhood of Sparta, a little to the south of the village of Chrysapha. It once formed part of the Sabouroff collection, and was bought by the Berlin Museum with the rest of the Sabouroff marbles; a cast of a similar relief, but of inferior workmanship, can be seen at South Kensington (cat. 20). The subject is clear enough. Two colossal seated figures are depicted, the front one of which, a man, turns full face and holds a wine-cup of the shape known as a *kantharos*. By his side is seated a woman who draws her veil about her with a gesture of natural modesty very frequent in early Greek art. She wears the peaked shoes of Asia Minor, the man wears sandals. Behind the throne-like chair a

bearded serpent uprears itself. To the seated pair two small figures approach, a man and woman, the man bears a cock and an egg, the woman a flower and a pomegranate; these details are hardly discernible in the small-sized illustration here given, though obvious enough in the original. The technique of this remarkable relief is so peculiar that it is impossible to pass it over in silence, though it is the meaning of the scene depicted that chiefly concerns us. The whole design is worked strictly in profile with the exception of the face of the seated man, which is turned full and which thereby dominates the whole relief. He seems to look not at the figures that approach but at the spectator. Further, and this can be well seen on the South Kensington cast, the design is cut in a succession of flat, superimposed planes, not modelled. It in fact suggests the technique of wood, not of stone. We turn to the interpretation, and first it is important to note the place of finding. The relief was found standing erect on a tumulus composed of earth and stones, and near to it was found a slab inscribed 'Ερμης, "of Hermes." There can be little doubt, therefore, that the enclosure was sacred to the Hermes of the lower world, the Chthonic Hermes. The symbols represented point also to the lower world; the serpent, cock, pomegranate, egg, and the dog and horse, which in certain instances appear, have all to do with the worship of the infernal deities. By what name precisely we are to call the seated couple it would be hard to say. The more mythology is studied the more clear it becomes that gods and goddesses, whose functions were almost exactly identical, were locally worshipped under different names; nay, indeed, that even in the same locality, owing to the importation of other cults, the same god could have two different names. In all parts of Greece we find a divine pair ruling over the lower world: the names of Pluto and Persephone were most widely adopted, but we have also at Eleusis two Chthonic divinities known only under the general terms of "The God" and "The Goddess" (ὁ θεός and ἡ θεά). We have also Zeus Chthonios and Ge Chthonia, and at Athens the cult of Neleus and Basileia; at Hermione we have Klymenos and Chthonia. We must, therefore, leave the precise names of the Chthonic couple undetermined, only being sure that they represent the double power, male and female, that in the lower world, by analogy with the upper, rule humanity.

But we are not at the end of the interpretation. If the relief here represented stood alone, the mythological meaning might suffice; but among the other analogous monuments are some which demand further elucidation. In one, notably, a dog springs



up against the knee of the seated figure, two others are inscribed with the names of mortals, *Τηοδῶς* and *Αριστοδῶς*. Here we can scarcely suppose that deities are represented, and so a fresh perplexity is added. Perhaps if literature did not step in to help us, the right solution could never have been found. The seated figures are, in fact, in one way mortal, in another divine: they represent the *dead heroised*,—ancestors who are figured to let the semblance of gods of the lower world. The Egyptians believed that the soul of the pious man was made in some mysterious way one with Osiris; and the Greek believed his dead ancestor ruled as a very living and real divinity in the world below. Alcestis when she died became "a blessed daimon," powerful to answer prayer. Her tomb was,

"Like the gods  
Honour'd, a veneration to a world  
Of wanderers. Of the wanderers struck thereby,  
Who else had sail'd past in his merchant ship.  
Ay, he shall leave ship, land, long wind his way  
Up to the mountain summit, till there break  
Speech forth, 'So this was she, then, died of old  
To save her husband. Now a deity  
She bends above us. Hail, benignant one!  
Give good!'"



Fig. 2.

Nor was this any special canonisation, the meed of notable virtue; it was the ordinary state of the departed,—conceived of as mysteriously powerful because beyond the sphere of sense. Aristotile says the dead were reckoned as having become more powerful (*κυριώτερον ἢν ζήσαντων*). Plato (*Laws*, xi., 927) says that "the souls of the dead have the power after their death of taking an interest in human affairs," "and therefore, men should have a fear not only of the gods above, but in the second place of the souls of the departed." It would be easy to multiply references of this kind. It is enough if we grasp the fact that the departed ancestor of any family of note became a sort of god, and was worshipped with a cult carefully prescribed and handed down from generation to generation. His tomb became a shrine, to which the pious descendant brought his offering. It was this ancestor worship that gave rise, no doubt, to many a local divinity, and it is this ancestor worship that is represented in the Sparta reliefs. The two tiny figures are the pious descendants who, no doubt, offered the relief with the double purpose of commemorating their ancestors and appeasing those Chthonic deities,—by whatever name they were called,—whose functions were in part shared by the dead man and his wife.

Our next relief (fig. 2) takes us a step further in the same direction; we take it next not

because chronologically it is nearest, but because it illustrates a further development of the same belief. The marble of which the slab is made is Pentelic, but from the style it is presumably the work of a Boeotian sculptor, and it dates about the middle or end of the fourth century B.C. It belongs to a class of monuments not set up over tombs, but dedicated within the precincts of the burying-place. It is, in fact, a memorial tablet offered to the gods of the lower world. Such tablets were either fixed in the wall of the shrine or erected on a pillar. This one, evidently from the form, stood on a pillar, in the way frequently depicted on painted vases.

The analogy with the preceding monument is obvious. We have the heroic couple and the procession of miniature worshippers. The man, however, no longer simply holds a kantharos, he is regularly engaged at a banquet. He lies in Ionian fashion, his wife is seated by his side. A slave boy attends to draw wine from the amphora. Near the couch is a table heaped with the little, conical cakes, probably those which went by the name of "pyramids." Here, again, we have a mingling of the human and the divine, but the human seems to be getting

come to determine the order of priority, it is more likely that this element of the banquet was transferred from heroes to gods than *versus*, at least the custom of *libation*, i.e., pouring wine on the ground, can only have arisen in connexion with Chthonic cults. The tablet we have selected is again only one of a large series,—the same in type, but varying in detail,—and offering in many instances difficulties in the minutiae of interpretation in which we cannot now enter.

So far the two series of monuments we have considered have this common principle as the basis of their designs, that they represent the dead man as he is supposed to be after death, i.e., in heroised form with divine attributes and functions. We may say in passing that the whole this manner of representation is characteristic of the Dorian stock. We now pass to a series of monuments actuated by another motive, i.e., the desire to represent the dead man as he actually was during life, but as we shall see, this class, in the main Ionian, could not be rightly understood without realising the meaning of the other; the more simple, human, and naturalistic of the second series are yet tinged with some flavour of the



Fig. 3.

heroising faith,—the types of the two series act and counteract on each other.

This is admirably seen in the monument selected for our third (fig. 3) illustration. It is the so-called "Leucothea" relief, from the Villa Albani; where it was found is unknown, but it is probably a piece of Attic work. The older school of interpreters, who were keen to scent mythology everywhere, held that it represented Leucothea nursing the infant Dionysos. But certainly no mythological interpretation is needed; it is a human mother, not a goddess, who with large tender hands takes her youngest born upon her knee and holds him,—a charming touch of realism,—at just a little distance that she may the better see the face which to her, at least, is lovely. It is a maid-servant, not a nymph, who waits with the elder children till the mother has looked her fill. Beneath the lady's chair is a work-basket of ancient pattern, for she is thrifty matron as well as loving mother. It is, however, instructive to note that the mother was mistaken for a goddess: she is seated in a chair of regal splendour with arms to it, always a note of dignity, and a foot-stool; if she were to rise to her feet she would overtop the maid-servant by nearly one-half, and though this may be due to the general principle of isoecephalism so carefully observed in the best Greek reliefs, yet it denotes also exalted rank. What, however, is most suggestive for our purpose is to

the upper hand. But for the crown on the reclining hero's head, and the approaching worshippers, the banquet might be that of a mere mortal. The cakes, indeed, have a somewhat sacred air, as this shape of cake is supposed to have been offered to Demeter. It is, in fact, the old story, the mortal conceived of as a god after death; the gods loved feasting, so the dead man when he is a happy daemon will feast at will. Plato (*Laws*, ii., 363) is severe on this widespread and comfortable faith. He says:—"Still grander are the gifts of Heaven which Musaeus and his son Eunolpos offer the just: they take them down into the world below, where they have the Saints lying on couches at a feast, everlastingly drunk, with garlands on their heads: their idea seems to be that an immortality of drunkenness is the highest meed of virtue." We are not concerned here with the morality of this heaven, though no doubt, being a conception perfectly honest and genuine, it was cogent as a motive power. What we have to notice is, that this feast of the beatified is only another evidence of their deification. It was part of the regular worship of certain gods, notably the Dioscuri and Aesculapios, who all of them are of the nature of god-heroes, that a table (*πράντα*) should be spread for them, and a couch prepared for their reclining; then when they had well eaten and well drunk, they were easy to be entreated. It seems probable that if we



compare this relief with the Spartan stela (fig. 1): manifestly they are the same in type, art form; the seated regal figure, the approaching procession; but the severe hieratic ideal of god and worshippers has melted into the humanity of mother, children, and maid; it is the old form touched with a new meaning. This is the history of countless of the loveliest Attic compositions, an old Doric type softened into Ionian grace, an austere dogma transmuted into a human truth. Spoken of as one isolated instance, this may seem fanciful, but we venture to say that the more deeply Greek art is studied the more this traditional element is felt,—this habit of keeping the old form and informing it with a new spirit.



Fig. 4.



Fig. 5.

In a large number of reliefs the purely human element alone appears; thus in our fourth instance (fig. 4) we have the simple figure of a citizen leaning on his staff, a *lektyhos* for his anointing on his wrist, and his dog beside him. There is nothing of the god here. This stela now stands in the Naples Museum, much disregarded, quite unphotographed (except by ourselves), a pure bit of early Greek work among a host of vulgar Græco-Roman reliefs. The modelling of the figure is obviously imperfect, specially in the right arm, but no one will deny that this very simple composition has the charm of a perfect sobriety and serenity. It is surmounted by an akroterion of great beauty. Looking on to the stela in figure 6, we may see how this architectural form of decoration speedily became corrupted by the introduction of a certain degree of naturalism. We may say in passing that these akroteria are of the utmost importance in the classification and dating of the stela, and also of no small interest in connexion with the history of the Ionic and Corinthian capitals, but such questions are beside the purport of the present paper. It may be also suggested that in the dog who so frequently appears on Attic stela we have a sort of echo or reminiscence of the symbolic, sacred dog who appears in the early type forms; not that he has here the smallest symbolic meaning, but that he was part of the traditional stock-in-trade of the grave relief-maker, and therefore apt to appear where he could appropriately be worked in.

Very similar in general conception to the Naples stela is our fifth instance (fig. 5), a monument found at Karystos, in Eubœa, and now in the Berlin Museum. It once formed part of the Sabouroff collection. The most superficial critic will see at once its likeness to the style of the Parthenon marbles, and we have included it, not from any special interest in its interpretation, but for its intrinsic beauty, and because it shows more conclusively than any *à priori* reasoning how widely felt was the influence of Phidias.

Our last two instances have been long, narrow

stela, with one figure only, and such compositions seem to have been much in favour in the early part of the fifth century. They are singularly dignified and singularly unemotional. As a rule, they are purely human in intent, but sometimes, as where a maiden holds a dove, or a youth a cock, it is hard, indeed, to say whether there be not latent some notion of deification. Often, in all probability, the sculptor was as little clear on the matter as we are. We turn, last of all, to two monuments (figs. 6 and 7) both of great beauty, and which open up quite a new field of inquiry.



Fig. 6.

We take first the simpler composition (from a stela in Berlin), fig. 6. We have represented here husband and wife, Menæas and Menekraleia, clasping hands. The form of the letters dates the monument as belonging to the first quarter of the fourth century B.C. The drapery is distinctly post-Pheidian, especially the fold of mantle thrown over the wrist of Menæas. The drapery also of Menekraleia shows that tendency to swirl the folds about the body which is very different from the august but somewhat non-natural schemes of



Fig. 7.

Phidias. In fig. 7 the central notion is the same; husband and wife again clasp hands, but the scene is amplified by the presence of a mourning attendant, and the style is grander and bears more of the stamp of the individual artist. The two principal figures, husband and wife, are inscribed Thraseas of the deme of Perithoidai and Euandria. The head of Thraseas is ideal, but with a touch of portraiture about mouth and nose. He is dressed in the simple himation, leaving the breast exposed; in the original the working of the skin is beautifully executed, both on breast and arm, and the wrinkles of the hand-joints almost overstep the limits of permissible realism. The rendering of the maid-servant's

head and figure are very remarkable. She is a subordinate figure, and yet, by the accident of a traditional composition, she occupies the central position. Fearing that she may distract the spectator's eye the artist has literally only sketched her in, and she has quite the effect of being in a back plane, and yet the face is perfectly expressive and the sorrowful look is obtained by very simple means, by a prominence of the upper lid and a depression of the inner corner of the eye.

What is the action intended? Most people, at first sight, would say the parting of husband and wife, the visible image of the supreme *chiai*. Such was long the current interpretation; but there are obvious difficulties: both husband and wife are dead, their names are conjointly inscribed; further, it is noticeable that in these so-called "parting scenes" all expression of grief is confined to the subordinate figures,—slaves, attendants, and the like. Here, notably, only the maid-servant droops her head in grief, husband and wife look face to face with perfect serenity. Some would argue this is only the ideal calm of the thoroughbred Greek, and, indeed, this point is no doubt one to be considered. Whatever they felt, the Greeks disliked in art a rude exhibition of emotion; but this is not the real clue to the mystery. The scene intended is the *chiai* of meeting, not the *chiai* of farewell, the eternal all-hail of husband and wife. It is doubtful whether, in the best days of Greek taste, a sculptor would have allowed himself to depict on a funeral monument a scene of such vivid suffering as that of the earthly parting; to them, as to us, the supreme fact of life was companionship, and the supreme loss of death parting.

"Here we suffer grief and pain,"

the hymn says, and with a fine transition from the general to the poignant particular

"Here we meet to part again;"

but all that the Greeks felt or that we feel is not met for expression in art of the monumental kind, and they figured, therefore, here again as in the old Spartan stela, what *was to be*, the meeting in Hades: "in their death they were not divided." The slave might mourn; he was left behind, of no account, above or below; but the husband and wife are serene with clasped hands, for love is stronger than death. So it seems to us now in looking at this ancient gravestone, and probably, in fact, what happened was something of this fashion. The wife died, perhaps, first; her image was set up and her name engraved, and they made her seated on a chair after the pattern of the older lower-world goddess, and as the husband knew that he too must follow soon, he bade the sculptor make a gravestone with the two together, only his name was not graven yet awhile. Perhaps they planned it together before her death, and it comforted both their hearts with that strange mixture of faith and sentiment which humanity at all times finds so sustaining. We have to remember, indeed, that with the Greeks in the case of husband and wife love was far more of a social instinct than a romantic sentiment; but of whatever nature that love might be, we have in these gravestones with the clasped hands the image, not of severance, but of marriage for all time.

In conclusion, it is most necessary to guard against the supposition that the two several ways of regarding the dead man on his monument were successive developments. They subsisted side by side,—the one, perhaps, that of the people, the other of the educated few; the one obtaining ultimately on votive commemorative tablets, the other rather on actual sepulchral monuments. We must beware how we tabulate and date the shifting of human conviction, specially before the days when the analysis of sentiment begins. If we could have Socratically questioned the Greek of the fifth century B.C. we should speedily have reduced him to the confession of beliefs logically incompatible,—the fine warp of his reasoned conviction tangled inextricably with a web of materialistic tradition.



## "THE HEALTH OF NATIONS."

**T**HE two volumes recently published under this title are rather difficult to define. The title-page title is given below.\* The outside cover bears the words, "The Health of Nations," in one corner, and "Edwin Chadwick" in another. In the preface Dr. Richardson says that "the author of the works herewith submitted to the public" did him the honour to entrust the publication to his care, leaving the selection and arrangement entirely to his responsibility. The title, "A Review of the Works," suggests that the book is a criticism of Mr. Chadwick's writings by Dr. Richardson. The terms of the preface imply that the book consists of a selection from Mr. Chadwick's writings. It does not appear, however, that either conclusion is correct. The book is really a *résumé*, or what is vulgarly called a "boiling-down," of Mr. Chadwick's writings and opinions upon the various important subjects in relation to sanitary progress and general public well-being with which his name is so indissolubly connected. It takes a little while to find this out, however, when we are put on the wrong scent in two directions at once; and even when we have fairly discovered the principle of the volume, the result is rather confusing. We have a reference to an essay contributed by Mr. Chadwick to the *Westminster Review* of a certain date. The editor, as we suppose we must call him, proceeds to summarise the contents of this essay. The whole chapter is headed "Practice and Progress." The real title of the essay in question was "An Essay on the Means of Insurance against the Casualties of Sickness, Deceit, and Mortality," and this is quoted in the preamble of the chapter. Then commences a summary of its contents, interspersed with remarks by the "editor," under the sub-heading "Social History, 1828"; then a summary of another portion under a second sub-heading, "Practical Men," with which the chapter ends. But the next chapter, headed "The Value of Life," is, we find, on reading it, only another sub-heading of the summary of the same essay. Between this illogical arrangement, and the odd way in which what are apparently Dr. Richardson's own remarks are mixed up with Mr. Chadwick's, it is impossible to say which of them we are to regard as the author, and it requires considerable attention to find out at any particular paragraph whether we are reading Mr. Chadwick's or Dr. Richardson's words: in some places it is entirely doubtful. This method, or want of method, renders the book, well-intentioned as it undoubtedly is, a most confusing and irritating one to read. It would have been far more to the purpose to have reprinted entire some of the most important and typical of Mr. Chadwick's writings, with some historical notes as to the circumstances under which they were written.

The "editor" has, however, so far adopted a method that he does classify his subjects under some main headings. The first volume includes, "Political and Economical" and "Educational and Social"; the second volume is devoted to the sections "Sanitary and Preventive of Disease" and "Prevention of Pauperism and Poverty."

From our point of view the work of Mr. Chadwick as a great sanitary reformer is of the most interest, and it is in connexion with sanitation that he had, perhaps, the greatest reputation with the general public, so that Kingsley many years ago proposed in his "Yeast" (a social and sanitary novel) that he should be celebrated in a kind of modern "Æneid," to be called the "Chadwickiad." It appears, however, that it was in connexion with the subject of life insurance that his thoughts were first turned towards sanitary problems. This was while writing the article we have already referred to for the *Westminster Review*, on "The Means of Insurance." He told Dr. Richardson that in the first part of his work he was merely

interested in the results of the calculations as they came out in reply to the questions he had formulated from general observation and induction. But as the labour progressed there developed what he termed the "sanitary idea," the idea that man could, by getting at first principles and arriving at the causes which affect health, mould life altogether differently, and "beat what hitherto had been accepted as fate."

The earlier fights of Mr. Chadwick in the cause of sanitation took place so long ago that at the present moment his name may be little familiar even to some who are unconsciously following in his steps; and he has, perhaps, had less reputation than most men who have done so much useful work, from his not being specially connected with any one line of work. As Dr. Richardson said in a paper he wrote in the *Social Science Review* five-and-twenty years ago, Mr. Chadwick made laws, but was not in the Legislature; did something for sanitation, but was not a doctor; had a hand in education, but was not a schoolmaster; and Dr. Richardson then prophesied that the future biographer of this man would be at a loss to classify him. It is, perhaps, in kindness to the future biographer that this *résumé* has been brought out. The doctor's own opinion of his hero's work is summed up in the title he has chosen for his book,—"The Health of Nations," selected inasmuch as there was nothing advanced in Mr. Chadwick's writings which did not bear on the happiness and well-being of the people. That is true; and, perhaps, the best definition of Mr. Chadwick's part in modern life would be to say that he was a great social and sanitary reformer.

The greater portion of that section of the book in vol. ii., which deals with sanitation and the state of dwellings, is extracted from the Report on the Sanitary Condition of the Labouring Classes of Great Britain, prepared by Mr. Chadwick as Secretary to the Commission of Inquiry, appointed in 1839, as to the causes of disease among the labouring classes of the metropolis and in other parts of the kingdom. Dr. Richardson extracts many chapters, in his own confused fashion, out of this Report, and it is singular to observe how very modern some of the remarks, made not far from fifty years ago, appear even at the present moment; in other words, how much the writer was in advance of the general knowledge and perceptions of his own day. Most of the propositions which have now passed into articles of sanitary faith are found stated here; and occasionally, on the other hand, we are struck by remarks in regard to the circumstances which originate disease, which remind us that this was half a century ago, and that proceedings now universally condemned were then the ordinary every-day way of doing things. The following passage is at least satisfactory as an indication that we have made some progress:—

"The sewerage of the metropolis, though it is a frequent subject of boast to those who have not examined its operations or effects, will be found to be a vast monument of defective administration, of lavish expenditure, and extremely defective execution. The general defect of these works is, that they are so constructed as to accumulate deposits within them; and the accumulations remain for years, and are at last only removed at a great expense and in an offensive manner by hand labour and cartage. The effect is to generate and retain in large quantities before the houses the gases which it is the object of cleansing to remove. . . . It may be mentioned as another instance of the absence of appropriate knowledge that has governed these structural arrangements that a large proportion of the most expensive sewers are constructed with flat bottoms. In proportion as the water is spread the flow is impeded, and the deposit of matter it may hold in suspension increased."

It is curious to read this now. One would have imagined that, apart from anything that could be called scientific study of the subject, ordinary observation and common sense might have warned men against flat-bottomed drains for a drainage carrying solids in suspension. But so it is; a thing is obvious to one generation which was quite overlooked by the preceding one; and that many facts in regard to drainage are obvious to every one now is in a great measure to be attributed to the influence

of the man to whom they were equally obvious fifty years ago.

The further chapters in this section of the subject deal with the condition of "Streets and Pavings," next "Water and Health," in the course of which, by the way, is the record of the fact that at one time there were three different water companies passing through the same streets of a considerable portion of London and competing with each other; of course, with threefold mains and so many separate systems of service pipes. The chapter on Land Drainage and Health is an admirable one, and we quite concur in Dr. Richardson's remark as to the simplicity and force with which the points are brought before the reader. "Ventilation and Work" includes a description of a tailor's work-room at that period, from which there is little doubt Kingsley took his description in "Alton Locke." "Overcrowding in Private Houses," "Medical Officers of Health," "Common Lodging Houses," and "Sanitary Dwellings for the Wage Classes" are among other branches of the subject which were treated of, and which form chapters in the present work. In the last-named chapter is a significant fact which might have its practical application now. In certain emigrant ships there were very bad sanitary conditions and very high death-rates till it was determined to contract with the owners not for the number shipped, but for the number landed alive and well at the end of the voyage. The effect was most striking; the shippers improved their sanitary appliances, and engaged officers of health to take care of the passengers, paying them also "by results." By these contracts we ensured to every poor passenger affectionate attendance, and at least one sincere mourner if anything happened to him." The result was the lowering of the death-rate by one-half. "A War-ship's Worth of Sanitation," a consideration of what could be done with the cost of one first-class man-of-war towards improving public sanitary conditions, is another point in this portion of the work. The chapter on the disposal of the dead is of interest; and in connexion with this subject it is worth while to mention a letter from Carlyle to Mr. Chadwick, in 1850, in which the Chelsea philosopher states, in his own characteristic manner, his long-felt approval of cremation as the most rational means of disposal of the dead.

The book, unsatisfactory as it is in form, should be read through by those who are interested in the subjects of which it treats, as giving information as to the history of a very important branch of modern progress, and of the part played by one determined and practical man in promoting it. Dr. Richardson admits that his friend evinced neither oratorical nor literary gifts in his statements of his theses by word or by pen; but he impressed you as a writer who always had carefully prepared facts behind him to justify all his conclusions; and of his determined attitude in pressing his convictions a dramatic idea is conveyed in a quotation from a semi-humorous article in the *Daily News* of August 9, 1846, referring to his evidence before the Poor Law Commissioners:—"Chadwick stands alone, dark and terrible as Milton's hero, confronting the whole three Commissioners, who are waxing more and more vehement," the evidence not being to their minds. And, indeed, Mr. Chadwick has never been one to incline to that time-honoured Governmental request, "Prophecy unto us smooth things, prophecy deceits." He may claim the distinction of having probably told more disagreeable truths than any Englishman of his generation; and he has had the satisfaction of living to see most, if not all of them, admitted and acted upon.

**A Big Walnut Log.**—The *Glasgow Herald* says that there was recently landed *ex S.S. Lord O'Neill*, from Baltimore, U.S., one of the largest logs of black walnut imported into the Clyde. Its extreme measure is 17 ft. long, 42 in. broad, containing over 200 cubic feet calliper measurement. To those interested in trees it will not only appear a rare but also a valuable specimen. It has been consigned to Messrs. Allison, Consland, & Hamilton, timber brokers, of Glasgow.

\* The Health of Nations; a Review of the Works of Edwin Chadwick; with a Biographical Dissertation. By Benjamin Ward Richardson. London: Longmans, Green, & Co. 1887.



## NOTES.

**E** referred last week to the question of the ventilation of the proposed Channel Tunnel. As a matter of expense, this is no inconsiderable item to be carried to the debit of working cost. But there is a much more serious question than that of the cost of ventilation. It is one which the advocates of the tunnel, whether scientific or otherwise, have conveniently left out of sight. This is, the degree to which the capacity of the tunnel or transport is limited by the fouling of the air by the consumption of coal. That limit, so far as our present engines for locomotive traction are concerned, is very narrow. We cannot put the weight of pure carbon that would be burned by an engine fitted for the tunnel service at less than 20 lb. per mile, and probably this estimate would prove far too low. But this consumption would liberate 73 lb. of carbonic acid gas per mile. A mile of tunnel will contain about two million cubic feet of space, or 160,000 lb. of air. The passage of two trains, whether following or crossing, through a mile of tunnel, would thus raise the proportion of carbonic acid gas from the normal rate of 4 in 10,000 parts, to that of 1 in 1,000 parts, which is not fit for respiration. In addition to the gas from the fire would be that formed by the respiratory process of the passengers. Thus, after the passage of every two, or at the outside three trains, the tunnel would be impassable in safety. Ten miles an hour may be taken as the practical limit of speed of an air current for ventilation; so that an interval of at least two hours must be allowed after each pair of trains to renew the air. Increasing the weight of the trains in order to reduce their number will not much mend the matter, as the consumption of fuel, and the formation of gas, increases with the weight of the train. Supposing, then, the impurity of the atmosphere not to be more than the proportion at which delicate persons begin to succumb, and that the ventilating apparatus is in good order to produce a current of air at the rate of ten miles an hour, the capacity of the tunnel will allow for the passage of twenty-four trains in the twenty-four hours, or about half the average frequency of the trains on the railways of the United Kingdom. How is the line to pay?

**T**HE proprietors and lessees of theatres seem minded to make the best of the occasion of the late dreadful disaster to advertise each the safety of his own theatre, and the special provisions for the safety of the public which each has made, or is about to make. We have these confidences after every theatre disaster; and in general they are very much a repetition of the same statements as have been made on each previous occasion. Mr. Pinero is, however, entitled to the credit at least of novelty, in his proposal that before the curtain rises every evening the proprietor should come to the footlights and make a speech explaining to the audience the arrangements for exit in case of accident. This is a typical example of the wild kind of proposition which is apt to be made, and to find its way into print, when people's heads are full of the danger of theatres. Cannot Mr. Pinero realise that as long as such an address from the manager were paid any attention to, it would be the very thing to alarm nervous old women of both sexes, and put them all on the *qui vive* for imaginary danger, where it did not exist; and secondly, that it would certainly degenerate in a very short time into a mere ritual, to which no one would pay any attention? And if an accident or an alarm did take place, and the audience got into a fright, would they remember directions they had heard, any more than directions that were printed? Not they. Then another wiseacre, Mr. T. A. Brocklebank, writes to the *Times* to ask why the steps leading to the exit door cannot be made to lead up instead of down to the door, so as to give less encouragement and facility for rushes. It has apparently not occurred to Mr. Brocklebank that one reason against his proposition is that doors

are usually, for convenience, made on the ground-level. It is possible to render theatres much less liable to fire than they now are, and it ought to be insisted on (officially) that they should be so; but render theatres as fire-resisting as you can, as we observed last week (and as we perceive, our respected contemporary, the *Field*, urges in a very spirited and sensible article in its last issue), until people learn not to be such fools as to rush into panics, and trample each other to death on the first alarm of fire, no theatre, except an open-air one, will be really safe.

**S**INCE the foregoing remarks were written, one really important improvement has been announced by Sir George Chubb, in a letter to the *Times* of Wednesday. He states that his firm can now make doors which, while they can be locked so as to be secure from the outside, will give way at once on a push from the inside. This, we have ascertained, is an entirely new device, and is to be put into operation in the new theatre in the Strand, at the instance of the architect, Mr. W. Emden, who is to be commended for the attention he appears to be giving to provisions for public safety in the two new theatres in which he is professionally concerned. The invention is not yet, we are told, quite in a stage for publication, but we shall probably have further information to give in regard to it. In the meantime, however, we may say that, from inspection of a model of the apparatus, we are convinced that it is a perfectly good and efficient means of accomplishing what is desired. The push must be made on a special portion of the framing of the door; but by selecting the central lock-rail as the operating portion, and projecting it a little, no one can lean against the door without its opening as intended.

**T**HE International Congress on Hygiène is to be held at Vienna from the 26th of September to the 2nd of October. Among the subjects of interest to our readers which are to be discussed are various reports, by reporters delegated from last year's Congress, on matters connected with sanitation. Dr. Gärtner, Professor of Hygiène at the University of Jena, is to report on the tests to be used to ascertain the hygienic condition of drinking-water and lavatory-water. "M. le Dr. Frankland, Professeur de Chimie à Yew-Reigate" (so in the programme), will give a report on the purification of sewage discharge in connexion with the question of the contamination of river water; Dr. König, Professor of Agricultural Chemistry at Münster, and Dr. Müntz, Professor at the "Institut National Agronomique" of Paris, will present reports on the same subject. M. Durand-Claye, Engineer-in-chief "des Ponts et Chaussées" at Paris, and Major Humphreys, of Memphis, Tennessee, will present reports on the working of the Waring and Shone systems of ejection. The means for the provision of solar light and warmth to buildings will be the subject of reports by M. Clement, Physician of the Hôtel-Dieu at Lyons; Dr. Knauff, Professor of Hygiène at the University of Heidelberg; M. Trélat, whose name is well known to our readers; and M. Gruber, architect, and Professor at the "Ecole Supérieure du Génie" at Vienna. We have not space to give all the names of readers of papers and reports, but other subjects to be discussed are Instruction in Hygiène at Elementary and Secondary Schools; Isolated Hospitals and their Methods of Construction; Hygiène of Boats, especially those of the mercantile marine; Tests for the Sanitary Condition of Air; and the Use of Lead Pipes (by Dr. Hamon of Boulogne). Professor Corfield contributes a report on the question of some precautions against the spread of infectious diseases, but in general England seems to be taking a very small part in the proceedings. No doubt considerations of locality and language have something to do with this abstention. Vienna is not, geographically speaking, very central.

**W**HILE we in England are laboriously endeavouring to get money to commence the Manchester Ship Canal, similar undertakings are being carried on abroad with considerable determination and success. The chief one is the Corinth Canal, which is nearing its completion, having been commenced in 1882,—a period of five years. It was intended to have it ready by the beginning of next year, but unforeseen circumstances (as in Exhibitions) have intervened, and so the opening is postponed. Another great work (also in Greece) is the drainage of an enormous marshy district, known as Lake Copais, in Northern Boeotia, which, whatever the *modus*, or money, which the English company, who are the undertakers, get out of it, will give 27,000 acres of profitable land to the Grecian kingdom, and, so far, do somebody good. The opening is also recorded of a canal between Havre and Tancarville, on one of the Seine reaches between Havre and Rouen, with a branch to Harfleur, at a cost of 1,000,000*fr.* A new basin of 523 acres, the basin of Du Belloy, connects the canal with the port, and the accommodation is so ample that it is expected that the goods freight between Havre and Paris will be reduced by two francs per ton.

**T**HE catastrophes at the Opéra Comique and that at Exeter have caused a lively discussion in the Berlin press as to the chances of escape of the spectators in the various Berlin theatres in case of fire. The consensus of opinion appears to be that the conditions of escape are fairly favourable at the Opernhaus, the Schauspielhaus, and the Friedrich Wilhelmstadt Theatre, but very bad in all the rest. In the Opernhaus and Schauspielhaus the stalls may be emptied in a couple of minutes through four large doors opening outwards. The same is the case with the pit, at the back of the stalls, which has separate exits, whilst broad concrete staircases offer similar facilities for the occupants of the upper tiers and gallery. The Friedrich Wilhelmstadt Theatre, being quite a new building, deserves special mention. The architect has here paid particular attention to the causes of the Ring Theatre catastrophe in Vienna some years ago. From the gallery two broad concrete staircases lead down to the ground floor, besides which the people in the gallery may, through numerous unlatched windows, opening outwards, descend, by means of iron ladders, to the roof of the first floor, and thence, by a second set of iron ladders, into the garden below. From the stalls five specially constructed doors lead directly into the garden, besides the two ordinary doors opening on the foyer. Moreover, the scenery and woodwork in the theatre are impregnated with some composition rendering them incombustible. In all the theatres of Berlin there are now iron curtains, and special reserve exits have been added, whilst oil lamps are lighted in all corridors, passages, and rooms during a performance, in case of accident to the gas supply. With the exception of the above-mentioned theatre, however, the rest appear to be as bad as can be. The *Berliner Börsen Zeitung*, in referring to this subject, states that in one theatre two pillars have recently been raised in the stall lobbies with a view to divide the human current in case of a panic, but which will undoubtedly do more harm than good. In another, the lobbies are so narrow, and the cloak-room is situated so awkwardly, that even under ordinary circumstances the spectators have at the end of the performance to stand closely packed for upwards of twenty minutes before they can get out. It would be impossible here for a single individual to penetrate the crowd. In certain other Berlin theatres the spectators can only reach their seats on climbing high, narrow staircases, and in one theatre the corridors and passages form a veritable maze. In consequence of these disclosures, all the leading Berlin journals now demand that there shall be at least two doors on each side of the ground-floor leading directly into the open; that all doors shall open outwards, and that every tier shall have special fireproof staircases, to be used only in case of fire, leading directly into the open



One journal also demands the entire abolition of stage boxes, and of the boxes slightly raised above the stalls, where such exist. Furthermore, it is demanded that the attendants, box-keepers, and other functionaries, shall be ordered, under heavy penalties, to remain at their posts in case of danger, and not be the first to run away, as was the case in Paris. These men, it is maintained, should be the last to leave the building, and they should offer the public the same example of coolness and courage as a captain and crew of a sinking ship. Finally, it should be the imperative duty of the firemen at all theatres every night to test the working of the water hydrants and the telegraph, and see that all doors intended for exit are unlocked. It is stated that in all Berlin theatres the iron curtain is tried every night, so that there is hardly any fear of this important protection failing, as was the case at the Opera Comique, through the rusting of the mechanism. Nevertheless, it has been proposed that the working of the iron curtain shall be intrusted to a man who is seated in front of it, and who, by a simple contrivance, is unable to quit his seat until the iron curtain has descended. Such an arrangement seems carrying matters to an absurd length; in short, it is panic legislation.

**THE** Burgh Engineer and the Firemaster of Edinburgh have been instructed by the Lord Provost to examine the theatres and places of amusement, and to submit to the Town Council, as early as possible, a report of their examination, with any suggestions that may occur to them of improvements to aid in securing the safety of the public. This is, of course, an outcome of the recent disastrous event at Exeter. Similar warnings have been given before, which have caused a like temporary action, productive of no practical result, not only in Edinburgh, but elsewhere. Legislative enactment, stringently carried out, would probably be the most effective measure. Since this was written, Newsome's Circus, in Nicholson-street, has been burnt down, fortunately without loss of life.

**AN** appeal is made by the Committee for the Preservation of St. Botolph's Priory Church, Colchester, for funds to assist in such repairs as are necessary for the preservation of these beautiful and interesting remains, which have been for some time in danger of falling to further ruin in process of natural decay. Mr. Loftus Brock is the architect who has been consulted, and no one will doubt that in his hands necessary practical work will be combined with every care to carry out repairs without any injury to the archaeological value of the remains. In the course of his report on the present state of the remains, and the course to be taken with regard to them, Mr. Brock says:—

"The ruins consist of the piers and arches of the nave, the walling of the west front (the upper portions are gone), the base of what appears to have been a tower at the south-west of the front, of peculiar plan, and the walls of the north and south aisles.

The walling consists of brick taken from some ancient Roman buildings, in more or less of a fragmentary condition, of all sizes and thicknesses, fragments of roofing, and flue-tiles. There are also flint walling and masses of rag-stone. The whole is put together with mortar formed of poor sand, and it is not too good to resist the action of the elements. It is of very early Norman work. . . . The church having been unroofed since the siege, the effect of the elements for so many years upon the masonry, composed as stated, has been no more than might have been expected. The ruin is well ended over its whole surface, the joints between the Roman bricks are so open that a rule will pass in more than 6 in. in almost every joint, the masonry of the upper part of the nave-arcade is thoroughly separated from the mortar, parts of the outer ridge of the remaining arches have fallen, and much of the remainder is so dangerous that entrance to the ruin must be denied to every one except such as may be willing to use the greatest care in inspecting. Parts of the west front, where there are two tiers of interlaced arching, have fallen; other portions may be expected to fall at any moment."

What Mr. Brock proposes is to strengthen the piers and supports in some places, to exclude the passage of wet through the walling by

grouting the loose masonry on top, and afterwards covering it with a mass of cement concrete spread to a slope to throw off the wet; to rebuild the portions of the arches which have recently fallen, in order to increase the lateral support; to cut out all loose portions of the walling, and to replace the same stones and brick in their original positions; to re-point the whole of the surfaces; to cover over the small remaining piece of vaulting to the south-west tower with cement concrete. Shores have been applied, and some of the missing parts rebuilt solidly in cement; but the heavy work necessary to be done to the nave-piers, and to secure, in part, the west front, have, however, exhausted the funds at the committee's disposal; the pointing of the front has hardly been commenced, and the operations are at a standstill. Subscriptions will be gratefully received by the Rev. T. R. Corbett, Colchester, the Treasurer to the Preservation Committee.

**DR. DÖRPFELD'S** discovery of the older Athene temple in the Acropolis raises a host of questions which the discoverer himself is the first eagerly to discuss. The *Mittheilungen* of the German Archaeological Institute at Athens publishes, side by side in the same issue (xii.), with delightful frankness, two papers, one by Dr. Dörpfeld, the other by Dr. Petersen, embodying views diametrically opposite. Dr. Dörpfeld starts the interesting hypothesis that when allusion is made to the "old temple of Athene" (ὁ παλαιὸς ναὸς or ὁ ἀρχαῖος ναὸς) the reference is not, as has always been supposed, to the Erechtheum, but to his own newly-discovered temple. Further, he thinks that the *θησαυροφυλάκιον*, the back chamber in which the bulk of the State treasure was kept, belongs to this earlier temple, not to the Parthenon. It is still more startling to hear that Pausanias actually saw and (in a partially corrupt passage) noted this temple. Dr. Dörpfeld gives a map, in which he marks the exact route taken about and up to this temple. Dr. Petersen will have none of this. The two papers deserve, and are sure to receive, much attention from Classical scholars as well as archaeologists proper.

**THE** last number of the *American Journal of Archaeology* (III., pl. xiii. and xiv.) devotes two beautiful coloured plates to the illustration of the Dieulafoy excavations, to which we recently drew attention. The monument selected is the remarkable enamelled frieze of Persian warriors. The explorer himself thinks we have in this frieze a representation of the famous body of troops known as the Ten Thousand, who were also called, Herodotus tells us (vii., 83), "The Immortals," for the following reason:—If one of their body failed, either by the stroke of death or disease, forthwith his place was filled up by another man, so that their number was at no time either greater or less than 10,000. Herodotus goes on to say that these Persians were "adorned with the greatest magnificence; . . . besides their arms, they glittered all over with gold, vast quantities of which they wore about their persons." Certainly the dress and accoutrements of the warriors of the frieze is of striking splendour and of excellent decorative effect. No idea of this effect can be obtained from any but a coloured reproduction. The warriors are depicted in profile. Each one carries on his left shoulder a bow and large quiver, elaborately decorated. The dresses are all cut of the same pattern, but very various in colour,—some gold embroidered with yellow or green starlike flowers, others white with various coloured stars. The low boots are gold or blue; the head-dress uniformly green. The plates are accompanied by a letter from M. Méliant, describing the excavations in general. The same number of the *Journal* has a paper by Dr. Waldstein on the school of "Pasiteles." He brings some additional arguments for referring the Venus Genetrix and the Esquiline Venus to, if not Pasiteles, at least some sculptor of the Pasitelean manner. Greek art is this time somewhat slenderly represented. Out of seven original articles four are devoted to Oriental matters. One of

these papers treats of "Forgeries of Assyrian and Babylonian Antiquities." If the plates given are really facsimiles of such forgeries American buyers must be easily cheated. The paper would have appeared more appropriately in some purely popular journal. Mr. Frothingham's discussion of "a proto-Ionic capital and bird-worship," though it mainly concerns an Oriental cylinder, is of great interest, not only from the point of view of architecture, but also from the light it throws on the origin of an art form frequently found on Greek vases, i.e., the Ionic column surmounted by a bird, raven, harpy, or siren.

**IN** reference to recent controversy about the age of the walls of Chester, we hear that, at a meeting of the Town Council of Chester on Wednesday, at which Sir Jas. Pictou and Sir Henry Dryden were present, a letter from Mr. Arthur Cates was read suggesting that the wall on the Roodee should be entirely cleared for its whole length and the foundations carefully examined. Sir Jas. Pictou addressed the Council in favour of the proposal, and said it should be regarded as a matter of national interest and one for which a public subscription might very well be opened. He did not consider that the citizens of Chester were fairly to be called upon to spend their money in finding antiquities for other people's study and interest, though, of course, they might contribute their share. Sir Henry Dryden, who, we may assume, did not oppose such a movement, entered, however, a very requisite caution as to the necessity of protecting the work from the weather if it were uncovered. The Town Council appear, from the report that has reached us, to have been entirely in favour of facilitating such investigations, so that we may expect to have further information in regard to Chester walls before long.

**A** CORRESPONDENT writes:—"Mr. William Nelson, of Edinburgh, publisher, died at his residence, Salisbury Green, on the morning of Saturday last. He was a man of very cultivated taste, and his picturesque house, overlooking the Queen's Park, and commanding a view eastward to North Berwick Law and the Bass Rock, was stored with beautiful works of art; but he was far from being selfish in his love of the beautiful, and desired that others should share it. To him the City is indebted for various improvements, among others for the restoration of St. Bernard's Well and the adjoining grounds, and for the restoration of the ancient buildings in the Castle at present in progress. It appears that a few days before his last illness Mr. Nelson signified his approval of the finished drawings for the restoration of the Parliament House in the Castle, prepared by his architect, Mr. H. J. Blanc, and gave him instructions regarding certain proposed additions to St. Margaret's Chapel. The Argyle Tower is now almost ready to be handed over to the authorities; it has been restored in a very satisfactory manner. Although a public benefactor Mr. Nelson shrank from publicity, and refused honours which were offered to him, preferring the pleasures of home to the allurements of office. He was most generous in his dealings with his employees, looking after them during sickness, and not losing sight of those dependent upon them in the event of their being overtaken by death."

**THE** *Albert Fine-Art Album*, of which two or three numbers have been sent to us (no publisher's name), appears to be a collection of a series of designs by Mr. Sopon Bezirdjian, whose name appears on the title-page, and who apparently is designer and publisher also. He states that "his object is to introduce to this country, and to the West generally, a pure knowledge of and taste for the best forms only of Oriental art." This is a rather ambitious mission, and we do not know whether we could accept all the designs in the numbers before us as representing the best forms only of Oriental art. In some of them the colour is very crude. Most of the designs, however, show good draughtsmanship and some originality. But Mr. Bezirdjian is under two misconceptions:



In the first place, there are a good many artists and architects in England who know, at all events, much more about Oriental design than he seems to be aware of; and secondly, what those who are interested in Oriental design want is not original designs made for the purpose of publication, but fine illustrations of the best types of existing work. If Mr. Bezirdjian will give them that, he will be more likely to find a public for the *Albert Album*.

THE "Goat in Boots Tavern," No. 333, Fulham-road, at the corner of Park, once Lovers' Walk, is about to be rebuilt from the designs of Mr. T. H. Smith. Messrs. Turtle & Appleton are the contractors. The story of this sign, in its later guise a relic of Morland, is not a little curious. The tavern stands in what some thirty years since was known as Little Chelsea Village. In 1663 a house here was known as the Goat at Little Chelsea; and until the year 1713 it had the right of commonage for two cows and one heifer on the neighbouring Chelsea Heath. The original sign of the Goat is said to have been painted by James Christopher Le Blon, a Fleming, who is believed to have died, 1740, in a hospital at Paris. In the early part of last century a favourite sign for post-houses was that of Mercury with the legend "Mercurius Is Der Goden Boode." The words "der goden boode" became corrupted into "the Goat in Boots." The story goes that Morland, employed by mine host to re-paint this particular sign-board in lieu of discharging his drink-bill, equipped the goat with a whip, hanging-board, jack-boots, and spurs. The sign-board has been painted again with tawdry embellishments, so that little or none of Morland's handiwork appears. There is one other tavern of this sign in London, at Stanhope-street, Euston-road.

THE neighbourhood of Annan, in Dumfriesshire, has become celebrated of late years, not only in the United Kingdom, but in America, for the red and pink sandstones raised in many large quarries there. We had occasion to allude to this fact in describing the "Red Corsehill" stone last year (see the *Builder*, vol. ii., 1886, p. 894). We have now before us a sample from the Warmanbie Estate Quarry, also near Annan, on which our opinion has been asked. It is a very fine-grained red sandstone, of the age known to geologists as Triassic or New Red, and is made of minute particles of quartz, which in themselves are practically imperishable. The first question in such a case is, What is the nature of the material (if any) which binds these particles together? For on this almost the whole of its weathering properties depend. In the case of many stones this could not be ascertained without a microscopical analysis, but here the semi-conchoidal fracture exhibited by the stone shows at once that silica is one of the cementing materials; whilst its red colour, its aspect, and the freedom with which it can be cut, equally demonstrate that it is also bound together partly by peroxide of iron, and partly by compression. Of these, the last-mentioned is the least desirable qualification, the first being a very good one. The silica existing as a cementing material is secondary in origin, and although it is not so durable as the crystalline quartz grains which it binds together, it nevertheless is a first-class cement. The stone is not quite such a dark red colour as the "Red Corsehill" which usually comes to the London market, but other tints are no doubt obtainable, as they are in most quarries. When treated with hydrochloric acid it does not appreciably effervesce, and the amount of carbonate of lime must be exceedingly small, that which is present probably existing in a crystalline form in minute particles of feldspar. It is very compact, takes a sharp angle, and is apparently very easily wrought, approaching in this respect the limestones.

AN exhibition of work done by the students who are taught at the Polytechnic Institution, which has been held during the last few days, was advertised as one which "should

be visited by all who are interested in technical education." As we observed last week, the teaching of special trades is not what we should define as the object of "technical education," properly so called; and as far as the evidence of results goes, it is the teaching of trades, or special kinds of manufacture, which is carried on at the Polytechnic. But there seems to be a good deal of useful and instructive work done. Among the exhibits we observe there are working drawings of building construction, plans and sections of houses, drawings of brick-bonding, and various details of iron construction. It does not appear, however, that the models for the teaching of this class of work are all irreproachable. It is clear that there are model drawings of some kind, as the same section of cornice is repeated by two different workers in their detail drawings, and shows the cornice stones most insufficiently bedded, in comparison with their projection: a cornice should never project more than its bed on the wall. Then, again, it can hardly be said that this is the most scientific method of forming the abutment of a principal rafter on a tie-



beam, but it appears to be passed by the authorities. The wood-carving work is good, and some of the plaster modelling that is shown is also very creditable. In the same room we observed a model of a hot-water circulating system for a house; good, only that there are two nearly horizontal lengths in the flow-pipe, a thing to be avoided if possible, as it checks the flow. The models of a king and queen post roof, near this, are deficient in that the method of framing is not shown in a workmanlike manner; the pieces are put together and painted over, so that it is impossible to see if the joinings are properly made or not, and it looks rather as if they were not, in which case the model is only a toy. Among the exhibits in the down-stairs room is a really admirable piece of work, in the shape of a bicycle, built by one of the students. Art handicraft seems to be the department least cultivated; we noticed a metal coffee-pot, "hammered work"; very good workmanship, but bad and inelegant in form, totally without artistic spirit; and the same thing struck us in regard to other manufactured articles. Wood-carving, as an object in itself, is carried out with considerable taste and feeling; but applied art seems to be neglected or not understood.

#### FURTHER NOTES BY AN ENGLISH ARCHÆOLOGIST IN BRITANNY.\*

WEDNESDAY, August 17th, was perhaps the most interesting day of the whole tour made by the party from the Royal Archaeological Institute. The gentleman to whom we were indebted for the notes already published sends us the following:—

On account of the tide an early start was necessary, and, punctually by six o'clock, the whole party assembled on the quay of the dock at Vannes to start by the little steamboat engaged to take them to Lockmariaker. Here they were soon joined by the Vice-President and many other members of the Société Polymathique, the President being prevented from attending by a family bereavement. Some of the members of that Society joined the English party, the others following in a second steamer, and proceeded down the Rivière de Vannes for the Morbihan Sea, passing Roquedas, the spot where the jadeite was discovered, the Ile aux Moines and Gavr Innis, both to be visited on the return trip. The two small steamers reached Lockmariaker, in a heavy shower of rain, early in the forenoon. This was almost the only rain the travellers met with during their visit to Brittany. After sheltering for some time until it held up, the members of both French and English societies together went on to the curious twelfth-century apsidal church of Lockmariaker. Outside they were shown an ancient cross with an inscription, said to be yet unread, standing against the wall of the churchyard. After waiting here for a short time, the party was taken charge of by M. Mahé, Inspector

under Government of Ancient Monuments in the district, who conducted them to the megalithic remains. It is hardly possible to mention them in detail, but first among them is the great menhir (vertical stone) named Men-er-Hroec. This megalith, now fallen and broken in pieces, must have been, when upright and whole, nearly 65 ft. in length. It has sometimes been said that the pieces now prostrate formed not one, but two menhirs; but if any of the English visitors had even entertained a doubt upon this point, it must have been dissipated by the examination of the stones under the guidance of M. Mahé and Dr. de Closmadeuc. At Lockmariaker many of the members of the Institute saw for the first time those wonderful marks on the stones of the dolmens which have given rise to so much controversy. On the underside of the Dol-ar-Marchadourien is the outlined figure of the axe, so like the axe used in the present day by the Indians of North America and other aborigines. The horse-shoe shaped, L-shaped, and other usual marks, are found abundantly in the dolmens here, generally in the supporting stones, as also the so-called cup-marks, little round sinkings in the stone a few inches in diameter. Nearly all the dolmens of this neighbourhood show traces of the tumuli which once covered them, and in many cases, though they now stand exposed, they are surrounded by the debris of their mounds. At Lockmariaker there are no alignments of stones, nor are any circles of stones found there; but the menhirs (upright stones) and the dolmens are the largest in Brittany, perhaps in the whole of a Roman city, up to the present unidentified, although the name of Darioirum has sometimes been assigned to it. It is an accepted fact that in Brittany wherever any large number of prehistoric remains are found Roman remains are found also. Last year the ruins of a Roman temple were unearthed in a garden near the church, some portions of columns and the lower part of an altar being found. Only the last line of the inscription, — the usual votive dedication, — remained, and the visitors were informed that it is the only inscription found at Lockmariaker. It is much to be wished that the upper half, with the name of the deity, may come to light, but at present all excavation is stopped, and the site of the temple has been covered up.

The members of the two societies (English and French) lunched together in the public school in the rear of the Mairie, and were joined by the local clergy and others. After lunch, M. Le Chanoine Le Méné, on behalf of the Société Polymathique, bid the English visitors welcome in the kindest terms, and was seconded by Dr. de Closmadeuc in a learned and eloquent speech. The toast, which was drunk with enthusiasm, was responded to by Mr. Joseph Brown, Q.C., on behalf of the Royal Archaeological Institute, who concluded by wishing success and prosperity to the Société Polymathique.

Immediately afterwards the party again took steamer and proceeded to the Island of Gavr Innis, the property of Dr. de Closmadeuc, and there visited a sepulchral chamber, still covered with its tumulus formed of loose stones, in the supports of which are carved the axe-heads and other designs which have been so often published. The axe-heads of this tumulus differ from nearly all the designs on the dolmens of the neighbourhood by being well and clearly cut in relief, whereas the other markings are merely outlined on the stone. Here is also the channel, some 3 ft. long and 4 in. deep, cut in the supporting stones of the chamber, the use of which is as great a mystery now as when it was first discovered. One thing only can be said, which is that the chamber in the tumulus at Gavr Innis shows that its builders had made an immense advance in the art of using tools over that shown by the builders of the other sculptured dolmens in the neighbourhood. The tumulus was opened in 1892, when several broken hatchets of diorite, &c., were found; some of these are deposited in the Vannes Museum. Some interesting Mediaeval remains have also been found in the island. From Gavr Innis the Island of Er Lanic was seen in the distance, where the double circle of stones, in the form of the figure 8, may still be traced at low tide, but is almost lost in the sea.

On the way back to Vannes the party landed at the Ile aux Moines, and there visited the stone circle of Kergonan, the largest in the

\* See p. 358.



Morbihan, but much interfered with by farm buildings erected in the centre.

The morning of the following day was again spent in the Museum at Vannes, when the Curator, the Chanoine le Méné, together with Dr. de Closmadeuc, a second time favoured the visitors by showing them over it and explaining its contents. In the afternoon the party, accompanied by Admiral Tremlett, left Vannes for Carnac and Plouharnel. The sleeping accommodation in these two villages being but very limited, it was necessary to divide the travellers between them. The remainder of the day, with Friday, August 18, and the greater part of Saturday, were spent visiting the megalithic remains, which extend, with occasional breaks, for a distance of some four or five miles from Erdeven (some mile and a half west of Plouharnel) to near La Trinité, east of Carnac. From Mont St. Michel, near Carnac, an immense cairn or tumulus, composed of loose stones, and crowned by a small chapel, the best general view is obtained, and from its summit most of the alignments of stones are visible. This tumulus was opened in 1863 by the Société Polymathique, and at its foot are some interesting remains of a supposed twelfth-century monastery, discovered some years ago by the late Mr. James Miln. The alignments of Menec are those nearest Carnac, and consist of eleven lines of menhirs, ending near the farm of Menec in a semicircle. A little further on, at Kerlescan, a quadrilateral enclosure of stones has its fourth side completed by a long barrow. There is also a quadrilateral at Courcounno, near Erdeven. The many dolmens bearing sculptures were duly visited; among others that in the park at Kercado, on the capstone of which is a rudely-outlined axe. Many of these monuments have now been purchased by the Government, and will in future be preserved from further destruction; but very many, and among them some of the most interesting, still remain in private hands. These are being broken up by the peasants on all sides, and are used simply as quarries whenever stone is required; in addition to this, much damage is yearly done to the dolmens by careless diggings in the earth at their bases, causing the supports to give way and the capstones to fall.

On the evening of Saturday, August 20, the party of archaeologists left Plouharnel Station for the quaint old town of Quimper, when they visited the cathedral, the western spires and great part of the towers of which were built from designs of M. Viollet le Duc. From thence they went on to Pont l'Abbé. This interesting little place was formerly the seat of a Carmelite monastery, of which the church remains in good preservation, as well as part of the abbey buildings. The cloisters, having got into a bad state of dilapidation, were removed a few years ago, to the great regret of all lovers of antiquities. From Pont l'Abbé the party drove to Penmarch, visiting the church on the way. The projecting headland is singularly like St. David's Head, in Pembrokeshire.

On their return the excursionists were most hospitably entertained by M. du Chatellier, at his château of Kernuz, when he showed them his splendid museum, brought together by himself and his father, the richest collection in the world in antiquities from the department of Finistère. After this they returned to Pont l'Abbé, where they dispersed, having had a most enjoyable and instructive excursion, and found many kind friends in Brittany.

#### TWO MODERN PARIS CHURCHES.

For some years Paris has erected very few religious edifices. The stoppage in this class of building, which has given France so many remarkable and noble architectural monuments, may be ascribed to two causes: the large number of existing churches, which are sufficient for present requirements, and the special bent of the administration, since 1879, in the direction of civil architecture. Accordingly, with the exception of the American Church not long since inaugurated,—and which is of course not a national building, being erected by the American community for themselves,—no new church has been erected in Paris since that of Notre Dame at Auteuil, which dates from 1880.

This church was the work of one of the most eminent members of the Académie des Beaux Arts, M. Emile Vandremere, who also designed the church of St. Pierre at Montrouge, of the



Church of Notre Dame, Auteuil, near Paris.—M. Emile Vandremere, Architect.

interior of which a lithograph illustration will be found on another page. These two churches, both based on the basilica form, represent therefore the most recent church architecture of Paris.

The church of Montrouge is the oldest, having been commenced in the last years of the Empire; the building was interrupted by the siege and the Commune, and was finally completed about twelve years ago. It stands at the acute angle formed by the Avenue d'Orléans where it intersects the Avenue de Maine. The plan of the site, narrow at the entrance façade, and very wide at the apsidal end, constituted a special difficulty in dealing with the design, which the

architect endeavoured to surmount by building a large square porch in advance of the nave, and giving great lateral extension to the transepts. The choir is arranged so as to allow of the side aisles being continued round it. In the centre is a ciborium decorated at the four angles with figures of angels, executed by M. Maniglier, and carried on polished marble columns. Above the entrance-porch is a clock-tower and campanile, about 190 ft. in height. The nave has a round-arched arcade of eight bays, on granite columns. Under the church is a large crypt, used as a religious school.

The total external length of the building, inclusive of porch and apse, is about 230 ft., and



The interior height of the nave is about 65 ft. The choir, however, is raised to a height of about 10 ft. The tower, the lower portions of the apses, and the cornices, window jambs, string courses, capitals of the nave, &c., are in hard ashlar, the remainder in hammer-dressed work; the roofs are tiled. The timber construction is shown internally. The furniture and fittings are in waxed oak.

The painted decoration is entirely in low tones; the main portion of it consists of some mural paintings in the cupolas of the transepts, shaded in monochrome. In the tympanum of the porch is a painting on porcelain, and a statue of St. Peter, by M. Maniglier; a fine group in marble, by M. L. Durocher; and various bas-reliefs of considerable merit. The windows, which are numerous and mostly treated in grisaille, are the design of an able pupil of Delacroix, M. Oudinot, who has executed many important commissions for the Government. The total cost of the building was about 1,900,000 francs, or 892 francs per square metre.

The Church of Notre Dame d'Auteuil is not yet completely finished, and has cost up to the present moment about 1,100,000 francs. Here again M. Vaudremer had to contend with a difficult site, very narrow at the façade and with a rapid fall towards the Seine. The general style of the building is somewhat based on the Romanesque architecture of the South of France. The plan takes the form of an elongated rectangle, with transepts, and terminating in a polygonal apse. The entrance façade, of which we give a view, is surmounted by a turret of very original design, rather more than 160 ft. in height. The total length of the church is a little over 200 ft.; the nave and transepts 60 ft. in height, the choir rising to nearly 90 ft. The declivity of the ground has rendered it possible to secure a crypt about 16 ft. high below part of the floor. The nave is divided into six bays of round arches, carried on stone columns, and the foundations are of concrete. The building generally, like that of Montrouge, is in rubbed stone for the tower, plinth, strings, and dressings, and of hammer-dressed stone for the filling.

In regard to decoration, up to this time the building is poor enough. In the crypt the visitor may remark a monumental bas-relief in marble, the work of Debay, and which came from the preceding church, as well as a "Mater Dolorosa" by Carpeaux, whose somewhat Pagan type of genius did not, however, lend itself very well to the representation of religious figures and feelings. In the transepts are some bas-reliefs in bronze, gilt, the gifts of some of the congregation. The figure of the Virgin and Child in the interior of the entrance porch is the work of M. Maniglier. The windows are filled with some good glass with figure subjects, executed by MM. Roussel, de Beauvais and Avenet, after cartoons by M. Theodore Maillot.

It should be added that, from want of sufficient funds the dome, which, according to the original design should have surmounted the crossing, has not yet been carried out. This, when executed, is to be composed of brick with stone bands, and lighted by circular-headed windows. It will rest on a polygonal subbase with pyramids at the angles, and will be surmounted by a cone-shaped lantern.

The former curé of Auteuil, the Abbé Lamazon, who was appointed Bishop of Limoges and is since dead, contributed largely to the building of this church, in support of which he gave altogether no less than 400,000 francs.

#### THE LIVERPOOL AUTUMN EXHIBITION.

THE seventeenth Exhibition of Pictures by Modern Artists, at the Walker Art Gallery, Liverpool, was opened on Monday, the 5th inst.

It contains in all 1,279 works of art, including oils, water-colours, architectural drawings, and sculpture.

There are, of course, on the walls several pictures from the late Exhibition of the Royal Academy, some of which have already been noticed in the *Builder*. Among them we find "The Christ Bearer," by Mr. W. F. Yeames; "Samson," the large and ugly picture by Mr. S. J. Solomon (which has been purchased by Mr. J. Harrison, of Liverpool, and presented to the Corporation for the permanent gallery; a very doubtful gift); "Carnation, Lily, Lily, Rose," by Mr. J. A. Sargent; "Whittington's Banquet," by the late D. W. Wynfield; "First

Boats away after a Gale," by Mr. H. Moore; Portrait of Baron de Worms, M.P., by Mr. F. Holl; "Robert Burns, November, 1785," by Mr. J. Hodgson; "Kyle Akin," by Mr. J. Brett; "The Love Feast," and "Callista, the Image-maker," by Mr. E. Long; "Dominicans in Feathers," and "The Old Tortoise," by Mr. H. S. Marks; and Mr. Ernest Normand's "Jealousy is cruel as the grave." This is a fair contribution for a provincial exhibition to have secured, and the best of the pictures above enumerated form, especially as to figure-subjects, the cream of the collection.

In going through the rooms of the gallery we also meet with a great number of works now seen for the first time by the public, well worthy attention,—and as a whole the collection is one of great and varied interest, and probably above the average. Among the previously exhibited pictures are also Mr. Hacker's "Pelagia and Philammon" from "Hypatia" (242), and Mr. Collier's "Lilith" (315), both of which will be remembered in the Grosvenor Gallery of this season.

"The White Lady of Nuremberg" (962), by Mr. Wyke Baylis, an interior of a Gothic church with a shrine, is a fine picture. The effect of the stained glass, however, though rich in colour, is rather deficient in transparency, and the lights and shadows are somewhat scattered. The florid Gothic work is well given.

"The Schoolboard at Home," by Mr. Faed, is one of his interiors with a female figure and children, the former of whom strongly reminds us of the very pleasing one exhibited at Liverpool last year under the title of "When the Bairs are in Bed," and which was bought by the Corporation, though the present figure is scarcely equal to its predecessor. "Helpless," by Mr. T. C. Gotch, and Mr. Ayerst Ingram (128), is a shipwreck on an immense scale, but the amount of subject is scarcely proportionate to the canvas it covers. The whole scene is a sort of study in light greys, and deficient in contrast of light and shadow. The wreck is well put in, as are also the foreground figures. No. 8, "A Penzance Trawler off the Cornish Coast," by Mr. John Frazer, is very pure in tone, and full of atmosphere. If it has a fault, it is that parts of the water in the foreground, though good in form and motion, are a little hard.

Mr. C. Napier Hemy has two pictures, "The Trawler's Punt," a characteristic bit, the boat stem on, well drawn, and his usual green transparent water. "On the Harbour Bar," his second work, a water-colour, is not so successful, especially in the treatment of the sea, which is rather opaque, and the general execution of the drawing not equal to this artist's oils. Mr. E. Green's picture, "Sunrise at Jerusalem" (583), looking over the Pool of Hekziah, is fine in effect, and the architectural character of the buildings of the ancient city is well portrayed.

There are several very good works, both in oil and water-colour, having picturesque portions of street architecture for their subject. Among these may be specially mentioned "Summer-time in a Cornish Village" (536), by Mr. John McDougal. This drawing, a water-colour, is wonderfully bright and pure in its lights, and equally true and cool in its shadows, preserving the details of the buildings, while satisfying the eye as an effective work of art. In the same line follows Mr. Hampson Brown in his "Bidston Village" (435), which, while it is a faithful transcript of the village scene, is a contrast to the former in being somewhat realistic and lacking its sunny and atmospheric effect. In "The Gyaractides" (315), by Mr. H. Holiday, we have an architectural subject well drawn. It is a moonlight effect. Exception might be taken to the greenish tone of the picture, but there is a fine feeling throughout it. The strictly architectural drawings are, as before, accommodated in what the printed catalogue calls "The Vestibule," but which is, in fact, simply the staircase, where any one trying to study them is constantly interrupted by the passing and repassing of visitors to the rooms of the gallery.

Among a number of designs of local interest are those of Messrs. Lewis Hornblower & Son for the "Proposed Rebuilding of Rufford Hall," a good specimen of English Domestic architecture; and a "Design for Buildings in Victoria-street, Liverpool," by Mr. H. Sumner (1,197), is an example of the modern street architecture which is fast effacing the former

aspect of plain old Liverpool, as it was familiar to the resident of twenty or thirty years ago.

There are also a great number of other designs, many of them by Liverpool architects, apparently well adapted to their purposes, and many of them possessing considerable merit and originality of design.

"Graythwaite Hall, Windermere," for Lieut.-Col. Sandys, M.P., is an effective design for a large mansion in the Elizabethan style by Mr. R. Knill Freeman. It was noticed in the course of our remarks on the Royal Academy architectural exhibits of this year, among which it had a place.

"Church for Rogerstone, Mon., Mr. Thomas M. Lockwood. This was also noticed in our review of the Royal Academy drawings.

"Stokesay Castle," Mr. James H. Cook. An exceedingly well-executed sepia drawing from a set which obtained the R.I.B.A. Silver Medal, showing a picturesque bit of black-and-white timber work mounted on the foundations and remains of the walls of the old castle.

"Lewis's New Premises, Ranelagh-street, Liverpool," Mr. Walter W. Thomas, architect, to replace those recently destroyed by fire. This is a design in white and red brick with tall clock-tower fronting the street, and working into the design the tower in the rear still standing. The lower story is an uninterrupted row of plate-glass windows, upon which the whole lofty superstructure appears to stand,—too common a feature in modern shop architecture.

"Wesleyan Chapel and Schools, Durham-road, Gateshead," by Messrs. C. O. Ellison & Sons. This is a Geometric Decorated design with high-pitched roof and tower and spire; the adjacent schools being kept in harmony with the principal building. The same architects also exhibit design for "Wesleyan Chapel, Palmgrove, Oxtou," much in the same style as the foregoing, with bell-turret only.

"New English Presbyterian Chapel, Llandudno," Mr. T. G. Williams, architect, is an Early English design with some features of Geometric Decorated. It has a small tower and spirelet.

Messrs. Bare and Beckwith send a series of designs for "Villas at Spital, Cheshire." These are of the cottage orude type, with some black-and-white work introduced with good effect.

"The Hall and Billiard Rooms, Runnymede, West Derby," Messrs. F. & G. Holme, are two drawings in sepia of elaborately-decorated rooms of Classical character with richly-carved woodwork and panelled ceilings, well proportioned and good in detail.

"Testcombe, Fullerton," Mr. W. D. Caröe, is a picturesque design in English domestic Gothic with some black-and-white work introduced. It is an effective composition.

"Design for Commemorative Schools and Clock-tower," Mr. Edward Hodgkinson. This was in the Royal Academy exhibition of this year, and was noticed in the course of our remarks on that collection.

"New Offices, Temple-court, Liverpool," by Mr. G. E. Carroll, is a good design for commercial buildings, in red brick with carved stone doorway and window dressings.

"Smoking-room, Portland-place, London," Mr. W. D. Caröe. An effective interior, Elizabethan in character, panelled in wood.

"Design for a House in Aigburth Drive, Sefton Park, Liverpool," by Mr. James W. Crofts; and "House to be erected" in the same park, by Messrs. F. & G. Holme, are both of good design, in the mixed style so much adopted in our modern dwelling-house architecture, and seem well adapted to their sites.

"Design for Town-hall, Grantham," and "Design for Memorial Clock-Tower, Pier-head," both by Mr. E. Winter. The former is a Classical design in stone, relieved by marble columns at the upper story windows and doorway, and surmounted by a small clock-tower. The latter is a Gothic design, the clock turret being supported on four open arches, but it does not possess any very original features.

"A Small Country House," Mr. Ernest H. Jones, is a pleasing specimen of Domestic Gothic, with black and white timber-work introduced.

The sculpture is not an extensive collection. It includes model bust of Philip James Bailey, author of "Festus" (life study in plaster for proposed statue), by Mr. J. A. P. Macbride; "Puck" (plaster statuette), by Mr. Hargreaves Bond; "A Child of the Lagoons," a bronze, by Mr. S. M. Fox.



## IMPROVEMENTS IN THE MANUFACTURE OF PORTLAND CEMENT.\*

So much has been said and written on and in relation to Portland cement, that further communications upon the subject may appear to many of the present company to be superfluous. But is this really so? The author thinks not, and he hopes by the following communication to place before this meeting some facts which have up to the present time, or until within a very recent date, been practically disregarded or overlooked in the production of this valuable material, so essential in carrying out the important works of the present day, whether of docks and harbours, our coast defences, or our more numerous operations on land, including the construction of our railways, tunnels, and bridges, aqueducts, viaducts, foundations, &c.

The author does not propose to occupy the time of this meeting by referring to the origin or the circumstances attendant upon the early history of this material, the manufacture of which has now assumed such gigantic proportions,—these matters have already been fully dealt with by other more competent authorities; but rather to direct the attention of those interested therein to certain modifications, which he considers improvements, by means of which a large proportion of capital unnecessarily involved in the method of manufacture simplified, the cost of manipulation reduced, and stronger and more uniformly reliable cement be placed within the reach of those upon whom devolves the duty and responsibility of constructing works of a substantial and permanent character; but in order to do this it will be necessary to allude to certain palpable errors and defects which, in the author's opinion, are perpetuated, and are in general practice at the present day.

Portland cement is, as is well known, composed of a mixture of chalk, or other carbonate of lime, and clay,—such as is obtained on the banks of the Thames or the Medway,—intimately mixed and then subjected to heat in a kiln, producing incipient fusion, thereby forming a chemical combination of lime with silica and alumina, or practically of lime with dehydrated clay.

In order to effect this, the usual method is to place the mechanically-mixed chalk and clay (technically called slurry), in lumps varying in size, say, from 4 to 10 lb., in kilns with alternate layers of coke, and raise the mass to a glowing heat sufficient to effect the required combination, in the form of very hard clinker. These kilns differ in capacity, but perhaps a fair average size would be capable of producing about 30 tons of clinker, requiring for the operation, say, from 60 to 70 tons of the dried slurry, with from 12 to 15 tons of coke or other fuel.

The kiln, after being thus loaded, is lighted by means of wood and shavings at the base, and, as a matter of course, the lumps of slurry at the lower part of the kiln are burnt first, but the moisture and sulphurous gases liberated by the heat are condensed by the cooler layers above, and remain until the heat from combustion, gradually ascending, raises the temperature to a sufficient degree to drive them further upwards, until at length they escape at the top of the kiln. The time occupied in loading, burning, and drawing a kiln of 30 tons of clinker averages about seven days.

It will be readily understood that the outside of the clinker so produced must have been subjected to a much greater amount of heat than was necessary, before the centre of such clinker could have received sufficient to have produced the incipient fusion necessary to effect the chemical combination of its ingredients; and the result is not only a considerable waste of heat, but, the clinker is not uniformly burnt; a portion of the outer part has to be discarded as over-burnt and useless, whilst the inner part is insufficiently burnt, and has to be re-burned afterwards.

Moreover, the clinker, which is of excessively hard character, has to be reduced, by means of a crusher, to particles sufficiently small to be admitted by the millstones, where it is ground into a fine powder, to become the Portland cement of commerce.

This process of manufacture is almost identical

\* A paper read before the Mechanical Science Section of the British Association of Manchester, by Mr. Frederick Ransome, A.I.C.E.

in principle and in practice with that described and patented by Mr. Joseph Aspdin in the year 1824, and though various methods have been adopted for improving the quality of the cement and for utilising the waste heat by drying the slurry previous to calcination, still the main feature of burning the material in mass in large and expensive kilns remained the same, and is continued in practice to the present day.

The attention of the author was directed to this subject some time since in consequence of the failure of a structure in which Portland cement formed an essential element, and he had not proceeded far in his investigation of the cause of the failure when he was struck with what appeared to him to be the unscientific method adopted in its manufacture, and the uncertain results that must necessarily accrue therefrom.

Admitting, in the first place, that the materials employed were considered the best and most economical for the purpose readily accessible,—viz., chalk and an alluvial deposit found in abundance on the banks of the Thames and the Medway,—and being intimately mixed together in suitable proportions, was it necessary, in order to effect the chemical combination of the ingredients at an intense heat, to employ such massive and expensive structures of masonry, occupying such an enormous space of valuable ground, with tall chimney-stacks for the purpose of discharging the objectionable gases, &c., at a great height in order to reduce the nuisance to the surrounding neighbourhood?

Again, was it possible to effect the perfect calcination of the interior of the lumps alluded to without bestowing upon the outer portions a greater heat than was necessary for the purpose, causing a wasteful expenditure both of time and fuel? And, further, as cement is required to be used in the state of powder, could not the mixture of the raw materials be calcined in that state, thereby avoiding the production of such a hard clinker, which has afterwards to be broken up and reduced to a fine powder by grinding in an ordinary mill?

The foregoing are some of the defects which the author applied himself to remove, and he now desires to draw attention to the way in which the object has been attained by the substitution of a revolving furnace for the massive cement-kilns now in general use, and by the application of gaseous products to effect calcination, in the place of coke or other solid fuel. The revolving furnace consists of a cylindrical casing of steel or boiler plate supported upon steel rollers (and rotated by means of a worm and wheel, driven by a pulley upon the shaft carrying the worm) lined with good refractory fire-brick, so arranged that certain courses are set so as to form three or more radial projecting fins or ledges. The cylindrical casing is provided with two circular rails or pathways, turned perfectly true, to revolve upon the steel rollers, mounted on suitable brickwork, with regenerative fins, by passing through which the gas and air severally become heated, before they meet in the combustion-chamber, at the mouth of the revolving furnace; the gas may be supplied from slack coal or other hydrocarbon burned in any suitable gas producer (such, for instance, as those for which patents have been obtained by Messrs. Brook & Wilson, of Middlesbrough, or by Mr. Thwaite, of Liverpool), which producer may be placed in any convenient situation.

The cement mixture or slurry,—instead of being burned in lumps,—is passed between rollers or any suitable mill, when it readily falls into coarse, dry powder, which powder is thence conveyed by an elevator and fed into the revolving furnace by means of a hopper and pipe, which, being set at an angle with the horizon, as it turns, gradually conveys the cement material in a tortuous path towards the lower and hotter end, where it is discharged properly calcined.

The material having been fed into the upper end of the cylinder falls through the flame to the lower side to it; the cylinder being in motion lifts it on its advancing side, where it rests against one of its projecting fins or ledges, until it has reached such an angle that it shoots off in a shower through the flame and falls once more on the lower side; this again causes it to travel in a similar path, and every rotation of the cylinder produces a like effect, so that by the time it arrives at the lower and hotter end it has pursued a roughly helical path,

during which it has been constantly lifted and shot through the flame, occupying about half an hour in its transit.

To some who have been accustomed to the more tedious process of kiln-burning, the time thus occupied may appear insufficient to effect the combinations necessary to produce the required result; but it will be seen that the conditions here attained are, in fact, those best suited to carry out effectively the chemical changes necessary for the production of cement. The raw material being in powder offers every facility for the speedy liberation of water and carbonic acid, the operation being greatly hastened by the velocity of the furnace gases through which the particles pass.

That such is practically the case is shown by the following analysis of cement so burnt in the revolving furnace or cylinder—

Carbonic acid, anhydrous.....	0.40
Sulphuric acid, anhydrous.....	0.26
Silica soluble.....	24.63
Silica insoluble.....	0.90
Alumina and oxide of iron.....	10.56
Lime.....	61.43
Magnesia, water, and alkalis.....	2.03

100.00

Again, fineness of the particles results in their being speedily heated to a uniform temperature, so that they do not serve as nuclei for the condensation of the moisture existing in the furnace gas. The calcined material, on reaching the lower end of the furnace, is discharged on to the floor, or on to a suitable "conveyor," and removed to a convenient locality for cooling and subsequent grinding or finishing.

It, however, is not in the condition of hard, heavy clinkers such as are produced in the ordinary cement-kiln, which require special machinery for breaking up into smaller pieces before being admitted between the millstones for the final purpose of grinding; nor does it consist of an overburnt exterior and an underburnt "core" or centre portion; but it issues from the cylindrical furnace in a condition resembling in appearance coarse gunpowder, with occasional agglutinations of small friable particles, readily reduced to fine powder in an ordinary mill, requiring but small power to work, and producing but little wear and tear upon the millstones.

The operation is continuous. The revolver or furnace, once started, works on night and day, receiving the adjusted quantity of powdered material at the upper or feed end, and delivering its equivalent in properly-burnt cement at the opposite end, thus effecting a great saving of time and preventing the enormous waste of heat and serious injury to the brickwork, &c., incidental to the cooling down, withdrawing the charge, and re-loading the ordinary kiln.

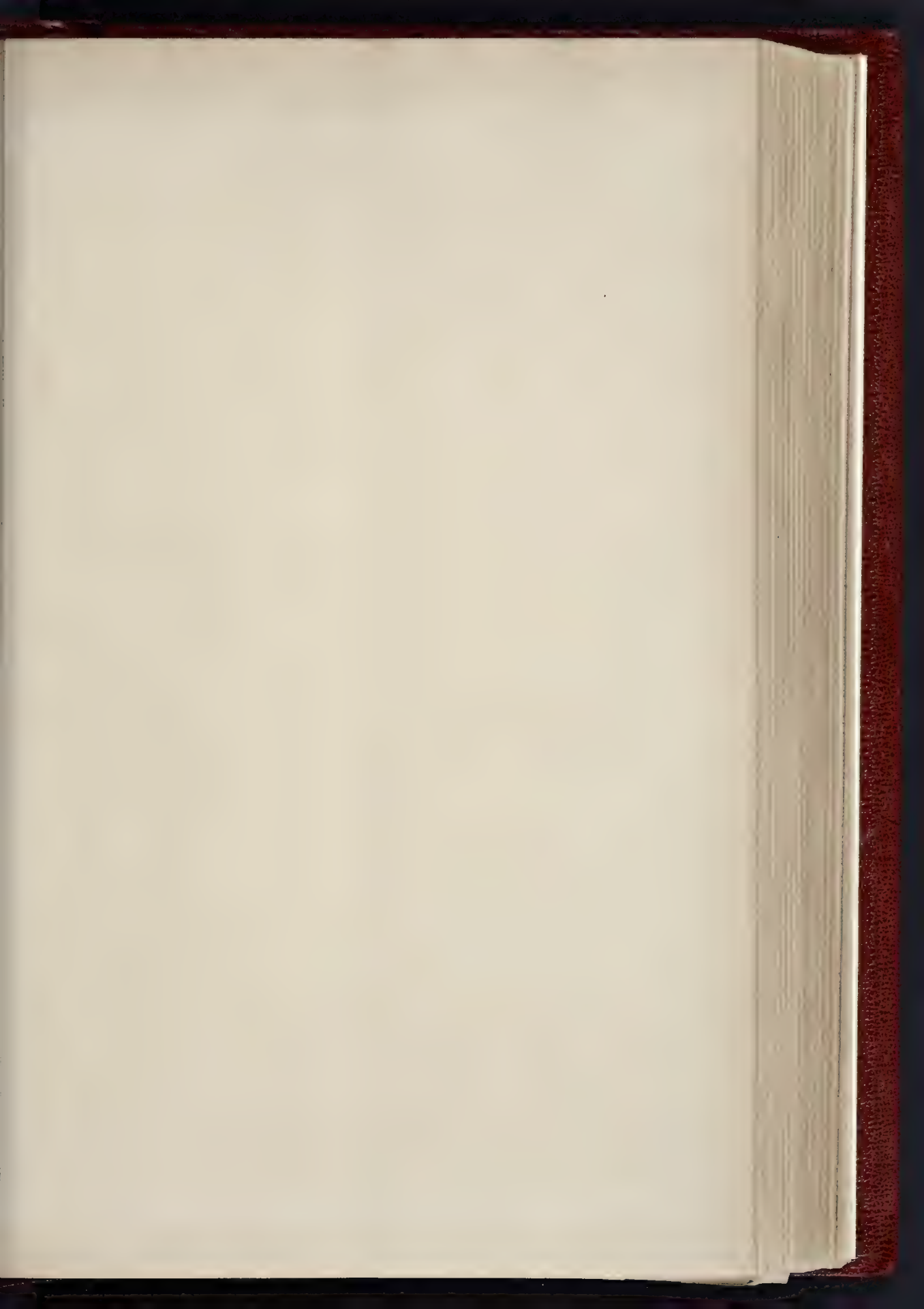
Cement, when taken from the furnace, weighed 110 lb. per bushel. Cement, when ground, leaving 10 per cent. on sieve with 2,500 holes to the inch, weighed 121 lb. per bushel, and when cold 118 lb. per bushel.

When made into briquettes the tensile breaking strain upon the square inch—

At 4 days was .....	410 lb. per square inch.
At 6 days .....	610 lb. " "
At 14 days .....	810 lb. " "
At 49 days .....	950 lb. " "
At 76 days .....	1040 lb. " "

A cylindrical furnace, such as the author has described, is capable of turning out at least 20 tons of good cement per day of twenty-four hours, with a consumption of about 3 tons of slack coal. It will be readily understood that these furnaces can be worked more economically in pairs than singly, as they can be so arranged that one producer may furnish a sufficient quantity of gas for the supply of two cylinders, and the same labour will suffice; but in order to provide for possible contingencies the author advises that a spare gas-producer and an extra furnace should be in readiness, so that by a simple arrangement of valves, &c., two cylinders may always be in operation whilst from any cause one may be undergoing temporary repairs, and by this means any diminution in the output may be avoided.

The advantages accruing from the employment of gas-producers for such a purpose have been abundantly proved in steel and glass-making industries, where a saving of from fifty to seventy per cent. of the fuel formerly employed has been effected. The cost is small; they occupy little room, they can be placed at any reasonable distance from the place where the gas is to be consumed, any labourer can shovel the slack into them, and they do not require skilled supervision.





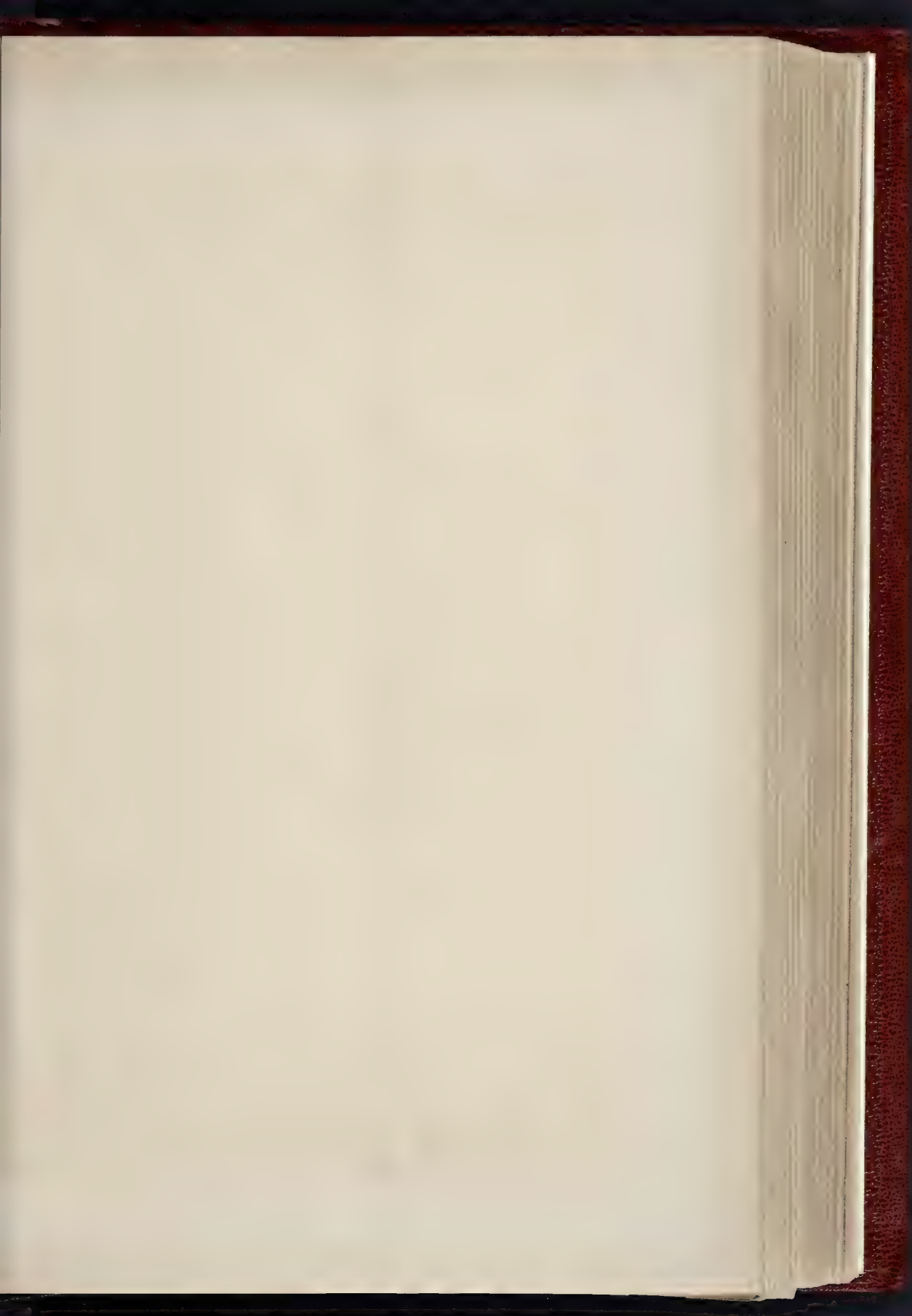


SCHEME OF DECORATION FOR A



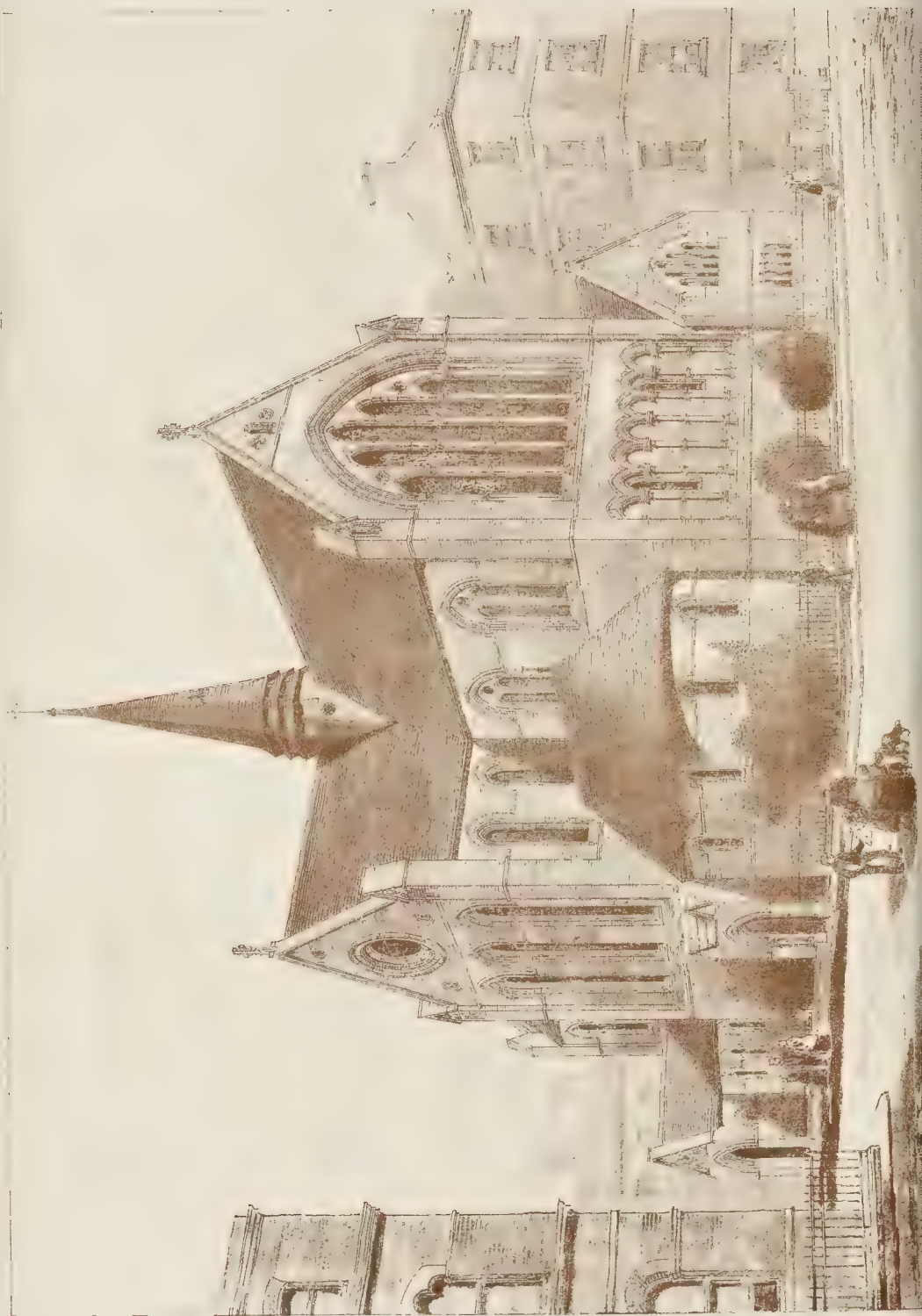




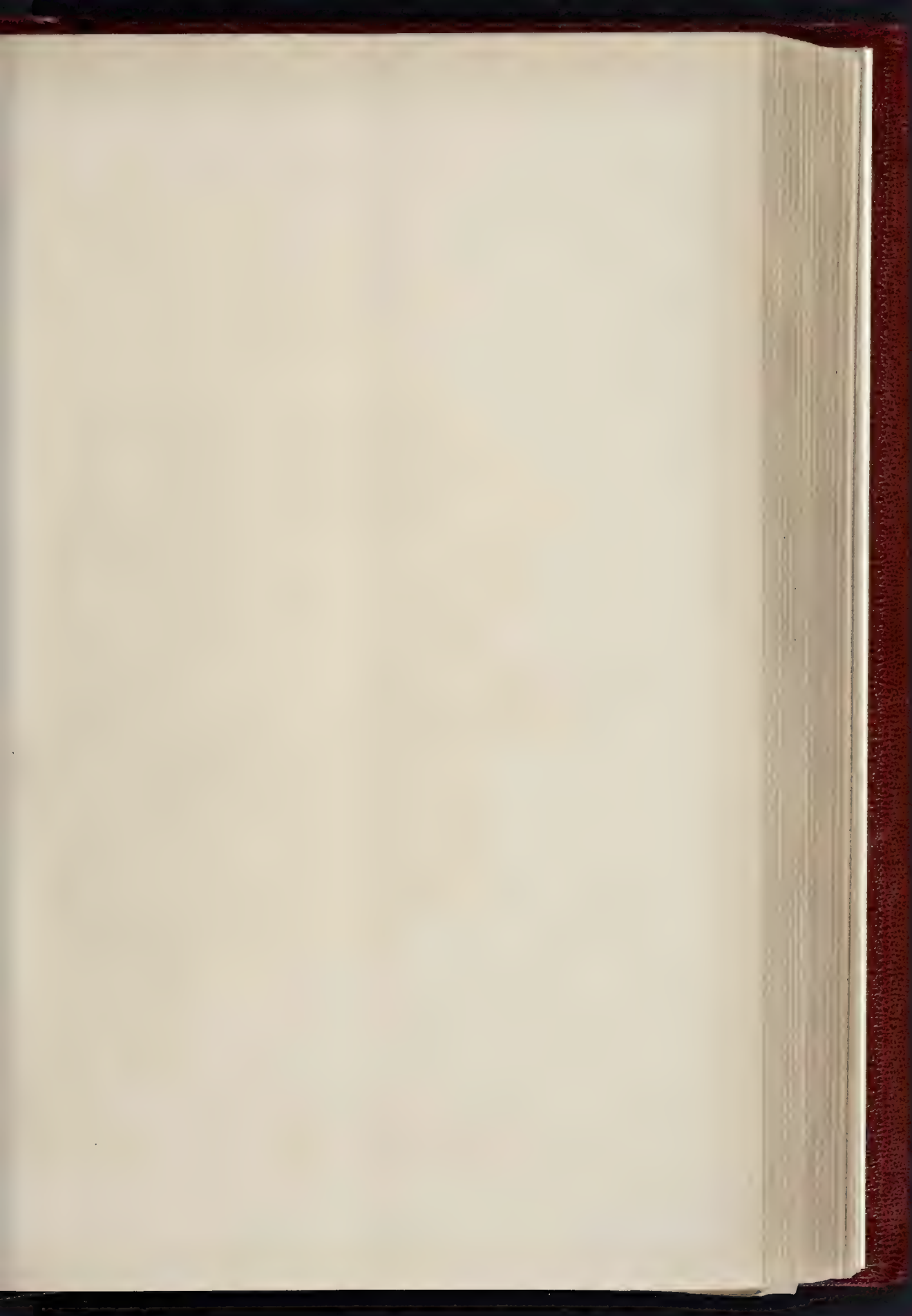




THE BUILDER, SEPTEMBER 17, 1897.



14. PHOTO. SHARLES & CO. 22, WEST 75, N.Y.







SCULPTOR: M. J. SALMON. PHOTOGRAPHER: M. J. SALMON. LONDON.

STATUE OF HANDEL; FOR THE PARIS OPERA HOUSE.—M. J. JULIEN SALMON, SCULPTOR.



CHURCH OF ST. PIERRE DE MONTROUGE, PARIS.—M. EMILE VAUDREMER, ARCHITECT.



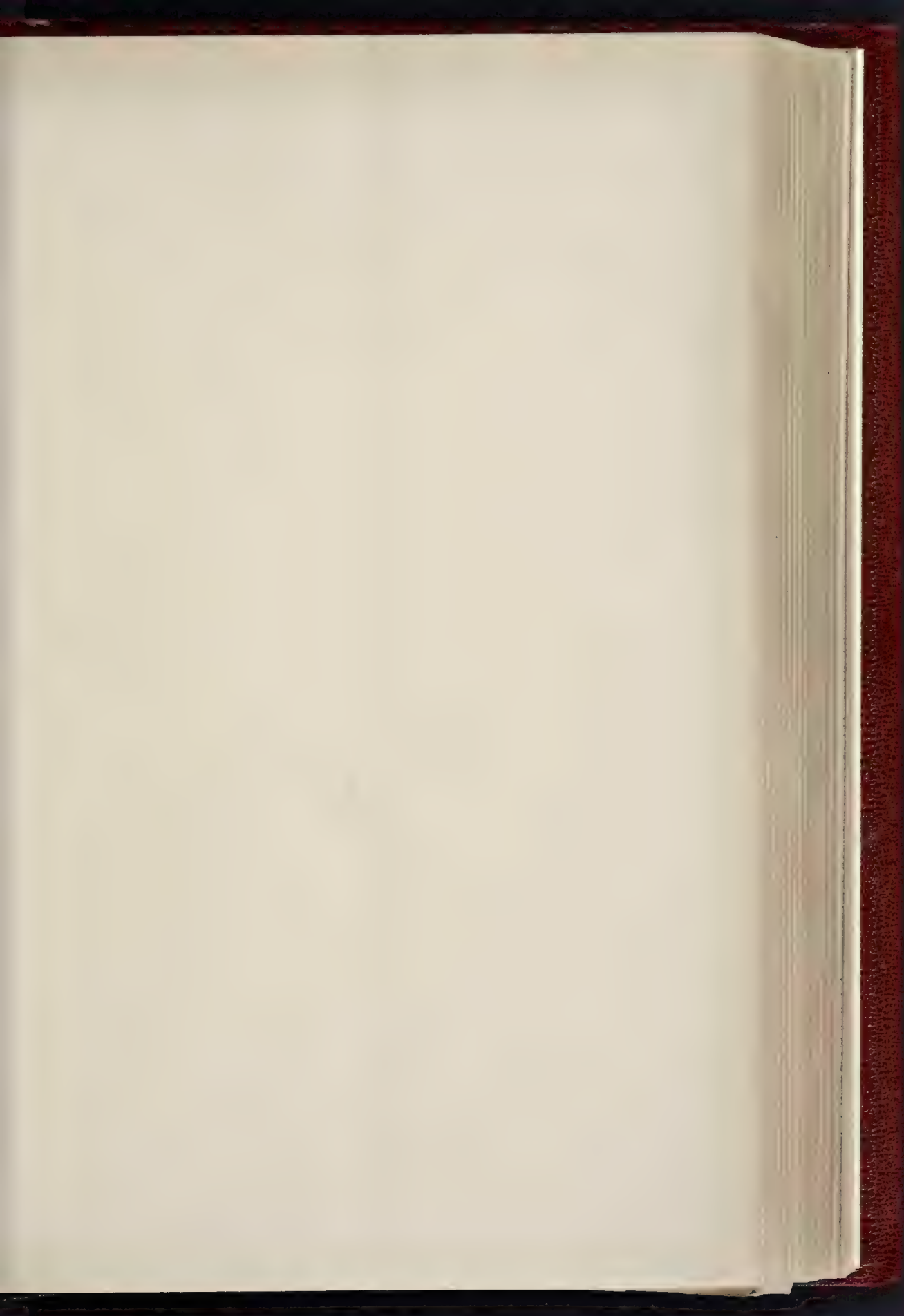




CHURCH OF ST PHILIP, BUCKINGHAM PALACE ROAD.—MESSRS DEMAIN AND BRIERLEY, ARCHITECTS









THE BUILDER, SEPTEMBER 17, 1887.









It is claimed by the author of this paper that the following are some of the advantages derivable from the adoption of this method of manufacturing Portland cement, as compared with the more complex system:—

(1) Economy of space,—the furnaces, with their appurtenances, requiring only about one-fourth the space of what would be occupied by the ordinary kilns for producing a given quantity of finished cement.

(2) By continuous working, loss of fuel by cooling and subsequently re-heating of the kiln walls is avoided.

(3) Economy of repairs, which are of a simple and comparatively inexpensive character and of much less frequent occurrence, as no racking is occasioned by the constant rapid changes of temperature.

(4) Economy in first cost.

(5) Economy in grinding, a friable granular substance being produced instead of a hard clinker, whereby crushers are quite abolished, and the wear and tear of millstones greatly reduced.

(6) Economy of labour,—the conveyance to and the removal from the revolving furnace being conducted automatically by mechanical "elevators" and "conveyors."

(7) Improved quality of the cement, from non-mixture with fuel, ash, or other impurities, and no over-burning or under-burning of the material.

(8) Thorough control,—from the facility of increasing or diminishing the flow of crushed slurry, and of regulating the heat in the furnace as desirable.

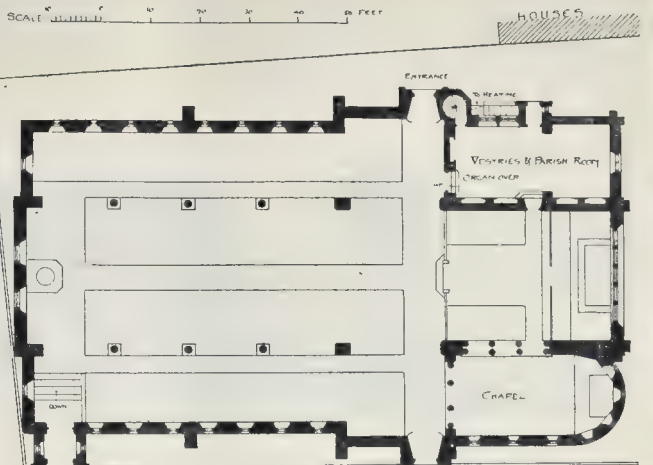
(9) Absence of smoke and deleterious gases.

It is well known that in some localities the materials from which Portland cement is made are of such a powdery character that they have to be combined, being moulded into balls or bricks previous to calcination in the ordinary way, thus entailing expense which would be entirely obviated by the adoption of the revolving furnace. This has been proved by the author, who has produced cement of a fine quality with a mixture of slag-sand from the blast furnaces of the Cleveland iron district,—prepared according to Mr. Charles Wood's process,—with a proper proportion of chalk or other carbonate of lime, which, in consequence of the friable nature of the compound, he was unable to convert in the ordinary cement-kiln, but which, when burnt in the revolving furnace, gave the most satisfactory results. The cement so made possessed extraordinary strength and hardness. It has withstood climatic influences for many years, and it has been a matter of surprise that ironmasters and others have not adopted such a means of converting a waste material,—which, at the present time entails upon its producers constant heavy outlay for its removal,—into a remunerative branch of industry, by the expenditure of a comparatively small amount of capital.

The demand for Portland cement has increased, and is still increasing, at a rapid rate. It is being manufactured upon a gigantic scale. Great interests are involved, large sums of money are expended in the erection and maintenance of expensive plant for its production, and the author submits that the development of any method which will improve the quality, and, at the same time, reduce the cost of manufacture of this valuable material, will tend to increase the prosperity of one of our great national industries, and stimulate commercial enterprise.

Works are in progress for manufacturing cement by this improved process, and the author trusts the time is not far distant when the unsightly structures which now disfigure the banks of some of our rivers will be abolished,—the present cement-kilns, like the windmills, once such a common feature of our country, will be regarded as curiosities of the past, and the manufacturers cease to be complained of as causing nuisances to their neighbours.

**Hope Chapel, Wigan.**—The Building Committee having advertised for designs for a new chapel, near the Market-square, received about a dozen designs from various architects. They ultimately selected, we hear, the one submitted by Mr. George Heaton, architect and civil engineer, of Wigan, as being entitled to the premium offered, viz., fifteen guineas. The cost of the building will be about 3,000*l*.



Plan of St. Philip's Church, Buckingham Palace-road.

### Illustrations.

#### CHURCH OF SAN GIOVANNI IN ZOCOLI, VITERBO.

THE view of the interior of this church is from a beautiful pencil sketch by Mr. Gerald Horsley,—a model of architectural sketching in pencil. As will be seen, it is a small Romanesque church of a good deal of interest and remarkable for its nearly unadorned simplicity of treatment.

#### STATUE OF HANDEL.

THE statue of the great composer, of which we give an illustration in this number, was exhibited in this year's *Salon*, and is intended to be placed in the vestibule leading to the grand staircase in the Paris Opera House.

The sculptor, M. Jean Jules Salmson, though his name is not much known in England, is an artist whose talent was recognised by the award of medals at the *Salon* as long ago as 1863 and 1866, and at the Great Exhibition of 1867. He is Professor of Sculpture at the Ecole des Arts Industriels at Geneva. Among his principal works in former years may be mentioned "La Dévotion," a bronze statue exhibited at the *Salon* of 1869 and now at the Luxembourg; "La Jugement de Paris," a polychromatic group in terra-cotta (*Salon* of 1869); "Phryné devant l'Aréopage," a bronze (*Salon* of 1870); "Henri IV.," a plaster statue for the Hôtel de Ville of Rochelle (*Salon* of 1876). We may mention also four caryatide figures representing Comedy, Folly, Satire, and Music, which form decorations to the façade of the Vandeville Theatre; "L'Innocence, L'Amour, et La Folie," a terra-cotta group the property of the Prince of Wales; and "The First Ascent of Mont Blanc," which was in this year's *Salon*.

In the statue of Handel, M. Salmson has very finely realised the character of the man, as known to us from the various biographical notices and records of his highly characteristic sayings and manners which are extant,—a man with a strongly-pronounced individuality, and a nature at once proud, defiant, and yet generous; and there is a sturdy power in the figure and expression which seems well in keeping also with the character of the composer's artistic productions.

#### ST. PHILIP'S CHURCH, BUCKINGHAM PALACE-ROAD, LONDON.

This church is now in course of erection for Canon Fleming, as a Mission Church to St. Michael's, Chester-square.

The Duke of Westminster gave the site, and has contributed largely to the building.

The designs have been somewhat altered since the perspectives were made. The plan we give, however, is as executed.

The materials used are Gainsborough bricks

for the outside facing, and stocks inside for plastering on; the core of the walls being of cement concrete, bonded with iron. Doubling stone is used for outside work and Coraham inside. The roofs are of pitch pine and fir, covered with Broseley tiles.

The flèche (which is loftier than shown on the view) will be covered with 26-oz. copper.

The church will be seated with chairs, and will hold about 800. The cost, exclusive of furniture, will be slightly over 6,000*l*.

Messrs. Macey & Sons, Strand, are the contractors. Mr. T. W. Creed is clerk of works, and the architects are Messrs. Demaine & Brierley, of York.

#### SCHEME FOR THE DECORATION OF A DRAWING-ROOM.

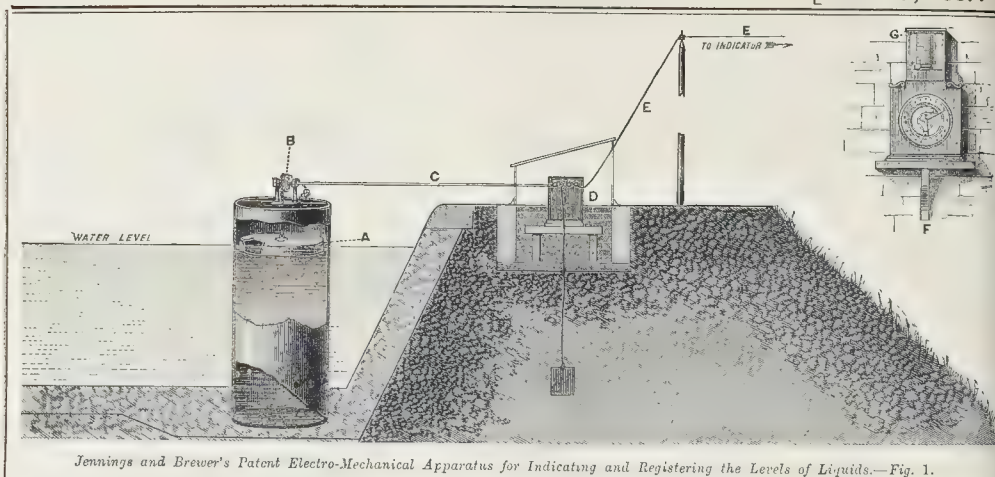
IN this scheme the painted frieze of peacocks is treated mainly in blues and greens on gold; it is divided into long panels by winged genii carved and gilded. The walls are hung with red figured silk in panels; the woodwork is in rosewood, with carved panels; the architraves, dado capping, and skirting are ebonised. In the centre panels of the large doors are bronze medallion heads of Poetry and Music; the smaller panels being enriched by marble plaques in the cartouches. A frieze of Cupids and seahorses over the doors is carved and bronze gilt, with a central tablet of lapis lazuli for the inscription. JOHN T. SHAW.

[The design was hung in the Architectural Room at the Royal Academy of this year.]

**Proposed Registration of Edinburgh Plumbers.**—A meeting of the master plumbers of Edinburgh and Leith was held on the 9th inst., there being upwards of fifty masters present. The object of the meeting was to consider the subject of the registration of plumbers, which was laid before a previous meeting by a deputation from the Worshipful Company of Plumbers, London. The meeting unanimously approved of the registration of both masters and men, and appointed a committee of thirteen to represent them at a public meeting to be held under the presidency of the Lord Provost.

**The Borough Surveyorship of Doncaster.** On the 8th inst. a special meeting of the Council in Committee was held, to consider the applications for the position of Borough Surveyor. The salary is 250*l*. a year. There were 154 applications, which had been reduced to ten, and these were further reduced to five, as follows, who are to meet the Council on the 20th, when the final selection will be made:—W. Spink, Dukinfield; S. G. Gamble, Grantham; W. H. R. Crabtree, Rotherham, Resident Engineer of the Rotherham Waterworks, who obtained the highest number of votes; H. C. Crammack, York; and R. J. Duff, Doncaster, Assistant Borough Surveyor.





Jennings and Brewer's Patent Electro-Mechanical Apparatus for Indicating and Registering the Levels of Liquids.—Fig. 1.

#### JENNINGS AND BREWER'S APPARATUS FOR INDICATING THE LEVELS OF LIQUIDS IN RESERVOIRS, SEWERS, &c.

THE object of this invention, which has been patented by the inventors and is manufactured by Mr. George Jennings, of Stangate, Lambeth, is to register correctly the fluctuations in level of water or sewage at any distance from the point of observation, as, for instance, in reservoirs some miles outside towns, or outfall sewers in low-lying portions of districts liable to flooding. In such cases the apparatus will be found of considerable use and in many instances invaluable, as it indicates truly what is taking place in the reservoir or sewer. It formed the subject of a short paper read by Mr. Walter Jennings at the recent Leicester meeting of the Association of Municipal Engineers and Surveyors. The following is a general description of the apparatus. The above illustration (fig. 1) shows the apparatus working in connexion with a reservoir in which is a cylinder and containing

Fig. 2 shows the arrangement of the transmitter (marked D in fig. 1). The weight G, when raised by the movement of the float, is held in position by a clutch on the lever A catching against a pin on the double revolving arm E. The weight G is released by the lever A when thrust out by a pin on the revolving disc B striking against the adjustable cam on the lever A at C, thereby releasing the weight G and causing the double arm E to revolve one half turn, when it is again caught and retained by a similar arrangement on the obverse side of the transmitter, so that at every period of rise or fall of the liquid in the reservoir the lever A, being alternately acted upon by the disc B, first releases and subsequently holds in position the revolving arm E. The latter, in revolving, presses together the two springs H for an appreciable space of time, thus completing an electric circuit.

Fig. 3 is a kind of isometrical bird's-eye view of the back of the transmitter, showing its commutator and the spindle to which is attached the shaft on which the pulley B rotates.

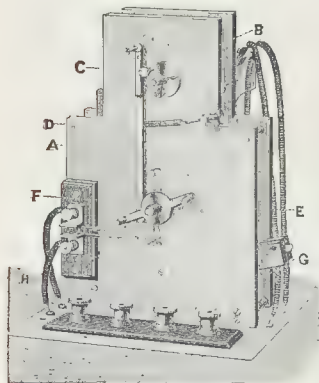


Fig. 2.

the float A. The float is connected to a chain passing over the pulley B, the dead weight of the float being counterpoised by a weight attached to the other end of the chain. The pulley B is keyed to the shaft C, which sets in motion the mechanism of the transmitter D, and at every inch or other period or difference of level (as may be arranged) of rise or fall, an electric current is transmitted along the line E to the indicator or receiver F, which may be situated at any distance from the reservoir and is usually fixed in the engine-room at the pumping station. A recording arrangement, G, can be added, so that a permanent record can be kept of the varying levels during each week on a diagram attached to the revolving drum, which contains a clockwork movement.

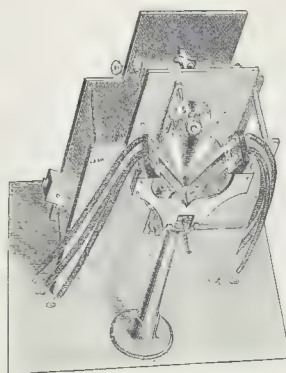


Fig. 3.

Fig. 4 shows the mechanism of the indicator or receiver when at rest.

Fig. 5 is an enlarged view of the upper part of the same mechanism when an electric current from the transmitter is received,—the rods H H having been elevated by the action of the electro-magnets, thereby lifting the levers G G, to which are pivoted the pawls one tooth higher of the wheel A; at the same time a pin at the end of the lever G draws out the opposite pawl clear of the wheel A, and the current, passing through the coils J, attracts the armature on the end of the lever E, the reverse of which is pointed at D to fit into the notched break-wheel B. Upon the current being broken the break is instantly released, and the pawl that has been raised upon falling engages a

tooth and causes the wheels to revolve one section of the circumference and allows the opposite pawl to resume its former position, thus immovably fixing the escapement wheels A, which are fixed with the teeth opposite,

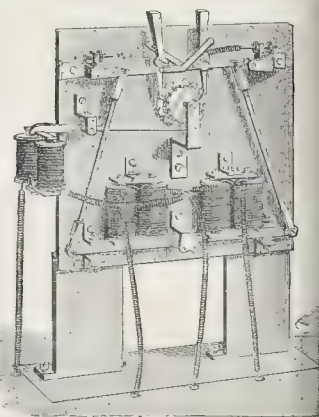


Fig. 4.

thus providing a similar action to take place when the current is reversed by the commutator.

The inventors claim that the apparatus is also applicable for denoting the direction and velocity of air-currents. Into this phase of the invention we need not here enter, but we may

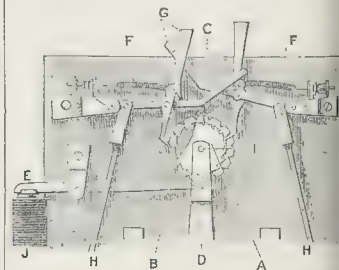


Fig. 5.

mention that when the apparatus was exhibited and described at the meeting before referred to, the general opinion of the borough surveyors and engineers then assembled was that the apparatus is likely to prove of great practical and public utility, especially in indicating the level of water in sewers.



## ARCHITECTURAL ASSOCIATION

The Architectural Association on Saturday, the 10th instant, made one of their vacation sittings to Ascott, the seat of Mr. Leopold de Rothschild, situated near Leighton Buzzard, the being enlarged under the direction of Messrs. Dovey & Williams, architects.

The house was formerly quite a small farmhouse, and has been added to at various times. The present additions consist of a new billiard-room (the present billiard-room being converted to a dining-room), and new kitchen and offices, and large suites of servants' bedrooms and nurseries. The kitchen and sculleries are built with glazed bricks internally, with glazed brick cove to ceiling; arrangements are being made to light the whole of the building with electric light. The house still retains traces of a cottage origin in the height of the two stories, the ground-floor being 9 ft. and the upper floor 7 ft. high. The billiard-room, now a dining-room, is higher, and so also is the new billiard-room: both these rooms are walled throughout in oak.

The external treatment is half timber and rough cast, with tile hangings; the garden outcrop is very extended and picturesquely broken up by various projections.

The position of the house is very charming, giving a fine view across an undulating country to the Chiltern Hills. The gardens, which have recently been enlarged, are beautifully timbered and planted.

The stables, near the house, which is arranged with two yards, have thatched roofs, and are very extensive. They contained forty horses at the time of the visit, which constitute Mr. Rothschild's hunting stud, the racehorses being at the stud-farm and at Newmarket.

The stagbouds are kept in another part of the grounds, and the kennels were visited, and great interest shown in the various arrangements for feeding the hounds. The pack, which consists of thirty-two hounds, were let out into the paddock for the benefit of the members, and were much admired.

In consequence of illness in Lord Rosebery's family, the proposed visit to Mentmore had to be postponed. The house is about four miles from Ascott, and can be distinctly seen from several parts of the grounds at Ascott. Instead of visiting Mentmore, therefore, the party proceeded to Leighton-Buzzard, and examined the fine parish church. This church is cruciform on plan, with a tower and stone spire at the crossing. The spire is remarkable for its tenuity and small broaching. There is a fine wooden rood-screen with curiously-carved dragons on the points of the cusps of the central arch, and bird crockets on some of the other arches. There are good stalls in the choir with return against the rood-screen.

## THE WALLS OF CHESTER.

Sir,—In your issue of the 3rd inst. [p. 320] there is an article by Sir James Picton, on the question as to whether the present walls of Chester show any trace of Roman work. As there has been, and still is, a great conflict of opinion on the subject, permit me, as one of the original promoters of the non-Roman theory, to say a few words in reply to Sir James.

His article may be divided into two parts, firstly, on the portion of the walls seen by the Archaeological Institute last year; and secondly, on the new excavation, near the Phoenix Tower. Sir James says that at the Kaleyard the wall "is built on the old Roman lines." This has never been denied: in fact, from the Newgate angle to the Phoenix Tower, and thence to Morgan's Mount, the wall, as I have argued, both in my "Roman Cheshire" and elsewhere, is on Roman lines. Of the wall at this point (the Kaleyards), Sir James said last year, after both Mr. Shrubsole and myself had explained to him the result of the excavations made by the late Dean Henson at its base, that "it exhibited no signs of Roman work; the characteristic wide mortar joints of Roman work were wholly absent" (*Builder*, August 21st, 1886), and this was chiefly from examination of the large stones projecting at the base and in front of which the excavations had been made. But when Mr. Brock, on the 22nd ult., remarked upon the close joints of the stones at this point, "so close that he could not insert the blade of a pen-knife in them,"

(*Chester Courant*, August 31st), Sir James endorsed his view and declared the wall Roman. As stated in my "Roman Cheshire," I believe the base of the wall at the Kaleyards to be of the time of Edward I., and I think Sir James will find similar close joints without mortar in portions of buildings of much later date.

Sir James further states that there was a "peculiarity" at the east end of the north wall: "a little above the surface the wall was double, with an interval between. This was pronounced to be Mediaeval work of uncertain date." This is exactly where Roman tombstones, &c., have been found in the wall from base to summit. The tombstone of a *Præfectus Castrorum* was met with 6 ft. above the ground surface, whilst a stone bearing two figures, one an ecclesiastic, has been found at the base and in the centre of the wall. Was the latter placed in position first? If so, according to Sir James's idea, it proves that the base must have been erected in post-Roman times, the summit in Roman times, an inverse chronological arrangement.

The North Gate cornice, and wall adjoining, which I have described in "Roman Cheshire," as being composed of Roman stones, brought from some large building (the interior, which Sir James has not seen, is very like the hollow wall he describes above as "Mediaeval, of uncertain date"), he speaks of as being of Roman origin, with repairs and insertions of subsequent date. No one denies the existence of Roman stones in its face; but when were they placed there? We have every reason to believe, in the reign of Anne, when all this part of the wall was greatly repaired. The large stones on the Roodee are next referred to by Sir James. Last year, whilst helping him up on to the lowermost stone, he remarked to me, "This is no Roman wall." To him, and to the Institute generally, whom it had fallen to my lot to conduct round the walls, I explained the result of the excavations made in front of these stones, to the depth of 15 ft., a year or two previously, by order of the Mayor, and he expressly then stated that the stones could not be a Roman wall, but merely (as partial excavations had shown) a retainer to keep the bank from slipping. I believe, as I then and had previously stated, that the stones are Roman, taken from a large building. Sir James is perhaps not aware that at something like 100 ft. behind these stones the remains of a Roman villa lie buried, and if the stones were placed there in Roman times (which I do not for a moment think) it was to keep the ground on which the villa stood from slipping forward (as it has done in the immediate vicinity) into the estuary. They are entirely out of the line of the present walls, and the original wall of the castrum seems to have been far inside, to the eastward; and from the summit of the plateau on which the fortress was built the sloping ground to the Roodee is found to be full of the remains of villas (including that named above) and private graveyards, to the very side of the estuary, sure *indicia* of the spot being extra-mural. A large number both of architects and archaeologists still hold the opinion I have named with regard to these three portions of the walls, and I believe that one or two publications on the subject are forthcoming.

It was a committee of experts, appointed by the Archaeological Institute, who last year examined the walls generally, and especially the points named, and their verdict delivered by the Rev. Dr. Bruce (the historian, and for forty years the incessant explorer of the Roman wall) was that "nothing they had seen was Roman work *in situ*." I am glad to see that even Sir James finally confirms this verdict, for he says in his recent article, "The walls above ground are, for the most part, post-Roman, of various age." This was the great point contended for last year, but I have stated in "Roman Cheshire" and elsewhere, over and over again, that we may expect to find traces of the Roman foundations of the walls, and this was verified in March last by the foundation of the destroyed southern wall being encountered in Bridge-street. It was 8 ft. thick, formed of boulders set in concrete, and so hard that it was with the very greatest difficulty cut through in order to lay gas-pipes. But as to the portion just laid bare on the north face, a loosely-built wall, without mortar from base to summit, of stones of various sizes, though chiefly large ones, many of them taken from Roman build-

ings, others tombstones, friezes, cornices, &c., it presents no feature whatever of Roman construction. I am perfectly aware that in such works as the aqueduct at Nimes, referred to by Sir James at Chester, immense square stones were employed for building without mortar; but I will ask him the further question, Did he ever know of a Roman castrum whose walls from base to summit were built without mortar?

Mr. Roach Smith, in reply to a letter of mine, brought forward the fact of the foundations of Richborough, Reculver, and Lyme having no mortar, but he said nothing of the superstructure. That is a solid mass of stones, concrete, &c., from base to summit.

Instead of the controversy on this subject being "set at rest," as Sir James hopes, I fear it is only just inaugurated.

W. THOMPSON WATKIN.

Liverpool, Sept. 13, 1887.

Sir,—Allow me to suggest a course by which irresistible evidence, and not assumptive evidence, could be obtained, as to the fact that the excavations of August last "have entirely invalidated" the theory of Hyginus.

His life, in the early part of the first century, was before the time of Trajan, for the eastern Prætorium at Rome was constructed on the lines of Hyginus, A.D. 23, and gives a length and breadth of 2,320 ft. by 1,620 ft. This length is found in Chester from Newgate to Phoenix Tower; the breadth thence to Morgan's Mount; the other sides, or, rather, side and end, are now existing beneath two perpendiculars erected on these known base lines on the east and north; approximately, under Nicholas-street and its continuation, and in Pepper-street and through the centre of the garden of the Probate Court in Whitefriars.

Until these existing, yet buried, foundations are disproved, I hold that the theory of Hyginus was put into practice in Chester, as the discovery of the hypocast in Bridge-street and Feathers-lane proves the site of the valetudinarium.

Allow me to take exception to another remark in the article—"The Via Prætoriana, intersecting the city in its length, crossed by the Via Principalis." The Via Prætoriana led only from the Prætorian Gate (the North Gate, near Whitefriars) up to the Via Principalis (to the site of St. Peter's Church), and did not cross that street.

With these corrections, I cordially agree with the remarks.

GEO. EDDAILE.

Stretford, Sept. 13, 1887.

## SHONE'S EJECTORS IN THE RECENT RAIN-STORMS.

Sir,—It was prophesied some time ago by certain unctuous engineers, who are very hostile to Shone's hydro-pneumatic system of drainage, that upon a very heavy rain-storm occurring at Westminster Shone's three ejectors, of 1,100 gallons aggregate capacity, and Atkinson's four gas-engines of four horse-power each, on the Houses of Parliament, would be overpowered and the basements there drowned. On the 17th ultimo a phenomenal and tropical rainfall occurred at Westminster, far beyond anything of the kind that has taken place in London for many years past, namely, of 0.59 in. in depth per hour, or 14.16 in. per day of twenty-four hours. As the area draining to the ejectors is 10 acres, the quantity of water draining therefrom to be ejected was 357 cubic feet, or 2,227 gallons per minute.

This quantity the three ejectors and the four gas-engines, all working together, successfully discharged, without any flooding whatever of the basement. It results from this fact that the ejectors received and discharged 1,113 gallons of water every half-minute during the storm. The lift was 20 ft. to the head of water in the main sewer outside, and 1,113 gallons of compressed air at 10 lb. pressure on the square inch were produced by the gas-engines and consumed by the ejectors per half-minute. I may state that for about two minutes the reserved storm water sub-way received about 2,000 gallons of water from the overflow thereto in the sewage manhole, which, however, soon drained away as the storm subsided.

I am glad to congratulate Mr. Shone on his ejectors performing their functions so admirably and so successfully. I felt assured that they would do so from what I had seen of their performance elsewhere. It was this that gave me confidence to recommend their adoption, under the peculiar circumstances, at the Houses of Parliament, in preference to ordinary pumps, whether centrifugal or otherwise.

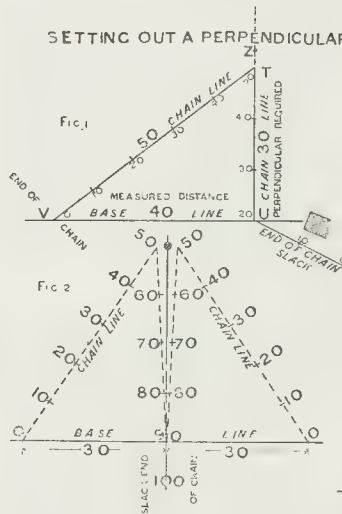
JOHN PHILLIPS, C.E.



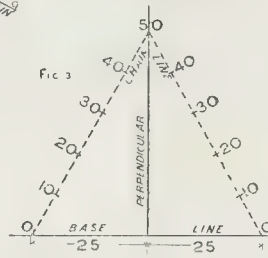
## SETTING OUT A PERPENDICULAR WITH THE CHAIN ONLY

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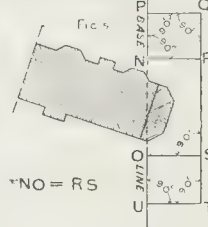
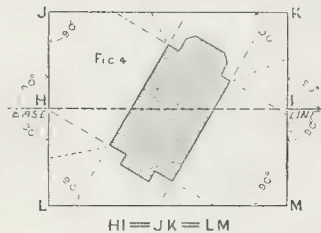
$$3^2 + 4^2 = 5^2 \text{ (EUCLID BOOK PROP. 1)}$$



PERPENDICULAR SIDES	INCLINED SIDE
3	4
5	12
7	24
8	15
20	21



## OBSTACLES IN RANGING SURVEY LINES



## The Student's Column.

## LAND SURVEYING AND LEVELLING.

## XII.—SETTING OUT LINES.

**Perpendiculars.**—A perpendicular in a horizontal plane to a base line may be set out with the use of a chain only, in the manner shown by figures 1, 2, and 3. A right-angled triangle is formed, having its sides in the proportion of the numbers given in the accompanying table to fig. 1; but the proportion of 3, 4, and 5 is generally selected, as the points of intersection at the angles are here more clearly defined than they would be if the proportion of the other lengths were taken. A distance of 40 links is measured along the base line in fig. 1 from the point at which the direction of a right angle is required. The assistants then hold the handle of the chain at V, and the 80th tally at U, while the surveyor holds the 50th tally, and pulls up the chain at T, so as to form the sides of the triangle T U V, respectively equal to 50 and 30 links with the chain. T U is thus set out at right angles to V U. If, instead of 40 links, 80 links be measured along the base line from U to V, then the 90th tally must be held at U to obtain a similar triangle as shown in fig. 2. Should the chain be suspected to be out of order, as indicated by the dotted lines in fig. 2, the exact direction of a right angle may be obtained by setting out the triangle upon both sides of a perpendicular and bisecting the distance marked by the 50th tally upon the chain to obtain the position of the full line, shown in fig. 2, between the dotted triangles. If the 50th tally comes to the same point in both cases it shows the method to have been correctly applied and the chain to be sufficiently accurate for the purpose. In fig. 3 an equilateral triangle is formed by measuring 25 links along the base line upon each side of the point at which the right angle is required, and while the handle at each end of the chain is held by the assistants at the points so arrived at, the surveyor pulls out the chain and marks the position of the 50th tally, through which the perpendicular line would pass.

**Obstacles.**—Fig. 4 shows how the distance H I may be measured when a rectangle can be

## SETTING OUT CURVES CASE I—

FIGURE 1

$$CAB + CBA + ACB = 180^\circ$$

$$ACB = 180^\circ - 2CAB$$

$$CAB + BAD = 90^\circ$$

$$2BAD = 180^\circ - 2CAB$$

$$ACB = 2BAD$$

$$ACB = \frac{AB}{2RAD} \times 360^\circ$$

$$ARC \text{ CIRCUM} \times 360$$

$$2BAD = \frac{AB}{RAD} \times 57.295$$

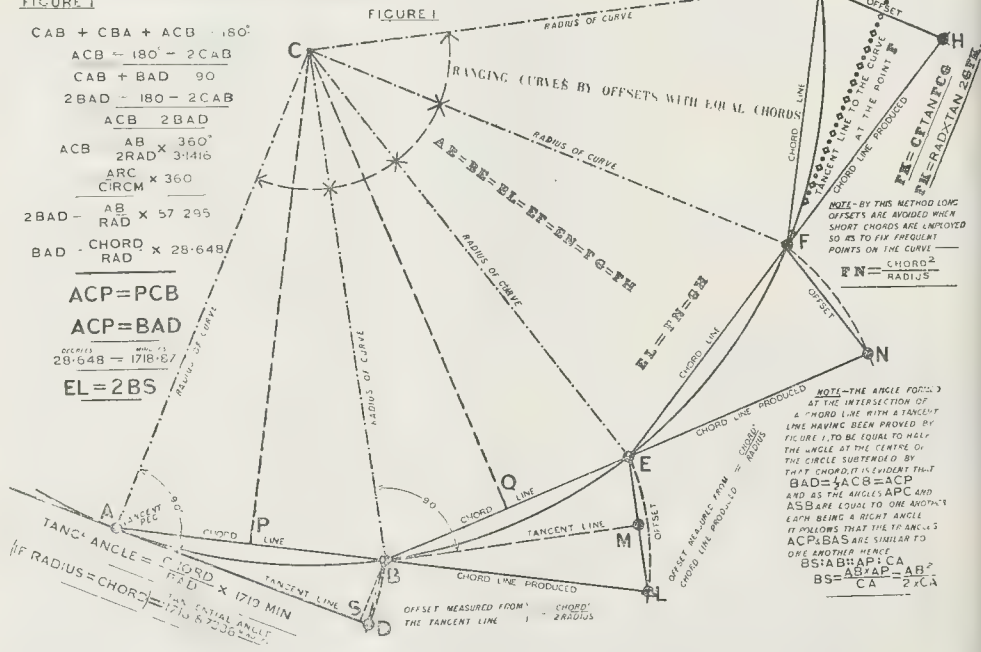
$$BAD = \frac{CHORD}{RAD} \times 28.648$$

$$ACP = PCB$$

$$ACP = BAD$$

$$28.648 = 1718.67$$

$$EL = 2BS$$



NOTE—BY THIS METHOD LONG OFFSETS ARE AVOIDED WHEN SHORT CHORDS ARE EMPLOYED SO AS TO FIND FREQUENT POINTS ON THE CURVE.

NOTE—THE ANGLE FORMED AT THE INTERSECTION OF A CHORD LINE WITH A TANGENT LINE HAVING BEEN PROVIDED BY FIGURE 1, TO BE EQUAL TO HALF THE ANGLE AT THE CENTRE OF THE CIRCLE SUBTENDED BY THAT CHORD. IT IS EVIDENT THAT  $BAD = \frac{1}{2}ACB = ACP$  AND AS THE ANGLES  $APC$  AND  $ASB$  ARE EQUAL TO ONE ANOTHER, EACH BEING A RIGHT ANGLE, IT FOLLOWS THAT THE TRIANGLES  $ACP$  &  $BAS$  ARE SIMILAR TO ONE ANOTHER. HENCE  $BS = \frac{AB \times AP}{CA} = \frac{AB^2}{2 \times CA}$

formed upon both sides of it, and fig. 5 shows how the distance N O may be measured when can be passed upon one side only. With a view of proving the accuracy of the work the perpendiculars at each end are erected upon the perpendiculars of the base line in fig. 4, while in fig. 5 double perpendiculars are set out at each end upon the side of the building that admits of it, as marked. The buildings can be surveyed by offset measurements from the sides of these triangles. The right angles can be best set at either by the use of the optical square or by staff. A theodolite being adjusted generally for long vision only, will not be found to be so accurate for the short distances at which the angles are here fixed.

**Curves.**—The angle between a tangent line and a chord being proved by the consideration of Case 1 to be equal to half the angle at the centre of the circle subtended by any given length of chord we are enabled to set out a curve as shown in the diagram (fig. 1), the length of the successive chord lines and chord arcs produced being measured with a chain and the offsets with a tape. The unit angle, the angle in which the chord is equal to the radius, is seen to be 67°29'55" degrees at the centre of the circle, giving a tangential angle with the chord, equal to 28°6'48" degrees, or 19 minutes nearly. This unit tangential angle serves as a constant, which enables us to set out various points in a curve independent of the determination of the centre of the circle.

# ANCIENT CHAIR IN THE BODLEIAN LIBRARY.

Sir,—In regard to the chair illustrated in our issue for Sept. 3 [p. 326], called the "Porteusian," and of which it is said "it probably formed a part of the furniture of Saldon House, Mursley, Bucks, the seat of Sir John Porteus," the internal evidence implies that the original owner must be a different person.

On the finely-carved back of the chair there are two heraldic lions rampant, supporters to what appears, by the fruit at the top, to be a fig-tree. These lions are presumably the supporters of the original owner, for whom the chair was made. Apart from any colour in the carving, these lions exactly represent the supporters of the Duke of Devonshire, viz., two lions rampant *argent*, as depicted in the "Notitia Anglica," which is the best authority I have (1724); whereas the Porteus supporters are, two greyhounds *argent*, *collared gules*, or, with line *gules*.

ROBERT ESSERY.

Northampton, Sept. 9th, 1887.

# DUTIES OF A CLERK OF WORKS.

Sir,—The letter of "Architect" in your last issue (p. 378) complains of the brevity of my tract. I now there is a popular prejudice in favour of brevity, but I have endeavoured to make the few pages as concise as might be, and I have no desire to add to them at present.

The clause on p. 36 is so palpably a clerical error that I do not think it will mislead any one. The words should be, "if there are ceiling joists." The other clauses referred to I am content to leave as they stand.

JOHN LEANING.

# VARIORUM.

THE Science and Art Department's "Directory revised to July, 1887," with Regulations for establishing and Conducting Science and Art Schools and Classes," has just been issued, price 6d. (London: Eyre & Spottiswoode). The title in the present edition, we are told, supersedes those in all former editions, "and are always subject to revision." The "Directory" gives "the Regulations common to Science and Art," and describes the nature of the "aid granted towards instruction in Science and Art." As an authoritative setting-forth of the wishes and commands of "South Kensington," the book will be very handy for reference by students as well as by teachers.—Mr. Banister Fletcher, F.R.I.B.A., has done well to publish in pamphlet form his lecture, delivered at Carpenters' Hall in March last, on "English Carpenters and Foreign Competition" (London: T. F. Batesford, 52, High Holborn). As was noticed in our columns at the time, the lecture abounds in statistics and other information pregnant with meaning to our English carpenters, who should not be slow to profit by Mr. Banister Fletcher's warning words.—"Health, and how to promote it, with Hints on House Drainage," &c., a brochure consisting of a paper read by Mr. V. J. Addiscot, Assistant Inspector, Sanitary

Department, Plymouth, in the George-street Lecture Hall (London: Alexander & Shepherd). Mr. Addiscot's views are, in the main, sound, and for the most part they are well expressed, but there are some bad misprints in the pamphlet, notably in line 18 of page 8, where for "facial" read "focal."—"Petroleum: Hints to those who use it," is an illustrated pamphlet (printed by White & Pike, Moor-street, Birmingham), consisting of a series of articles by Mr. Boverton Redwood, F.C.S., and other authorities on the subject, who give statistics and other particulars relating to the natural supply of the oil, both American and Russian, the construction and use of petroleum lamps in relation to safety, the detection of bad and dangerous oils, and the use of petroleum as a fuel. Now that the dark evenings of winter are approaching, this pamphlet, if carefully read (it is sold for threepence), may be the means of preventing many a lamp "accident."—From the City and Guilds of London Institute we have received the "Programme of Technological Examinations, Session 1887-88" (London: Published at the Central Institute, Exhibition-road, South Kensington). This is a work of similar character and usefulness to that mentioned at the outset as emanating from the Science and Art Department. In the list of subjects and examiners we find the following:—Carpentry and Joinery, Examiner, Mr. Banister Fletcher; Brickwork and Masonry, Mr. John Slater; Plumbers' work, Mr. S. S. Hellyer. We notice that candidates in either grade of Plumbers' work may, in addition to the written examination in that subject, present themselves for a practical examination, and candidates who pass this practical examination will receive a special certificate. The syllabuses of all other subjects have been revised, and important alterations made in some of them, particularly in Subject 34, "Carpentry and Joinery."—From the Phoenix Fire Office (19, Lombard-street) we have received a copy of the second issue of the tenth edition of "The Phoenix Fire Office Rules for Electric Light Installations and Electrical Power Installations," as drawn up by Mr. Musgrave Heaphy, C.E. We noticed the ninth edition when issued a few months ago (see *Builder*, May 28, 1887, p. 793). Mr. Heaphy informs us that although the rules have been extensively adopted since 1882 (they being the first of the kind, he says, drawn up in this country), not a single fire has yet occurred from any electrical installation that has been carried out in compliance with them. We notice, however, that Mr. Heaphy still deems it allowable for conductors to pass through party-walls, provision being made "so that the conductors cannot be a means whereby fire can be communicated from one risk to another." In our opinion, as we said when noticing the ninth edition, it is most undesirable that conductors should pass through a party-wall at all, and we think that such a course should be absolutely forbidden. We cannot but adhere to our view that if several houses are fed with the electric current from a common source, the connexion of the branches with the main should be perfectly separate for each house. But this notwithstanding, the value of Mr. Heaphy's rules as a whole is undoubted, and that they are widely appreciated is shown in the fact that they are largely used in America and the Colonies, while they have been translated into various foreign languages. As we have before said of these rules, no one should attempt to put up even a small installation without their guidance.

# RECENT PATENTS.

## ABSTRACTS OF SPECIFICATIONS.

12,574, Automatic Draught Regulators for Furnaces, &c. E. C. Mills.

According to this invention a copper expansion-rod is fixed in a straight length of the return pipe, and one end of the rod being fixed and the other free to move, a connexion is made by suitable mechanism on to the draught-door or damper of the furnace. When, by reason of the heat, or increased heat of the fluid in the return pipe, the afore-mentioned rod expands, the slight motion of its free end is multiplied largely by a slight curvature of the strut arms and tension rods, which are so fixed as to form a kind of combined horizontal and vertical lazy-tongs. The motions of the final pairs of rods are added together by the quadrant lever, whose fulcrum, mounted on the sliding tube, travels in one direction, while its

"power centre" is caused by the internal rod to travel in the opposite direction; the weight or quadrant end thus traversing twice the distance it would if its fulcrum were stationary.

12,806, Improved Slide Rule. G. Bousfield.

The rule which is the subject of this patent has been constructed primarily to simplify the measuring of round, square, and unsquared timber, but it is also capable of very many other uses. The inventor claims, "in a slide rule the combination of a scale for taking off quantities from plans, a decimal slide for solving the various problems now obtained by the ordinary brass slide in slide rules, duodecimal scale for cubing round, square, and unsquared timber or scantling, and a graduated scale of standard measurement for showing, without calculation, a comparison between lineal, superficial, and cubic feet of any size, and the relative St. Petersburg standard measurement; the instrument also serving the purpose of an ordinary two-foot rule."

12,859, Chimney Tops or Caps. H. S. Obbard.

The mouth or orifice of the pot made according to this invention is contracted, and a fluted outer beading slopes inwards and upwards towards the mouth, so as to cause the smoke to issue with more force. The wind will carry the smoke upwards by means of the fluted beading, and by a slight overlapping of the mouth by the cap the wind is prevented from blowing down the chimney.

8,341, Improvements in Door and Window Fittings. W. Griffiths.

The principal part of the invention is the use of a flat-headed stud or pivot forced down into a socket by a flat spring. This is adapted as a fastening for doors and windows.

9,583, Wood Block Paving. D. Goddard.

The blocks in this system of paving are grooved both for the keys or tongues which bind them, and also on the lower edges for fixing the block to cement or asphalt bed.

9,635, Thumb Latches. J. Lurdley.

The latches which are the subject of this patent, instead of being mounted on a fixed stud or pivot, are mounted with a short crank arrangement by which the latch can be more easily lifted, and can also be used as a bolt by being pushed forward under a stud which prevents it from being raised from the outside.

9,666, Improved Flooring Cramp. W. B. and N. N. Haigh.

The principal improvement in this invention consists in making a cheap and efficient flooring cramp in as simple a manner as possible, and to dispense with the necessity for screwing or otherwise winding back the sliding head to release the board after nailing; after, by the action of a lever, the board has been forced home. Pressure on a little foot-plate at the side releases the ratchet, which held it fast so long as was required. The construction is simple.

## NEW APPLICATIONS FOR PATENTS.

Sept. 2.—11,903, H. Hosack, Heating and Circulating Water.—11,912, A. Bout, Door Fasteners.—11,937, J. Homan, Fireproof Floors.

Sept. 3.—11,957, J. Wiltshaw, Mounts of Door and Other Knobs.—11,961, B. Turner, Door Springs.—11,966, J. Petter, Stoves and Fireplaces.

Sept. 5.—11,993, G. Woodcroft, Sash Fasteners.—11,996, S. Rhodes, Making Bricks.—12,014, G. Brower, Automatic Apparatus for Closing Doors.—12,023, G. Hayes, Bars for Glazed Sashes.

Sept. 6.—12,034, A. Ledger, Drawing Boards and T-squares.—12,062, H. and S. Denham, "Filler" used in French polishing.

Sept. 7.—12,116, E. Johnson, Lock Knob and Spindle.—12,117, J. Lee, Heating and Circulating Water.

Sept. 8.—12,133, T. Robinson, Cross Cut Saw Benches.—12,141, G. Kelley, Four-handed Reversible Door Lock and Latch.—12,160, W. Allen and K. Holmes, Bolts for Doors, Windows, Casements, &c.—12,161, G. Redfern, Water Meter.

## PROVISIONAL SPECIFICATIONS ACCEPTED.

10,231, Q. Backus, Domestic Stoves and Chimney-pieces in combination.—10,876, C. Perrot and Others, Stove Grates.—10,762, W. Lewis, Fire-clay, Terra-Cotta, or Fire-brick Domestic Fireplaces.—10,779, E. de Pass, Imitation White and Coloured Marble.—10,377, W. Youlton, Fireproof Floor Construction.—10,895, J. Anderson, Stays and Fasteners for Hinged Window-sashes, Casements, or Doors.—10,902, E. Deacon, Locks, Catches, and Latches.—10,928, A. von Fuchs-Baurett, Water-closets, Privies, &c.—10,990, F. Henson, Bolts for Doors, Casements, &c.—11,193, J. Hale and C. Simmons, Water-closet Pans and Traps.—11,324, J. Smith and A. Roberts, Lavatories, &c.—11,435, A. Allom, Ventilation.—11,205, H. Groggen, Combination Gully Trap and Channel.

## COMPLETE SPECIFICATIONS ACCEPTED.

### Open to Opposition for Two Months.

14,245, W. Shuttle, Hot-water Boiler for Heating Greenhouses, Conservatories, &c.—14,284, E. Verity and Others, Lever Latch for Doors.—14,322, J. Smeaton, Water-closets.—6,539, F. Caulfield, Levelling and Surveying Instruments.—8,507, A.



Miller, Sectional Monuments.—10,726, A. Boulton, Privies and Privy Seats.—13,603, C. Whitehouse, Augers and Boring Bits.—13,616, R. Schofield, Brick and Tile Making Machinery.—14,443, A. Henderson, Door Latches, &c.—14,448, H. Johnson, Lock Bolt for Windows, Doors, &c.—14,469, H. & A. Foster, Sawing Machinery.—14,538, W. Sargent, Circular Glass Ventilators.—8,755, E. Emanuel, Flushing and Trapping Overflows to Water-closets.

#### RECENT SALES OF PROPERTY. ESTATE EXCHANGE REPORT.

By JAMES LEWIS & Co.	
Kentish Town—64, Willems-road, 34 years, ground-rent 57.....	£280
Camden Town—186, Great College-street, 42 years, ground-rent 10s.....	400
By FRANK HARRIS.	
Greenwich—17, Stockwell-street, freehold.....	1,105
Catford—1 and 2, Ravensbourne-villas, 70 years, ground-rent 6s.....	760
By E. STIMMONS.	
Peckham—43, Copse-road, freehold.....	445
Camberwell—11, Grosvenor-park, 24½ years, ground-rent 4½ ls.....	220
Walworth—8, 10, 11, Smith-street, 10 years, ground-rent 12s.....	330
Clapham, St. Stephen's-terrace—A ground-rent of 2s½ per annum, 76 years.....	1,550
Canning Town—A ground-rent of 80s. 10s. per annum, 71 years.....	1,310
Brixton—30, Raeburn-street, 86 years, ground-rent 6s. 12s. 6d.....	275
Wandsworth—8, Ryeholm-street, 45 years, ground-rent 6s.....	240
Peckham Rye—5, Annot-street, 88 years, ground-rent 4s. 10s.....	225
By BLACK & DAWKIN.	
Greenwich—11, College-pace East, 18 years, ground-rent 11. 15s.....	130
Deptford—28 and 29, James-street, 61 years, ground-rent 6s.....	325
Greenwich—109, King George street, freehold.....	310
By C. C. & T. MOORE.	
Mill End—62 to 70 even, Ernest-street, freehold.....	1,300
Commerce-road East—No. 953, 83 years, ground-rent 7s.....	55
Stratford—14 and 16, Durdere-street; and 1, Wharf-road, 79 years, ground-rent 12s. 10s.....	405
14, Wharf-road, freehold.....	275

#### Miscellaneous.

**Sale of Building Sites at Lee-on-the-Solent.**—A few days ago a large company attended a sale of building sites by Messrs. Lunley, at the new sea-side watering place of Lee-on-the-Solent. The prices realised for the several lots sold were double those obtained at the early sales of the estate. The number of plots offered was twenty-eight, of various sizes, several of them containing an area of half an acre and upwards. On the sale commencing, there was an active demand for the several sites submitted. Three shop plots in the High-street, near the pier, having frontages of 36 ft., and depths of 120 ft., were sold for 65s. each. Three other sites in Cambridge-road and Portsmouth-road, having frontages of 120 ft. and similar depths, realised 95s. each. Two sites in Portsmouth-road, containing an area of half an acre each, with frontages of 88 ft., and depths of 250 ft., were sold for 145s. and 155s. each. The highest prices obtained were 270s. for a block in Gosport-road, having a frontage of 392 ft. and a depth of 105 ft., and containing an area of nearly an acre, and 220s. for another block opposite, having the same frontage of 392 ft., and a depth of 80 ft., and containing an area of nearly three-quarters of an acre. The purchaser of these two plots was Mr. Clifton, of London. It was stated that the plots afforded sites for the erection of nearly sixty cottages with 14 ft. frontages. A number of smaller plots, having frontages of from 40 ft. to 70 ft., and depths of from 80 ft. to 100 ft., were sold at prices ranging from 40s. to 55s. each.

**"Leaflets of Furniture."**—Under this title, Messrs. Walker & Sons, the well-known cabinet manufacturers of Bunhill-row, are now sending forth by instalments a preliminary issue of a portion of a new illustrated catalogue. The leaflets include illustrations of hall, library, dining-room, drawing-room, and bedroom furniture (most of it suitable in design), as well as a selection of Messrs. Walker's excellent wood chimney-pieces and overmantels. We have, on former occasions, spoken of the excellence of workmanship which characterises Messrs. Walker's productions.

**Church Fittings.**—A set of oak choir-stalls has been placed in Brewod Church by a former parishioner, in commemoration of his residence in the neighbourhood for twenty-three years. They were constructed by Messrs. Jones & Willis, of Birmingham and London.

**The Employers' Liability Bill.**—At the meeting of the Trades' Union Congress at Swansea last week, Mr. Inglis moved: "That this Congress regrets that the Government has failed to carry out the promise to deal with this subject during the present session of Parliament, and urges upon the Parliamentary Committee to persevere with the matter until an amendment of the existing law is carried upon the lines of the measure promoted by Messrs. Burt and Broadhurst." Mr. Inglis went through the proposed amendments to the present Act, all of which he said he cordially approved of. The Employer should be responsible for the negligence of any person in his service, because they knew it was an easy matter for employers to relieve themselves from responsibility by their definition of "the person in charge." It should also be made illegal for employers to contract out of the Act. He felt assured that the Congress would confirm the amendments proposed, and he trusted that the members of the Parliamentary Committee would use every effort to get them passed. Mr. Matkin (Liverpool), who seconded the motion, thought they ought to do something more than express their opinion, of which no notice would be taken. The Parliamentary Committee should impress upon members of Parliament in the various districts the necessity of passing the amendments proposed. Mr. Pitt (Glasgow) and Mr. Munro (Belfast) said they did not think that three years' compensation was sufficient in cases of permanent injury or death. Mr. Inglis said that the Bill provided for compensation up to 500s. After some further discussion, the motion was carried.

**Tasmanian Forests.**—The Hobart correspondent of the *Australasian Builder* writes:—"Our new Minister of Land and Works has promised to bring the conservation of Tasmanian forests into a practical shape. At present restrictions prevent the cutting and sale of timber either for export or for use in our own markets, the latter a very manifest absurdity, because when the cutting is restricted to legitimate use there is no fear that the abundance of timber we possess can ever be unduly depleted. A ridiculous instance of how the present restrictions work was recently given on the west coast, where a bridge is being erected across a river, the materials used being American and New Zealand timber, imported at a heavy cost, while along the banks on each side of the stream fine timber is growing in abundance,—blue gum, myrtle, stringy bark, and celery top pine,—all eminently suited for the purpose. It is proposed now to lay open a good many acres of pine-bearing land on the west coast for public use, which will be the means of yielding revenue to the public exchequer, and a great convenience to the building trade and the general community."

**Builders' and Contractors' Hardware.**—Messrs. F. W. Reynolds & Co., of 73, South-west-street, have sent us a very well-got-up and useful trade book, entitled "Architects' Illustrated Catalogue of Builders' and Contractors' Hardware." It contains particulars of open and close fire kitcheners, portable and "self-setting" ranges, boilers, gas-cooking apparatus, slow-combustion and register stoves (many of them appropriate and good in design), "parsons' grates," &c. This section of the catalogue is very complete. The catalogue also contains a large selection of Messrs. Reynolds's patent and other locks and furniture, brass-work, &c. Their new patent double-handed lever mortise and rim locks have much to recommend them. Stable fittings, sanitary appliances, and cast and wrought iron gates and railings are some of the numerous other goods figured and described in this very useful and presentable catalogue.

**Messrs. R. Waygood & Co.**—We have received from Messrs. R. Waygood & Co., the well-known engineers and lift-makers, a copy of the *Gazette* notice of the alterations in their firm, consequent on the retirement of the senior partner, Mr. J. M. Day, in favour of his son, Mr. Charles Day, who has for many years held a leading position in the business. We understand that, notwithstanding his retirement, Mr. Day, senior, will continue for the present to give the firm the benefit of his long experience in those departments which were under his more immediate personal control. The partners of the firm, as now constituted, are Mr. W. R. Green, Mr. H. C. Walker, and Mr. C. Day. The firm will continue to be known as "R. Waygood & Co."

**The Importation of Bricks and Tiles into Turkey.**—A correspondent of the *Manchester Courier*, writing from Constantinople, lays particular emphasis on the great demand for bricks, tiles, and draining pipes which he says exists in Turkey. Large quantities of solid and hollow bricks used to be imported formerly from Marseilles, but these are now produced in the country itself, and all foreign competition becomes impossible when such low-priced and heavy article has to bear freight, duty, and loss by breakage. Flat tiles 13½ to the square metre are furnished by Marseilles, and are substituted in all new buildings, and are displacing the round tiles produced in the country, which break under a slight weight. About 2,000,000 of such flat tiles are exported annually from Marseilles to Constantinople. They weigh 2,550 kilos, and their price in Marseilles is about 76 fr. Freight per steamer may be reckoned at 10 fr. per ton, and at about 5 fr. by sailing vessel. These tiles are, therefore, burdened with 50 per cent. of expenses in the shape of freight, duty, &c., and yet prove a profitable article of exportation, at least at present.

**Glasgow Architectural Association.**—The usual monthly meeting was held on the 6th inst.,—the President in the chair,—when three short papers were read. The first of these, "Friezes and Pilasters of the Italian Renaissance," by Mr. Geo. Tudhope, are dealing with the subject-matter in detail, was prefaced by a brief notice of the general principles regulating the choice and application of ornament. A second paper by Mr. Geo. Mackenzie considered the figure subjects introduced into the sculptured ornaments of the same style, particularly the examples of Della Robbia, Raffaello, Fiesole, and other masters. The third paper was by Mr. Wm. M.G. Petrie, and described the ornaments of one building, the Church of St. Maria at Brescia, one of the richest examples in Italy, illustrated like the preceding paper by numerous photographs, but supplemented by several sepia drawings. A short discussion ensued, followed by thanks to the several essayists.

**Architecture at the University of Sydney.**—From the *Sydney Morning Herald* for July 21st we learn that at a meeting of the Senate of the University of Sydney, seven applications which had been received for the position of Lecturer in Architecture during Michaelmas Term were received and duly considered. It was resolved, on the motion of the Vice-Chancellor, seconded by Professor Gurney,—"That Mr. John Sulman, F.R.I.B.A., be appointed to the office." Professor Gurney gave notice of the following motion,—"That Mr. Sulman be authorised to expend a sum not exceeding 100l. in preparing diagrams or drawings, &c., for use in his course of lectures on architecture." Mr. Sulman, whom we congratulate, is well known in London.

**New Railway Station at Gloucester.**—Mr. Jenkins, of Plymouth, to whom the contract was let at about 20,000l., last week commenced operations for the construction of the new Great Western Railway Station at Gloucester. A number of men are engaged in digging foundations on the ground in the rear of the houses in George-street.

**Grosvenor Gallery.**—We are glad to learn from the *Athenaeum* that there is shortly to be an exhibition at this Gallery of the works of the Russian painter, Verestchagin, an artist of remarkably original genius, whose works are well worthy of more attention than they have hitherto received in this country.

#### PRICES CURRENT OF MATERIALS.

TIMBER.		£.	s.	d.	£.	s.	d.
Greenheart, B.G.	.....ton	6	0	0	7	10	0
Teak, E.I.	.....load	10	0	10	13	0	0
Sassa, U.S. yellow	.....do	0	2	3	0	3	0
Ash, Canada	.....load	3	0	0	4	10	0
Birch	.....do	2	0	0	3	10	0
Elm	.....do	2	10	0	4	10	0
R.R. Dautsch, &c.	.....do	1	10	0	4	0	0
Oak	.....do	2	10	0	4	10	0
Canada	.....do	3	0	0	6	0	0
Pine, Canada red	.....do	2	0	0	3	10	0
Yellow	.....do	0	6	0	4	0	0
Lath, Dautsch	.....fathom	3	0	0	5	0	0
St. Petersburg	.....do	4	0	0	5	10	0
Walnut, Riga	.....log	0	0	0	0	0	0
Odessa, crown	.....do	2	10	0	3	0	0
Deals, Finland, 2nd and 1st	.....std. 100	7	0	0	8	0	0
4th and 3rd	.....do	5	10	0	6	10	0
Riga	.....do	5	10	0	7	0	0
St. Petersburg, 1st yellow	.....do	8	0	0	13	0	0
2nd	.....do	7	0	0	8	0	0
white	.....do	6	10	0	8	10	0



LONDON.—For building house and shop, at 4/s.  
 Bond Green road, Mr. J. W. Baker, architect.—  
 Allen & Co. .... 2730 0 0  
 Royal ..... 780 0 0  
 Burman & Son ..... 590 0 0  
 Baker ..... 588 0 0  
 Batley ..... 585 0 0  
 Garrett ..... 563 0 0

LONDON.—For alterations and additions to The Arns-  
 nuns-court, Aldermanbury. Mr. A. Dixon, architect:—  
 Walker ..... 4332 0 0  
 Allen & Co. .... 419 0 0  
 Dlyton ..... 396 0 0

LYMINGTON.—For sewerage works at Lymington.  
 Mr. James Lennox, M.Inst. C.E., Engineer.  
 T. Neave, Leytonstone ..... £15,585 0  
 Howell, Poole ..... 14,985 7  
 Whetnam, Weymouth ..... 13,350 0  
 Sanders, Southampton ..... 13,346 0  
 Edwards, South-bow-  
 Sea ..... 13,334 0  
 Neave & Son, Faddington ..... 13,300 0  
 Denton, Erih ..... 13,175 0  
 Perkins, Lymington ..... 13,047 0  
 Harrison, Brighton ..... 13,000 0  
 Adams, Kingsland-road ..... 12,988 0  
 Ffrench & Co., London ..... 12,980 0  
 Meader, Cowes ..... 12,560 0  
 Kingswell, Isle of Wight ..... 12,400 0  
 Bill & Co., Plymouth ..... 11,967 0 ..... £21,928 10s  
 Pitt & Co., London ..... 11,753 0  
 W. H. Deazie, Chichester ..... 11,400 0 ..... 11,780 0

## COMPETITIONS.

## CONTRACTS

## PUBLIC APPOINTMENTS.

## TENDERS

## TENDERS.

BERMONDSEY.—For rebuilding four cottages, Wood-  
s-place, Bermondsey, for Mr. Wilkins. Mr. E. Crosse,  
contractor. —

LLANRWST.—For erection of stables and other out-  
buildings, for Mr. R. Jones. Mr. W. E. Jones, architect,  
Anglesea Estate Offices, Menai Bridge:—  
W. & O. Pritchard, Llanfair, P.G.\* ... £280 0 0  
\* Accepted.

LONDON.—For alterations to 73 and 77, Queen Victoria-street, E.C. Mr. Robert J. Worley, architect:—

E. Toms .....	£1,698	0	0
Green & Lee .....	1,567	0	0
E. Lawrence & Sons (accepted) .....	1,563	0	0

LONDON.—For rebuilding No. 21, Wigmore-street, W.  
Mr R. J. Worley, architect. Quantities by Mr. R. C.  
Gleed:—

Bush .....	\$3,018	0	0
Perkins .....	2,945	0	0
Smith .....	2,883	0	0
Perry & Co. ....	2,754	0	0
W. & F. Cronker .....	2,753	0	0
Downs .....	2,746	0	0
E. Lawrance & Sons .....	2,686	0	0
E. Toms .....	2,643	0	0
Green & Lee .....	2,465	0	0

LONDON.—For erecting warehouse, No. 59, Mansell-street, Whitechapel, for Messrs. S. & H. Harris. Messrs. Wigg, Oliver, & Son, architects. Quantities by Mr.

Herbert Name:—		
Pritchard & Sons .....	£3,060	0 0
Eaton .....	2,638	0 0
Little .....	2,585	0 0
Conger .....	2,479	0 0
Exton & Burton .....	2,119	0 0
Lusk .....	2,112	0 0
Consett Bros. ....	2,068	0 0

LONDON.—For alterations to shop premises, 181 and 183, Old Kent-road, for Mr. T. Summers. Mr. J. S. Quilter architect :—

*First Contract.*

Wm. Downs .....	£1,220	0	0
Canning & Mullins .....	1,071	0	0

Scofield .....	£242	0	0
Millar .....	190	0	0
A. White & Co. ....	167	0	0
Taylor & Son.....	110	0	0

**NORWOOD.**—For the erection of a Free Library building, for the Lambeth Libraries Commissioners. Mr. Sidney R. J. Smith, A.R.I.B.A., architect, 15, York-buildings, Adelphi. Quantities supplied:—

	Fittings.	Total.
Wallis Bros. ....	£4,056	£5,460
Hall, Beddall, & Co. ....	3,783	449
W. Smith .....	3,750	435
Nightingale .....	3,653	425
W. & A. Greenwood .....	3,719	347
Higgs & Hill .....	3,494	415
Candler .....	3,430	570
J. & C. Bowyer .....	3,682	302
F. O. Richardson .....	3,568	379
J. & F. H. Higgs* .....	3,540	330

\* Accepted.

RAMSGATE.—For the erection of "Salvation Army barracks" at Ramsgate, for "General" Booth. Mr. E. J. Sherwood, architect, 101, Queen Victoria-street, London, E.C. Quantities by the architect:—				
	Large	Small		Total.
	Hall.	Hall.		
J. Munday, Wimbledon.....	£1,650 0	...£220 0		...£1,870
W. W. Martin, Ramsgate....	1,615 0	... 165	...	1,780
W. J. Corbett, Lonsdale.....	1,331 0	... 166	...	1,497
M. Cogens, Canterbury.....		... 166	...	1,487
Amos & Ford, Whitstable....	1,197 10	... 169	...	1,366

\* Too late.      † Accepted for large hall.

RICHMOND (Surrey). For the supply of York stone paving and road materials. Mr. Walter Brooke, A.M.Inst.C.E., Town Surveyor:—

<i>Fork Paving.</i>	A.	B.
	s. d.	s. d.
Bentley & Kay, Rastrick, Brighouse	—	5 6
J. Brooke & Sons, Hipperholme.		

near Halifax (accepted) .....	—	.....	5 6
Camm Bros. Brighouse, Yorkshire .....	5 5	.....	4 4
W. T. Chadwick, Liverpool .....	6 0	.....	5 8
S. Genise & Co., Rotherhithe .....	—	.....	6 5

Hill & Sons, Manchester.....	—	4 2
J. Munro & Son, Richmond .....	6 10	6 4½
J. Milnes & Son, Brighouse, York- shire .....	5 8	5 5

Nowell & Robson, Kensington .....	5	5	.....	5	4
Scotgate Ash Co., Pateley Bridge...	—		.....	5	4
Trickett & Sons, Millwall .....	—		.....	5	4
Vint Bros., Idle, near Bradford.....	—		.....	5	9

S. H. Watkins Brentford .....	5 11 .....	5 11
E. Webster & Co., Eccleshill.....	— .....	5 9
A. Price per yard delivered in parish yard.		
B. Price per yard delivered on railway.		

Road Materials (at per cubic yard).			
ton	per	cu	yd.

	Brock Guernsey	Graham Pennington	Charles Flinn	Brown Flinn
--	-------------------	----------------------	------------------	----------------

	s. d.	s. d.	s. d.	s. d.
G. Alldred, Strand-on-the-Green .....	—	—	4 7	4 7
C. Covington, Railway Wharf,				

Battersea .....	—	—	4 7	4 7
Daily, Twickenham .....	—	—	4 6	4 4
Downs, Richmond.....	11 4	12 9	4 0*	4 0*
Eastwood & Co., Belvedere.....				4 2

road, Lambeth .....	—	—	—	4 2
Emmerson & Co., Brentford ..	—	—	5 6	4 9
Fennings & Co., London Bridge, 11 10	—	—	—	—
J. Horsford, Care, near Fever-				4 7

snam .....	—	—	—	5 7
F. D. Kennedy, Richmond.....	13 6	—	5 5	5 2
A. & F. Manuelle, Leadenhall- street .....	11 7	—	—	—
C. M. Manuelle, Rensselaer- street .....	11 7	—	—	—

W. A. Manders, Fenchurch-	12	0	—	—	—
street					
Mowlem & Co., Millbank	11	5	—	—	—
Nowell & Robson, Kensington	11	0*	—	—	—
G. Pearce, Brantford	—	—	4	11	4
				5	

J. A. Price, Bristol	—	—	—	—
J. Runnalls, Penzance	—	12	3	—
Wills & Packlan, Sittingbourne	—	—	—	4 8

\* Accepted.







# The Builder.

VOL. LIII. No. 2329.

SATURDAY, SEPTEMBER 24, 1887.

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### The Roman Wall in Scotland.



WITHIN thirty minutes' walk of the outskirts of Glasgow, on the north-west, and well overtaken by the five-mile radius from the Royal Exchange of that city, is still to be

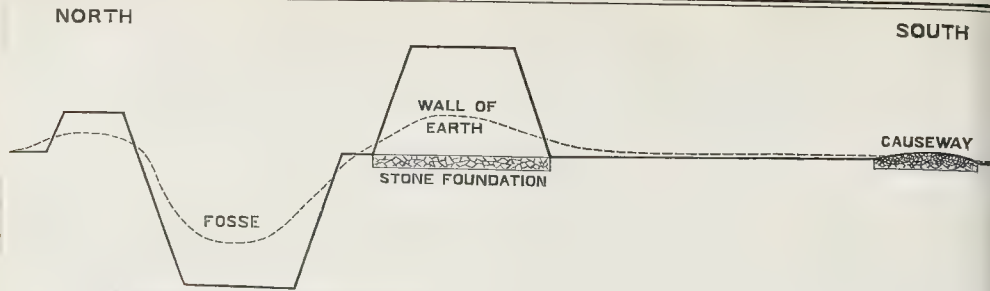
found a small, but wonderfully-preserved portion of the military barrier which Antoninus Pius caused his legions to draw across the isthmus between the Forth and the Clyde, A.D. 140. Although thus at the doors of the citizens, so to speak, with an excellent public road hard by, its existence is not at all generally known to them,—perhaps not generally known even to those of them who are distinctly smitten by the infection of antiquarian research. The best parts of the Roman Wall between the Forth and the Clyde, as pointed out in a former *Builder* article, are to be found on its mid-sections between Kirkin-tilloch and Falkirk, the remains discoverable to east and west of this great central stretch having, as a rule, made more rapid progress to the goal of complete effacement. Nevertheless, both to east and west of this central stretch exceptional vestiges are to be found,—to wit, a carefully-tended portion within the park ground of Callendar House to the east, and to the west this other most interesting sample, situated quite within the suburban area of Glasgow, and now to be more particularly referred to. Examined on a modern map, the work of the engineers of Lollius Urbicus, the general who then commanded the imperial forces in North Britain, is found entering Stirlingshire from the east after traversing half the breadth of Linlithgowshire. Thence it passes into a detached portion of Dumbartonshire, which ultimately leaving, it dips for a mile or two just within the north-western border line of Lanarkshire, after that re-entering Stirlingshire at a narrow south-western spur of that county, and finally passing into Dumbartonshire mainland, where the western termination of the work has place.

From Kirkin-tilloch westward the remains are generally difficult of recognition, except to the practised eye; but on Ferguston Muir, within the south-western spur of Stirlingshire, above alluded to, and close to the point where the three last-named counties meet, there is a short strip which has been little affected by the hand of man since the date of its construction, in the year 140, and not very much by the influence of the elements. Ferguston Muir,

once of wide extent, borders the north-west turnpike out of Glasgow on the route to Strathblane and Aberfoyle. It is not quite five miles from the centre of the city, and near to the point in question the Loch Katrine Aqueduct cuts in upon the ground, crosses the site of the wall, and passes citywards. The major portion of it has long since been "de-moored" under the gradual advance of tillage operations and experiments. Quite recently the encroachments of suburban villa builders have further pared away what agriculture had spared, and, the upland being breezy and healthful here, if Glasgow flourishes as it has done, perhaps the whole of it is bound to go the same road some day. But that time is not quite come yet, and a small part of the moor remains, unmolested apparently for nearly seventeen and a half centuries, and with the trench of Lollius Urbicus scored across it about as plain as ever it was. A country road (which at this point is no less than the ancient military way itself,—that military way which accompanied the barrier over the whole of its length at a variable distance southward, rarely exceeding 150 yards, and traces of which are here and there still discernible), skirts the moor from the direction of New Kilpatrick, after crossing at right-angles the main turnpike above mentioned, and thence mounting a somewhat steep rise of the ground which here occurs. The small portion of the moor still undisturbed is bounded on the south by this parish road,—or forgotten military causeway, rather,—while to the west, and of very moderate acreage indeed, there is a field in tillage which is all that now shields the relic from the onward march of the villas with which the road is becoming fringed, the latest built and most advanced of these being only at the further breadth thereof, and perched right on the site of the all but rubbed-out Roman work itself. Fields in crop or grass adjoin to the north and east, and also on the other, or southern side of the parish roadway. The strip of virgin moor possesses, perhaps, barely 200 square yards of area in all, and from the road there is nothing out of the way to catch the eye, the Roman work being visible, indeed, in the swelling of the southern agger, but not in such a manner as, at that distance, to suggest anything more than the natural surface contour of a patch of unproductive ground. It is only when the wire fence has been furtively violated, and the one hundred and fifty yards' breadth to the north traversed, that the truth of the matter begins to be dreamed of. Such chance, a few weeks ago, to be the incidental experience of the writer, who certainly knew himself to be not far from the line of the Roman vallum, and was unquestionably on the scent

for traces of it in thus incontinently constituting himself a trespasser, but had not the faintest notion that here, so far to the west, a really "good bit" was still existent. On gaining the summit of what seems at first but a broad natural furrow, but which is, indeed, the southern agger of the work, only a good deal flattened, the fosse or ditch at the feet of the spectator at once stands confessed, the bottom partially clogged, but still in well-defined measurements, and in shape and cutting virtually as the Roman digging implements left it. For a stretch of nearly three hundred yards the work proclaims itself in lines unmistakably bold, and at either extremity where the trench suddenly levels up into fields long under tillage, the course of the obliterated vallum is still discovered to the eye by a streak of differently-tinted vegetation, as if the throwing out of the ditch earth and (after some centuries) the filling of it in again had made a lasting mark on its capacity for grass growth. Across the unreclaimed portion of the moor the ancient barrier holds its way quite regular and unbroken, the fosse from 8 ft. to 10 ft. of clear depth, and at least 20 ft. wide from lip to lip. Measurements varied at various parts of the Roman wall in Scotland, according to the exigencies of the position for attack and defence, and here it has been by no means of quite maximum proportions, but rather of a size midway between the largest and the average. As a specimen, however, it is scarcely inferior to the best preserved portions still existing in the neighbourhood of Castlecary, Roughcastle, and Tamfour, a little to the west of Falkirk. The main agger, or wall of earth, on the south brink is of course trained off in its angles and altitude by centuries of beating down action on the part of the elements; but it is there distinct enough over the whole of the 300 yards (or thereabouts) of moor remnant, and its summit level is still to be measured by feet. According to the plan followed by the Roman military engineers, the earthen wall, when making its way across morass ground, rested on a foundation of roughly-dressed stone laid in thinish courses of from 10 ft. to 18 ft. broad, and here such foundation exists still, to be unearthed by comparatively small exertion of spade-work although concealed from the unaided eye. It is, indeed, well on record that from this point on Ferguston Muir eastward for about a mile the proprietor of the ground quite early in last century systematically levelled the main agger of the work, and in doing this filled up the fosse, in order to quarry and carry away a sufficiency of the Roman foundation stones wherewith to build the new park wall he had decided to erect, and in this wall surrounding the neighbouring demesne of Douglaston these





The Scottish Roman Wall in Profile, as constructed. (The line of dots shows existing condition where well preserved.)

stones are to be seen to this day. The agger on the north bank, always of small size as compared with its southern companion, and certainly not continuous from sea to sea, is distinctly visible on the Ferguston patch; thickish turf grass clothes the whole, down even to the bottom of the fosse, the sides of which also afford growth space for some scanty shrubwood planted promiscuously by the unstudying hand of nature. The only modern contrivance traceable to the hand of man is an open runlet of small dimensions cut by some rural drainman from end to end along the bottom of the trench (a ditch within a ditch), dry in summer, and in wet times carrying off the superabundant moisture to a neighbouring burn. For the most part devious in the course pursued, the Roman work is remarkably so in the section of which this Ferguston strip forms a fraction, more particularly after passing the site of the fort where New Kilpatrick now stands, and until that of Kirkintilloch is caught up. The land here is almost wholly reclaimed now, the very small fragment, above particularised, being about as belated a portion as any, although, considered as no more than a bit of waste ground, it also may be held as fairly drained. Morass surface must have been painfully abundant in the second century of the Christian era, however, and, as we now see, the Roman work perforce became uncommonly erratic of gait, perpetually zig-zagging in obtuse angles with the view of picking out the least unpromising of the rather unfavourable routes which were alone at disposal.

The Roman wall here, as elsewhere along its course, is locally known as "Græm's Dyke," and the story has been told times without number how that a Caledonian chieftain named Græme bore from his northern fastnesses in force upon the barrier of the invaders, throwing down a portion of it, and thus carving out a passage for himself and his followers, with the result that the people at once took to calling the rampart by the new name of "Græme's Dyke," and persevered in that ever after. In some accounts the actual spot where this alleged forlorn hope exploit took place is set down, but the whole story bears strong suspicion of gratuitous fabrication, the original author having most likely simply set his faculty of invention to work to account for the otherwise incomprehensible title of "Græm's Dyke," some centuries after the original signification of the word Græm, or Græms, or Grime had been forgotten. Doubtless, the Caledonians early found their way to the south of the barrier by simple dint of swarming into the ditch (for the most part dry), and climbing out of it again and over the agger on the opposite side,—a feat not calling for any extraordinary exertion on the part of mountaineers, at least, at points where the work was unguarded by soldiers,—but the special violation put to the credit of the mythical Græme must be held in the main as apocryphal, since, unfortunately for the ingenious bit of North British fiction, there are extant in England (Oxfordshire and Hampshire, for example) various bits of Roman work of similar earth-work construction, also known locally as "Grimes" or "Grimm's" Dyke. It is almost beyond all question that the term Græm or Grimm is generic; and that the

Græm of Scotland and the Grime or Grimm of the south of England (perhaps also the "Grim" of Grimsby) are one and the same. It has been hazarded that the title is of Celtic parentage, and simply means the "black" dyke; but this effort at solution hardly affords satisfaction, for the aggers and ditch, although no doubt black and grimy enough when fresh from the spade, would speedily become covered with a growth of vegetation. However, by the title of Græme's Dyke or by any other name the wall of Antoninus Pius is but little noticed or discussed on the part of the people through whose towns and fields it passes. Population abounds in the neighbourhood of Falkirk, Kirkintilloch, the two Kilpatrick's, and Dunlocher, and especially where the ancient Roman work all but touches Glasgow, but probably out of the inhabitants of these places (Glasgow included) not one in ten thousand ever consciously saw a bit of it. The small portion above described is, of course, no new discovery, being well enough known to a handful of people. It is also duly mentioned in Horsley's "Britannia Romana," published in 1732 and recognised as well preserved then, but even so recently as 150 years ago good bits were much more plentiful than now, and the mention accorded is after all only a passing one.

#### NOTES.

**T**HE verdict of the jury on the Exeter Theatre fire, which all our readers will have seen in the daily papers of Thursday, is no doubt what may be called an indignation verdict, and on one or two points the remarks made are certainly very unreasonable; as, for instance, that if the architect had raised the roof of the auditorium it would have carried up the smoke and allowed the audience time to escape. This was in accordance with the evidence of one witness, but that was merely the witness's opinion, not a statement of fact, and no raising of the roof would have really made any appreciable difference in the collection of the smoke, unless it had been raised to a height quite unreasonable and such as would have injured the acoustic qualities of the theatre. But in general, the verdict, strong as it is, must be accepted, as far as we can gather from the evidence, as a just one. The licensing magistrates must bear considerable responsibility for their carelessness in not satisfying themselves that the changes they required had been carried out; but we fear it is impossible to deny that the main *onus* of the matter rests on the architect, Mr. Phipps, who, as a theatre-building specialist, ought to have been the person to be most urgent in insisting on every possible structural precaution being taken, whereas he appears to have adopted the opposite part of making light of the requirements and even promising things which he never took care to see performed. We do not say that any one is responsible for all the fatal result, because in the panic in which the gallery audience obviously were we believe they would not in any case have got out without some fatal results; but there can be no doubt that the catastrophe was rendered much worse than it might have been owing to the structural defects in the building. The main factors

in this were the want of sufficient exit from the gallery, the want of a fire-resisting curtain at the proscenium (we purposely avoid the word "fireproof"), and the existence of the door in the wall between the stage and auditorium portions of the house, through which the smoke seems to have obtained direct access to the gallery stairs. The partition wall itself being thinner than the Board of Works' requirements did not affect the result in this case, though we hold that the wall between stage and auditorium portions should rather be 18 in. than 9 in. Of course, a theatre built as this was might have gone on safely for years, but a sudden fire finds out its weak points. We wish we could defend the architect, but we can see no ground for doing so. It seems to have gone into the matter with as light a heart as if fatal disasters from the burning of theatres had never been heard of. We regret this on more than personal grounds, since it casts a discredit on the architectural profession, which many ill-natured and illogical people will be eager to make the most of.

**A**LTHOUGH railways are of course made with the intention, or, at least, the hope of attracting commerce, very few have succeeded so far as the Canadian Pacific Railway in so short a time after its opening. Nor is it only the traffic of the country that it has monopolised, for that goes without saying, but it is that it has diverted already so much of the sea traffic. Japan, for instance, is having its trade revolutionised since the opening of the line, and particularly in the articles of tea and silk. Last year the great route for tea was through the Suez Canal, while the silk went to America *via* San Francisco. Now, however, the Canadian Pacific steamers take it for transport to Vancouver, and the Vice-Consul at Higo states it to be his conviction that in a very short time not only the tea, but a fair share of the general export trade, will go altogether by Vancouver. It is no wonder that the trade of some of the Japanese ports, such as Yokohama, should have increased during the year by 1,250,000%. One of the great increases, curiously enough, is in wire, the Japanese having, to a great extent, discarded their national bamboo umbrellas, and taken to making and wearing umbrellas and parasols on the European model.

**W**E hear that the Exhibition to be held at Glasgow next year will include one feature of remarkable interest. The promoters of the Exhibition, we are told, intend to do for sculpture what the Manchester Exhibition of this year has done for painting, and to form a representative collection of the sculpture of the last half-century. This is, indeed, news of interest to all lovers of art. At Manchester the splendid exhibition of paintings of the last fifty years was supplemented only by a few scattered works of sculpture, placed here and there as ornaments, but forming a very unimportant portion of the Exhibition. And it has been nearly the same in all similar Great Exhibitions, as far as we can call to mind. Sculpture has never been represented collectively on a large scale, and in a manner worthy of so great and intellectual a branch of art. The information reached us informally and in course of conversation, but we have no reason



doubt that it is correct, and we wish the management of the Glasgow Exhibition every access in so admirable a proposal. It will save many of us to Glasgow who might not otherwise go. It is to be hoped that the best advice will be sought in regard to the design, arrangement, and lighting of the sculpture galleries,—even more important with sculpture than with pictures.

It is now a month since the Act was passed empowering the Richmond Authorities to form a joint Board to carry out the scheme of drainage designed by Mr. Melliss and approved by the Local Government Board, but as yet there are no signs that even the preliminary steps are being taken to form this Board. Richmond is the greatest sinner in the matter of discharging crude polluting sewage into the Upper Thames, and for sanitary reasons which affect a much larger constituency than the residents of the immediate neighbourhood it is highly desirable that the Richmond Authorities should proceed with the carrying out of this approved scheme without a day's delay. It is true that the Act relieves these Authorities for three years of any of the liabilities as to the penalties attached to the discharging of crude sewage into the Thames, but this immunity may be swept away, even within the three years, if the Local Government Board be of opinion that there is "unreasonable delay in the preparation for, or the carrying out of, the works." The Chertsey Authorities have just been fined 50*l.*, at the instance of the Thames Conservators, for allowing unpurified sewage to pass into the Thames. Indications are not wanting that the Conservancy Board mean now to enforce more actively than ever the full requirements of law against delinquent Authorities. It will be seen from a recent issue of the *Builder* that Acton, another of the Thames Valley Authorities, has completed a new scheme of drainage, and is now passing a clarified effluent instead of polluting sewage into the Thames.

WE are, of course, not going to make any suggestion at this juncture as to where a liability lies for the miserable railway accident at Hexthorpe, but it is impossible to avoid a comment about the extraordinary and what seems to us, we confess, almost lunatic proceeding, which it appears is adopted by some railway managements, of suspending the block system on the days when there is an extra pressure of traffic. The block system was invented to insure trains against the disasters arising from one train overtaking and running into another that was stationary; a danger which was recognised as a serious one even when traffic was in a normal and regular condition. There comes a day when traffic has to be thrown out of its normal course and when there are extra chances of accident, and then the block system is suspended! Of course it may be replied that the working of the trains by flag signals is really a temporary block system on shorter lengths of line. So it is, if properly carried out; but to change the whole system suddenly, and to rely on a number of extra signallers, just at a time when there is extra risk on the line and when extra caution is required, does seem a most extraordinary proceeding. No doubt the passengers will grumble very much if they are kept waiting at a block signal box; nine-tenths of railway passengers are utterly ignorant and unreasonable in regard to the working of railways; but it is better that they should grumble in safety than be taken lighthearted into danger of a terrible death.

WE hear that Mr. H. A. Rogers, of New Southgate, has issued, in two large sheets, an etching of London, Southwark, and Westminster, as they appeared in the middle of the sixteenth century. The drawing is based upon N. Whittock's reproduction, or rather, as we should call it, amplification of Anthony van den Wyngaerde's bird's-eye view,—sometimes known as the Sutherland view,—which is now preserved in the Bodleian Library at Oxford. When the Fleming made his ink and sepia drawing, circa 1550, the spire of old St.

Paul's was *in situ*. But as regards the extent of the town, it is to be observed that many of the principal streets had but single lines of houses. In Rotherhithe, Lambeth, and Southwark there are scarcely any houses at all. Spitalfields, Goodman's-fields, and so between Ratcliffe and Wapping; Bloomsbury, and the ground between Pall Mall and Tyburn,—all is fields; whilst the greater part of Clerkenwell, Cripplegate, and Shoreditch parishes is vacant. Whittock's engraved drawing, to a smaller scale, though it makes a prettier picture than Wyngaerde's, cannot be taken as authentic for purposes of accurate topography, since it contains certain features which are not chronologically correct.

M. FOUCART, in the *Bulletin de Correspondance Hellénique* (1887, p. 129), publishes two inscriptions found at the Peiræus, which have a very general interest, as they deal with the rebuilding of the Long Walls by Konon. They also help to settle the site of the Temple of Aphrodite (Aphrodision), mentioned by Pausanias. He says (book i., 5):—"Near the sea there is a temple to Aphrodite, built by Konon, when he obtained the victory over the fleet of the Lacedæmonians off Cnidus in Caria." The inscription dealing with the Aphrodision runs:—"In the archonship of Euboulides, beginning at the sign, as you go to the right in front of the gates of the Aphrodision, 790 ft.; Demosthenes the Boeotian was contractor, together with the supply of stone." The other inscription reads:—"In the archonship of Diophantos, in the month of Skirophorion, for jobs by the day (*τὰ καθ' ἡμέραν ἔργα*) paid for teams bringing stone, 160 drachmas; iron instruments, 53 drachmas." M. Foucart fully discusses the inscriptions and gives a plan of the portion of the topography of the Peiræus to which they refer.

THE "Società delle forze Idrauliche," in its recent excavations at the so-called "Villa of Mæcenas," seems to have at length happily set at rest the name and purport of that problematical building. Nibby's conjecture proves now to be correct. It is no villa at all, but a part of the Heracleion, a temple of approximately the same shape as the Temple of Fortuna at Preneste. A fragment has been found bearing the inscription, "Æditiu H(erculis) Victoris." Several "cippi" are inscribed "Curatores fani Herculis Victoris," also a fragment of a cornice in which the club of Hercules appears repeatedly as a decorative motive. As yet the full plan of the temple and the extent of its dependencies is not made out, but the Society, to whom the site belongs, intend thoroughly to explore the whole building. A provisional account appears in the *Notizie degli Scavi di Antichità* (1887, p. 25), by Sig. Luigi Borsari, who publishes a number of the inscriptions. A full account, with topographical map and architectural details, is promised shortly.

FROM the annual report of the Hellenic Society, just issued to members, it appears that the Council have determined to alter the form of the *Journal* of the Society to Imperial 8vo., and to include the plates with the text, instead of issuing an extra atlas of plates. A double folding page will be used where any illustration is required larger than the page size. The change will be for the better: it is troublesome to keep a periodical in a dual form. There is also to be added to the *Journal*, as soon as it can be arranged for, a supplement, giving a notice of new publications on Greek archaeology, and a summary of foreign periodicals. This will be a very valuable addition.

WE believe the last contribution to periodical literature by Signor Gozzadini (whose loss to Italian archaeology we have so recently had to deplore) was a paper in the *Revue Archéologique* on the very curious sepulchral reliefs in the Museo Civico at Bologna. The most casual tourist who has wandered through the Museo Civico,—we say advisedly the best-arranged classical museum in Europe,—must

have been struck by these reliefs. They are so unlike anything to be seen elsewhere. In fact, they are unique, found only in the necropolis of Felsina. Up to the publication of this monograph they were but little known to the general public. The most usual subject of the designs is the departure of the soul for the lower world. This is represented by a warrior in a chariot drawn by winged horses, or by a scene of parting. The style of the reliefs can now be conveniently studied in the four plates with which Signor Gozzadini accompanies his article. It has been his life's work to elucidate these antiquities at Bologna, and it is right that it should be widely known that the Museo Civico owes much of its perfection to his care.

WE have received some specimen plates of a work which is being brought out by Mr. E. L. Conder in illustration of the noble church of Long Melford, in Suffolk. The drawings sent us are admirably executed, and show the greatest care in the carrying out of the work, and if the whole publication is equal to these it will be one of the best of our monographs of English buildings.

THE Metropolitan Railway Company have, as we lately mentioned, opened their line to Rickmansworth, thus laying themselves out for a certain amount of purely country and long-distance traffic. Baker-street thus becomes a terminus, but of all stations in London it would be difficult to find one worse adapted for this purpose. To endeavour to carry on a long-distance traffic in a manner satisfactory to the public or the shareholders a proper terminus is necessary, and such a one should have been made at Baker-street before the Rickmansworth extension was opened. It was the more necessary to undertake this work because the present station, whether we regard that part of it used for the main-line traffic or that in which the northern trains arrive and depart, is the most inconvenient and unwholesome in the metropolis. After being nearly suffocated in the main portion, a passenger is almost squeezed to a pancake or pushed on to the permanent way when on the narrow platform of the St. John's Wood line. This want of accommodation at Baker-street is the more noticeable because the stations on the northern extension are large and well-designed buildings.

WE have received a prospectus of a proposed art exhibition to be held at Derby in the month of December and January next. It is to be divided into three sections: I. Non-competitive, for professional artists only, including the leading branches of the fine arts; II. Competitive, for local amateurs; III. Competitive, and open to professional or amateur artists alike and independent of locality. This latter class includes a variety of the minor arts to which lady amateurs are more especially devoted, such as paintings on opal, crystoleum painting, designs for Christmas cards, &c., as well as the more orthodox applied arts included under the term "art-needle work."

There is likely to be a fine conglomeration of curiosities under this heading. There may very likely be a good collection in the non-competitive and purely exhibition section, as many artists are glad of a new opportunity of exhibiting their works at a time when most both of the London and provincial exhibitions are closed. But we do not augur much for the rest of the exhibition, and the selection of the judges is rather a puzzle to us. There are only three judges announced to pronounce upon and adjudge prizes for all this variety of work, and not one of them is an artist, as far as our knowledge of their names tells us. Mr. W. H. Gos, F.G.S., of Bank House, Stoke-upon-Trent, and Mr. H. J. Fenton, Waterdale, Doncaster, are, we presume, amateurs taking an interest in art; Messrs. Raphael Tuck & Sons, fine-art publishers, whose names are well known in that capacity, form the third person of this trinity of judges. With all respect to these gentlemen, we think it is rather presumptuous of them to invite artists, professional and amateur, from all parts of the country, to submit works to their judgment for the award of medals; and if they have, as the phrase is,



"power to add to their number," they would do wisely to invite the assistance of one or two artists of known standing; they will be more likely to have a good exhibition in that case.

#### NOTES OF A HOLIDAY ON THE NORFOLK COAST.

WHEN Mr. John Knightley was so indignant with the Highbury apothecary for presuming to think that he ought to have taken his family to Cromer instead of to Southend for their health,\* he did not dispute the sanitary superiority of Cromer. It was the question of the expense and trouble of moving a whole family so long a distance in coaching days, which he thought he understood better than Mr. Perry. It appears from the episode, that Cromer was in Jane Austen's day a recognised superior watering-place, a proper place to go to if you could afford it. For a long time since then it seems to have been quiescent, remaining until very recent years beyond the limit of the railway system; now railway extension has brought it within reach of excursionists, while at the same time the temporary residence of royalty,—foreign royalty, it is true, but still royalty,—has sanctified it in the eyes of society, and during this autumn Cromer has been another "London-by-the-Sea," swarming with visitors, and its sands covered with cricket and lawn-tennis players. This over-populous condition, which we had not realised from report, would hardly have been an extra attraction. But the fates were kind to us: Cromer was "full up," as the tramcar conductors phrase it, but we could find accommodation at Overstrand, a couple of miles eastward along the coast.

Now, Overstrand turned out to be an ideal place for a seaside holiday. A splendid beach; no promenade or pier or any such mundane vanities, a few visitors dotted about, and a small native population of fishermen, frank-spoken courteous fellows, whose boats formed one element in the picturesque of the scene. The accepted type of boat in this part of the coast has a marked character of its own. As will be seen from the subjoined sketch, it has



not the usual square stern, but is sharp at both ends, the object being, we were told, to render them more manageable in beaching in rough weather, the sharp stern not being so liable to be kicked up by the surf when approaching the beach. The rowlocks, too, consisting of circular holes through which the oars are drawn, are quite peculiar to this part of the coast. They are capital little craft, keeping wonderfully dry on a breezy day, and will stand a great deal of rough weather. The method of shaping the upper planks, narrow at the ends and widening in the centre, is duly emphasised with true artistic propriety in the painting of the boats; generally the top plank is red or blue, the next white, which gives a marked character, quite distinct from the commonplace narrow stripe of uniform width with which boats are usually decorated. The method of conveying the boats up the beach after landing is a characteristic incident of the place; the straight, heavy, sea-oars (so different from the river type of oar) are passed through the circular rowlocks so as to project on each side of the boats, and six strong fellows in sou'-westers and big boots march up in step, three on each side, carrying the boat between them by the oars; and if Mr. J. C. Hook wants a new foreground group for one of his pictures he will not easily find a better or more picturesque one than this.

The coast here, on the round shoulder that juts out eastward of the Wash, looks nearly north, and looking out from the beach, there is nothing but sea water between us and the North Pole, a fact with which the keen sharp air of the landward breeze is quite in harmony. The shore lies beneath high cliffs with an undulating skyline, composed of soft clayey strata, which have been for centuries gradually going into the sea. The coast line is now the section of what were once undulating downs falling in

long slopes to the sea; at present, between Overstrand and Cromer especially, the slope is upwards towards the sea, as will be seen from the sketch, "Near Overstrand," looking along the coast towards Cromer. The wave of the land, so to speak, sweeps upwards, but has been cut off just at the crest; one can almost see in imagination the continuing lines of the contours

at Sidestrand, about a mile from Overstrand. On first seeing this ruined tower, shown in the sketch, in the middle of a deserted graveyard, we supposed it to have been long ago dismantled, but the dates on the gravestones read as late as to 1854. On inquiry, we learned that the people were so much afraid of a landslip and of the church, about forty yards from the



as they once were. So great has been the advance of the sea, or rather the wearing down of the land by its action, that the site of the township of Shipden, under which Cromer was formerly included, has gone under the sea since the making of Domesday Book. Remains of the church of Shipden were formerly to be seen above water, off Cromer at low tide; and

edge of the cliff, coming down suddenly some day, that they declined coming to church, and the church was accordingly pulled down and the materials used towards the erection of a new one at a safe distance inland, the tower being left as a landmark for the fishermen. So there it stands amid the forgotten gravestones, the centre of a curiously melancholy scene. The round tower is of a type that is found here and there about the country, but only in very small churches (this tower is, perhaps, 35 ft. high); the form was evidently adopted, in these cases, for economy, to avoid the quoin-work at the angles necessary in building with flint pebbles, the staple walling material of the district.

It is a beautiful walk from Overstrand to Cromer over the high undulating downs, their margins relieved, on a fine day, against a deep-blue expanse of sea. Among the natural incidents of the neighbourhood is the abundance of poppies, which grow everywhere in profusion. One part of the downs close to Overstrand was glorious with wild vegetation of all colours, but the scarlet masses of poppies predominating; and it was curious to notice that on grey days, when there was no direct sunlight, the poppies seemed more vivid than usual, their strong colour requiring no help from sunlight, while the other vegetation retired into neutral tints. On the margin of the cliffs, when the wind blew off the land, the swallows indulged in a little pastime, which we found quite as interesting as they did. They flew about in numbers under the lee of the cliffs to get shelter from the wind, but every now and then one would mount up above the cliff edges make a pretence for a moment of beating against the wind, and then stiffen its wings and enjoy the luxury of being fairly blown away with a sweep to leeward. It was evidently a recognised and popular sport in the swallow world, and a very pretty little spectacle it made.

Cromer as it was,—old Cromer,—is getting pretty well extinguished amid the new streets and houses growing up around the old town. The old portion is curious and characteristic; narrow-winding streets without footwalks, which a modern omnibus fills up as the giant and his horse fill up the street of the old French town in Dore's illustrations to Rabelais. The new houses are mostly in the accepted manner of the district for domestic architecture: flint walling with brick or stone dressings, and are in general in good taste. The only noticeable building is the church: a large Late Gothic church, very solidly built (apparently) of flint with stone dressings, howbeit the chancel seems to have fallen into ruins at some period, leaving only



were known as the Church Rocks. A Cromer fisherman informed us that last year they, for the first time, remained invisible at all states of the tide: so the church under the sea must be suffering further disestablishment. An example of the practical influence in the neighbourhood of this fragility of the coast line is shown in the old churchyard

\* Vide Jane Austen's "Emma."



the flint rubble core of one pier standing. The nancel is just now being rebuilt, the core of the old pier being incorporated in the new work, a proceeding of rather doubtful utility. No workman we spoke to on the building could tell us who was the architect directing the work, so sublime is the indifference of the building artisan on that point. The tower is a fine solid piece of work, on a considerable

at and about Ranton, two or three miles from Cromer. The traffic must be limited at present, since in offering a shilling at the Ranton booking-office for a 6d. ticket back to Cromer, we were unable to get change without a special appeal to the station-master. Cromer, however, if things go on as they are, must soon overflow into neighbouring localities, and we fear our unsophisticated Overstrand will

silver such as the two spoons (history unknown) figuring here, and which seemed curious and pretty enough for illustration.

Architecturally speaking, we are in the region of flint building; but there are more ways than one of building flint walls. The employment of the wrong way, in a good many instances, has led to unhappy results, which have left their record behind. The wrong way is to build walls of rounded flints stuck into mortar of doubtful consistency, after the fashion of raisins in a plum-pudding, and with no through bond of any kind. The results are dramatically indicated in the remains of what was probably once the very fine, certainly very large and massive, tower of North Walsham, a few miles inland. This came down by the run fifty or sixty years ago, the west wall and half the north and south walls going, and leaving the remainder a gap-toothed ruin. The section of the walls thus exposed to view shows plainly enough why they fell; much more plainly, indeed, than it explains how they managed to stand for the best part of four centuries. The wall was a mere pebble-and-mortar pudding. But evidences of the same state of things appeared nearer to our doors. For, at Overstrand, there is but the ruin of the old church, and the new one, not many years old, is built close to it. Under the ivy of the old ruins are to be seen evidences that it was, on a small scale, a rather fine specimen of flint walling with inlaid decorative arcades and other like adornments. The church has two periods of history. First the eastern half of it got into such a crazy state, that, two hundred years or so after its foundation, this portion of the church was abandoned, and in the "churchwarden era" a cross wall was built cutting off and enclosing the western half of the church; the north and south entrance doors (for there were both) were built up as far as the springing of the arches, leaving the rest of the openings as triangular windows, and this portion of the edifice was accepted as the church. In recent times this portion also has become dilapidated, and the tower (still standing, and containing some good bits of detail) is said to be unsafe, and the new church, a prim little modern Gothic edifice, was built in the same precinct. This is not a very out-of-the-way history in itself; but it does rather strike one when one finds history repeating itself in other parishes on just the same lines. For instance, at Mundesley, five or six miles off down the coast, the church is now in the "second stage," as illustrated by the ruins of Overstrand; that is, the eastern portion is ruinous and unroofed, and the western portion kept in repair and used for service. At Antingham, again, a few miles inland, we noticed the same phenomenon of a ruined church standing close to a later one in use; the later building in this case seemed to be Late Gothic, and not a modern one; but we sighted it, to say truth, on the return portion of a twenty-mile walk, and in pouring rain, and considerations of time and the elements interfered with closer survey. But one carries away a general impression that the Norfolk coast is a region where a good many things are going to pieces, including the coast itself.

Among things, however, that show no sign of going to pieces, is the largest church-tower in the neighbourhood of which we are speaking, the grand and massive tower of South Repps, of which we have given a tolerably careful sketch. The rest of the church, externally, is uninteresting, and promised so little that we did not waste time by going inside: the tower is the great attraction. There are, as we observed, two ways of building with flints, and South Repps is emphatically an example of the other way. The flints are mostly squared and coursed (the labour of doing this must have been very great), the external and re-entering angles solidly built up in stone,—in the re-entering angles of the buttresses all the stones are worked in one solid piece for the two faces, leaving no joint at the angle; and such buttresses! such solid rock-like masses of walling, as it really does one good to see. The decorative details of the tower, as will be seen, are few and simple, but they are in the most refined taste,—not a touch of gimcrack anywhere, and worked out throughout in the most conscientious manner. The square traceried light in the middle stage of the tower is a very general feature in the towers of this district; it occurs in the same way at Cromer and Worstead, and other large towers; and even in so small a church as the



scale, and of the usual type of the larger towers of the district. We may give an illustration of it on another occasion. Internally, the nave is spacious and lofty, but somewhat bare and cold-looking; there are one or two small but interesting bits of brass in the floor. Vestwards of the old town is quite a new district, and a new local line of railway has just been opened in that direction, one idea of a connexion with which is that a new seaside "neighbourhood" may be achieved

not long retain its simplicity. One or two small rows of villas and shops (the latter as yet untenanted) look ominous of change already; the supremacy of the one shop in the place kept by "—, ropemaker and grocer" (that was the combination), will be contested; and the new villas will cut out the lodgings where, as at other great houses, such as Blenheim and Hampton Court, all the rooms opened one out of another, and where, among other waifs and strays of the past, we came on odd bits of



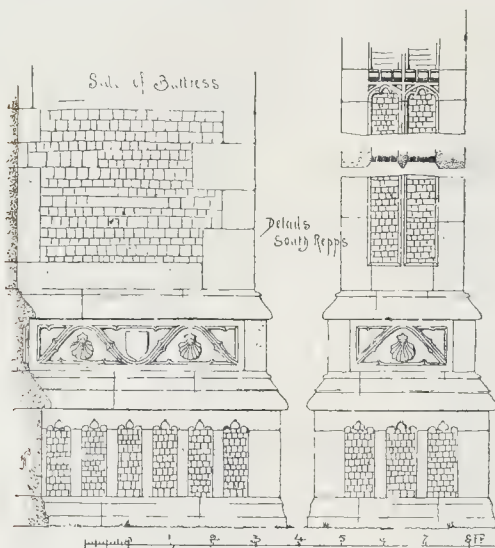
interesting little one at Erpingham, with its little sanctus bell-cot, the square light in the tower is not forgotten, though there it is reduced to a mere little port-hole with a single quatrefoil in it. The large west window at South Repps is of a remarkable and, as far as we are aware, unique design, in some of its points. Unfortunately, it is in reality in a very unhappy state, being almost entirely built up between the tracery (this was in that blessed

how the grand old tower seems rather to scorn it.

North Repps Church is a much smaller structure, remarkable mainly for the excellent workmanship of its walls. Trunch Church, the roof of which we have all admired in "Brandon's Open Timber Roofs" and similar illustrative books, is within a walk of Overstrand, and the roof, with its pierced-work spandrels, seems in wonderfully good preservation. The other lion

good one, but rather spoiled by its disproportionately high crocketed pinnacles.

It was impossible to be in the neighbourhood without a look once more at Norwich, dropping down by train over the level country, about which glide slowly the large sails of boats, floating on water mostly invisible from the railway, in a curious ghostly fashion. Norwich is not one of the largest or one of the most beautiful of our cathedrals, but it is certainly one of the most interesting, and reminds one again how remarkably various our cathedrals really are, in spite of similarity of general scheme and of certain classes of details. If the builders of modern Gothic churches had tried a little more of that kind of variety (even while keeping to pure orthodoxy of detail), they would have made a better thing of it. Looking at the apsidal end, with its flying buttresses, from the roof of the north transept, it occurred to us that possibly no one had sketched it from this point before. So, there it is,\* for what it is worth. We saw something else too, which we could not sketch, but the mention of which is not to be pretermitted. While "prospeting," as the Americans say, on the roof, a thunderstorm of the first order got up, passing away to the northward a little clear of the cathedral. Overhead came an enormous pile of thundercloud, as black as ink, except for those curls of white vapour which often accompany a cloud of this kind, and, as one may say, intensify its expression; against the cloud the cathedral spire, which seemed to go right up into it, actually glittered; below was the mass of trees in the Close all waving in the storm; to the north were constant flashes of lightning (we saw four separate silver streaks shake perpendicularly downward in the space of a second or two), and to the east a patch of clear bright sky, just by way of adding intensity by contrast. It was a Turner picture of the grandest type, with sound and movement added. It is not every day one sees a thunderstorm from the top of a cathedral; but it is well worth seeing when you do.

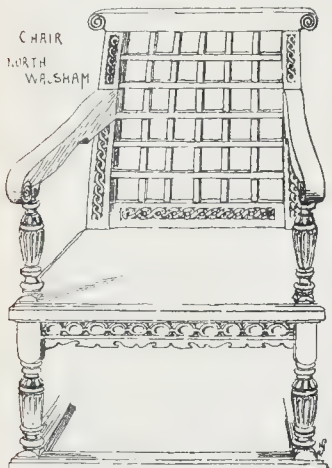


"churchwarden era," no doubt!) and cemented over, nearly half the tracery being broken out; but as the complete design of one side of the window remains projecting beyond the cemented face, we have ventured to restore it in the sketch. (The "Anti-scrape Society" no doubt would like to keep it as it is, as "an interesting memorial of the taste and feeling of our forefathers.") In all probability the angle terminations of the tower either once had, or were

of the church is the elaborate and rich late font-cover, of which the upper portion is much departed, but it must have been a fine and rich piece of work of its date. The church itself is disappointingly small in comparison with its repute, and not of much interest in its masonic details; there is a remarkably well-moulded doorway in the south wall of the chancel, which is in "the books." Knapton, a mile or two further on, with its famous roof, is also remarkably unattractive externally and as a building.

Among the larger churches of the immediate neighbourhood we are speaking of, Worstead and North Walsham are prominent. The latter, to the catastrophe of whose tower we have already referred, is poor externally, though big; but internally it is a very fine church, large and spacious, and with a fine though late arcade. Among special objects of interest in the church are some painted panels once forming portions of a rood-screen, or of the rood-loft, and some remarkably fine pieces of carving, also probably parts of an old rood-loft, which are at present hidden out of sight at the back of some seats at the west end. The chancel contains an exceedingly fine Renaissance tomb to one of the Pastons (of the family of the "Paston Letters"), of which we will give a drawing shortly, and a capital Renaissance chair is preserved in the vestry, of which a sketch is subjoined. A couple of large and exceedingly vigorous grotesque spout-heads, which once formed part of the ornaments of the tower, are also preserved in the church.

Worstead Church is of the same large and spacious type in the interior, and with a fine and well-preserved hammerbeam roof, which, however, has been bedevilled over lately with a coat of paint of an odious livid flesh-colour, apparently with the object of making the church lighter. Whoever did it may congratulate themselves on having gone far to destroy the dignity and impressiveness of the interior. There is a rood-loft *in situ*, but very much restored and patched up, containing panels painted with figures after the same manner as those to be seen at North Walsham. There is a considerable amount of inlay decoration in stone and flint on the exterior of the church; arcading and quatrefoils, &c., from some of which latter, by the way, the flints have fallen out, having been too superficially inserted. In general, however, the exterior masonry is firm and solid, and the tower is a



intended to have, crocketed pinnacles, like those of its neighbours at Cromer and Worstead; but we cannot help feeling that it is better without them; they would have spoiled the massive character of the whole. As a matter of proportion, the tower is perhaps a little too high for its width, or too narrow for its height; but it is a monument of fine and conscientious mason's work. At the turn of the road opposite the churchyard is what modern taste would call a charming example of a Queen Anne red brick dwelling-house; but it looks a little prim in that neighbourhood, and some-

#### SANITARY EXHIBITION AT BOLTON.

THE Health Exhibition which was opened on Tuesday afternoon in the fine Drill Hall in Silverwell-street, Bolton, in connexion with the Tenth Autumn Congress of the Sanitary Institute of Great Britain, is, if not quite so large as some of its forerunners, a fairly good and typical Exhibition, and the citizens of Bolton and the neighbouring towns may find in it specimens of most of the best sanitary appliances and materials now before the public, as well as exemplifications of the best methods of fitting and construction. Like preceding Exhibitions under the auspices of the Sanitary Institute, and unlike others too numerous to mention, the Exhibition was ready by the time appointed for the opening ceremony, a result partly due to the requirements of the judges, and partly to the labours of the Curator, Mr. E. L. Box.

The Exhibition is divided into five classes, viz., Class I., Building Materials, Machinery, and Construction; Class II., Water Supply and Sewerage; Class III., Heating, Lighting and Ventilation; Class IV., Personal Hygiene, Foods, and Disinfectants; and Class V., Miscellaneous. Each of these classes is subdivided into a number of sections, but inasmuch as a great many of the exhibitors have goods on exhibition coming under several sections, we will, to save needless repetition of exhibitors' names, proceed to notice the exhibits stall-by-stall so far as may be necessary.

At Stall No. 1 Messrs. Manlove, Alliott, Fryer, & Co., of Nottingham, exhibit a model of Fryer's furnace, known as the "Destructor," for burning town refuse. This model and other models and drawings of kindred apparatus in the Exhibition, to be hereafter referred to, will be looked at and compared with interest now that the question of the disposal of towns' refuse is becoming, in more than one sense, a "burning" one in many localities. The subject was recently treated of by Mr. Charles Jones, the Surveyor to the Local Board of Ealing, in a paper read before the Association of Municipal and Sanitary Engineers and Surveyors, a summary of which appeared in the *Builder* a fortnight ago, and of the discussion on which we give a report this week. The same exhibitors

\* See Lithograph in this week's issue.



show, amongst other things, one of Washington Lyon's admirable steam disinfectors.

Stall No. 2 is that of the Lumley Brick Company, Fence Houses, Durham, who exhibit some very good white and coloured enamelled bricks, together with fireclay goods. At Stall No. 3, Mr. R. de Solderhoff, of Cardiff, exhibits a drawing showing the construction of his patented "Incinerating Sludge Furnaces," to be used in conjunction with the operation of cooking, i.e., coke-making. The patentee locates his incinerating furnaces between coke ovens. In a small pamphlet which has been printed by the exhibitor, he gives the following results as having been obtained during fifteen weeks' work with two furnaces, each 14 ft. long, at Leyton:—Weekly average weight of wet sludge put into the two furnaces, 25 tons 6 cwt.; weekly average weight of ash taken out of the furnaces, 4 tons 17 cwt. 0 qr. 20 lb.; weekly average weight of coal used, 7 tons 11 cwt.; weekly average weight of coke obtained, 5 tons 1 cwt. We cannot here enter further into detail about these furnaces, but they appear to be worth attention. Whether their operation is productive of any nuisance we do not know. What do the Leyton people say?

Mr. James Gregson, of Bolton, Stall No. 4, shows a very good arrangement for fixing rain-water and other pipes to walls, so as to permit of the ready renewal of a single length. The pipe is kept well away from the wall, and the ears or lugs are provided with slots of a reversed key-hole shape, i.e., having a circular hole, with a vertical slit opening from the top part of the hole. Each length of pipe is suspended on large flange-headed galvanised iron nails, the heads of which are admitted through the circular part of the "keyhole," the pipe then dropping down to the extent of the length of the vertical slit referred to, which admits the stem of the nail, securely holding the pipe in position. The lugs or ears are attached to the socket at the top of each length of pipe, and while the socket is two or three times as deep as the sockets of the common rain-water pipes, the spigot end of the length of pipe above only drops half-way down into the socket, thus leaving more than sufficient play or power of telescoping between each length of pipe to allow not only of any length being readily lifted out and replaced, but to permit of the ready fixing of the lengths whatever may be the irregularities in the courses of brickwork. The lugs or ears can be readily applied to the ordinary rain-water pipes, thus keeping them away from the walls, though without affording the vertical play which is given by the deep sockets of Mr. Gregson's patent pipes.

At Stall No. 5 Messrs. James Richmond & Co., of Burnley, exhibit a model of the "Nelson" town-refuse destroyer. Close by is shown a model of T. & T. Vicars' improved self-acting smokeless furnaces, for the use of which there is great scope in Manchester and the surrounding districts.

Messrs. Doulton & Co., of Lambeth (Stall 27), have a very good display of sanitary appliances and materials, besides their "Peto" fireproof flooring, which was fully described and illustrated by us on the occasion of the Leicester Exhibition, two years ago.\* It is a method of flooring which is well worthy of the attention of architects, and we are able to announce that it is to be used throughout in the rebuilding of Mr. William Whiteley's recently destroyed premises in Westbourne Grove. We think it probable that if, unhappily, future fires break out in the premises now being rebuilt, they will, by the aid of this system of construction (coupled with precautionary measures as to the situation of staircases and lift-shafts), be confined to one floor,—supposing that incendiaries have not free scope to fire more than one floor at a time; for simultaneous outbreaks of fire due to accident alone are very unlikely to occur. Messrs. Doulton also exhibit their patent safety house drainage pipes, which are made in extra long lengths of 3 ft., thus diminishing the number of joints. These pipes are made of the best stoneware, with a highly-enamelled surface both inside and outside, and are connected together by their patent self-adjusting joint, which we fully described and illustrated last year in our account of the Sanitary Exhibition at York† This joint, while being self-adjust-

ing and flexible, is perfectly watertight, and has been found very valuable and helpful in laying drain-pipes in wet ground, as at Acton and elsewhere. Messrs. Doulton exhibit the application of these pipes, thus jointed, as soil-pipes, so that stoneware may be used throughout a building for closets, traps, soil-pipes, and drains, thus avoiding difficulties and objections to the jointing of metal and stoneware. The elasticity in the joints to which we have referred allows of settlements or deflections in the lines of piping,—whether used horizontally as house-drains, or vertically as soil-pipes,—without the joints ceasing to be air-tight or watertight. Those who have not already made themselves acquainted with this system of jointing (in which no cement is used) should do so, as it promises to effect quite a revolution in drainage work. Another useful sanitary appliance shown by these exhibitors is Hellyer's patent "Anti-D" trap made in stoneware.

Exigencies of space compel us to break off here, but we will next week conclude our account of the most notable appliances and materials in the Exhibition, which will remain open until and inclusive of Saturday, October 15th.

The report of the judges of the Exhibition made the following among other awards and recommendations:—

#### Medals and Special Certificates.

Bennis, E., Bolton.—Smoke-Preventing Stoker and Cannel Furnace.  
Lovibond, J. W., Salisbury.—Tintometer.  
\*Constantine Bros., Bolton.—Dr. Jaeger's Sanitary Clothing.  
\*Hoop's Dry Closet Company.—Dry Earth Closet without Separator.  
\*Doulton & Co., Lambeth.—Peto Flooring.  
\*Manlove, Allott, Fryer, & Co., Nottingham.—Washington Lyon's Steam Disinfectors.  
\*Greenall & Co., Manchester.—Steam Washer.  
\*Doulton & Co., Lambeth.—Self-adjusting Joint for Stoneware Pipes.  
\*Morrell's Sanitary Company, Manchester.—Morrell's Cinder-Sifting Ash Closet.  
\*White, W. F., & Co., London.—Nicholl's Soot and Salt Closet.

#### Certificates of Merit.

Haslam, J., Bolton.—Hand Fire Extinguisher.  
Maritime and General Improvement Company, London.—Loeb's Respirators.  
Gregson, J., Bolton.—Removable Rain-water Pipe.  
Vause, J., & Son, Bolton.—Shanks' Reliable Water-waste Preventer; Craig's White Enamelled Sink; Rufford's Enamelled Fire-Clay Bath; Shanks' Imperial Lavatory; Shanks' Wash-Out Closet and Cistern combined, for country use; Shanks' Tubal Wash-Out Closet; Shanks' Urinal with Flushing Flusher; Cast-Iron Smooth-bore Drain Pipes and Fittings.  
Cuenden, R., Bolton.—Shanks' Reliable Water-waste Preventer; Shanks' Imperial Lavatory; Morrison's Spray Lavatory; Shanks' Tubal Wash-Out Closet.  
Hemby & Co., Manchester.—Through Colour Linoleum.  
Maritime and General Improvement Company, London.—Portable Electric Glow Lamp.  
Control Air Propeller Company, Bolton.—Humidifier and Air Inlet.  
Morrell's Sanitary Company, Manchester.—Cinder-Sifting Dustbin.  
Doulton & Co., Lambeth.—Stoneware Safety Pipes, in long lengths.  
Parkinson, Swanson, & Co., Manchester.—Air-tight Soil-Pipe with Slide Catch.  
Robertshaw, J., Manchester.—Laws' Pathway Rubbish-Receiver.

#### Exhibits Selected for further Practical Trial.

With regard to the following [among other] exhibits, the Judges are unable to give their decision until they have submitted the exhibits to a more complete and extended practical examination than is possible before the opening of the Exhibition:—  
Doulton & Co., Lambeth.—Improved Siphon Flush Tank.  
Vicars, T. & T., Liverpool.—Mechanical Stoker.  
Milton Syer, London.—Siphon Waste Preventers, Nos. 1 and 2.  
De Solderhoff, R., Cardiff.—Incinerating Sludge Furnaces.  
International Water and Sewage Purification Company.—Systems of Water and Sewage Purification.  
Begg, G., Bolton.—Chamberland-Pasteur Filter; Slack & Brownlow's Filter.  
International Water and Sewage Purification Company.—Acoustic Disinfecting Powder and Liquid.  
Calvert, F. C., & Co., Manchester.—Soluble 70 per cent. Carbolic Acid.  
Kirkham, J. W., Bolton.—Blackman Air-Propeller.  
Control Air-Propeller Company, Bolton.—Air-Propeller.  
Wood, E., Manchester.—Air-Propeller.  
Rothwell, J., Farnworth.—Air-Propeller.  
Eolus Waterspray Company, London.—Keidel's Hydro-Ventilator.  
Maigron, P. A., London.—High-pressure Filter; Water-Softening Process.  
Lakin, R., Manchester.—Compound Carbolic Powder and Soluble Ciccol.  
Manlove, Allott, Fryer, & Co., Nottingham.—Fryer's Destructor; Johnston's Drier, Finner's Drier.  
Wood, E., Manchester.—Exhaust Outlet Ventilator.  
Kite, C., & Co., London.—Turret Ventilator, and Counterpoise Chimney-breast Ventilator.  
Cuenden, R., Bolton.—Hale's Ventilator, Banner's Rotating Ventilator, Banner's Inlet Ventilator; Chromite Disinfectant.

\* Exhibits which have already received medals at the previous Exhibitions of the Institute are excluded from awards of Medals, but those exhibits to which a second medal would otherwise be awarded receive special certificates, and these are distinguished in the list by asterisks.

Houghton, J., Liverpool.—Eureka Chimney-sowl.  
Rothwell, J., Farnworth.—Revolving Sower Combination Ventilator.  
Eolus Waterspray Company, London.—Stafford's Ventilator, Pollock's Downcast Ship Ventilator.  
International Paint Company, London.—Sanitary Magnetic Fire-proof Paint.  
Macpherson, D., & Co., Manchester.—Poochow Enamel.  
Bolton Paint Company, Bolton.—Oxide Paints.  
Asbestos Fire-proof Paint Company, Manchester.—Asbestos Fire-proof Paint.  
White, W. P., & Co., London.—Soot and Salt Urinal.  
Doulton & Co., Lambeth.—Anti-D Stoneware Trap.  
Hargreaves & Bardley, Oldham.—Eclipse Gas Governor.  
Stott & Co., Manchester.—Combined Gas Governor and Cut-off Valve.  
Furness, H., & Co., Manchester.—Regenerative Gas Lamp.  
Eolus Waterspray Company.—Capell's Fan.

The following exhibit, which has gained a certificate, is deferred in competition for the award of a medal:—  
Galloway, J., Bolton.—Lightning Fire Extinguisher.

The following, which have gained medals and starred certificates at previous Exhibitions, are now so well known and their merits are so fully appreciated, that the Judges do not think it necessary to make any further award to them:—

Moule's Earth-Closet Company.—Moule's Earth-Closet.  
Calvert & Co., Manchester.—Pure Carbolic Acid.  
Cuenden, R., Bolton.—Fotts' Edinburgh Sewer Trap.  
Vause, J., & Son, Bolton.—Buchan's Disconnecting Trap and Access Pipe.

The report is signed by the judges, viz.:—Mr. Rogers Field, B.A., M.Inst. C.E. (Chairman); Mr. A. Wynter Blyth, M.R.C.S.; Mr. W. Eassie, C.E.; Mr. Henry Law, M.Inst. C.E.; Mr. J. Wallace Peggs, A.M.Inst. C.E.; Mr. H. Saxon Snell, F.R.I.B.A.; Mr. Ernest Turner, F.R.I.B.A.; and Dr. Louis Parkes, Secretary.

#### ARCHITECTURAL ASSOCIATION VISITS.

THE Architectural Association, on Saturday, the 17th inst., made a vacation visit to Minley Manor, near Farnborough, the residence of Mr. Currie. The original house was designed by Mr. Clutton, and is a florid example of Gothic treatment, with a good deal of French feeling. The present additions are from the designs of Messrs. Devey & Williams, and comprise, in addition to extensive remodelling in the interior of the house, a chapel, kitchen, offices, stables, orangery, and entrance-courts. The chapel is built with square random Kentish rag, dressed to quite a smooth face, and worked with a very fine joint. The upper part of the wall has squared flint panels. The chapel is surrounded with a cloister. The dining-room is panelled with wood, treated in the Renaissance style, with a very rich wooden mantelpiece, and at the end of the dining-room is a smoking-room, with oak panelling in character with Mr. Clutton's detail. The staircase, which is arranged around a thick wall, is hung with French tapestry. There is also some good French ironwork in the house.

The afternoon was devoted to a visit to Bramhill House, Hampshire, the residence of Sir William Cope.

The present house was built by Edward, Lord Zouche, 1605 to 1612, which latter date is on some of the ornamental stack-pipe heads, with the initials E. Z. (Edward Zouche), from the designs of John Thorpe. The house is supposed to be built on some of the foundations of an older house, built by Thomas Foxley, who was a contemporary of William of Wykeham. This older house was probably built around a courtyard 100 ft. by 80 ft., and Thorpe almost filled up this inner space, there being only a narrow well some 12 ft. wide left in the centre of the house. There is a tradition that the house was intended to be purchased for the residence of Henry, Prince of Wales, the eldest son of James I., and the ornament over the oriel window in the principal front is thought to be the three feathers of his crest.

The house is built of red brick and Headington stone. Many of the mullions, however, are of brick and plastered.

The entrance-hall has a fine screen, decorated with shields, on which are painted the arms of the Cope family, and at the upper end of the hall is a dais. From this end a staircase is reached, and, passing beyond the staircase, are three rooms, used as dining-room, drawing and billiard-room. The staircase is an oak staircase that was brought from Eversley Manor by the present owner. On the first floor to the left is a splendid drawing-room with an elaborate plaster ceiling, having a double pattern with pendants. The mantelpiece is a very pure Italian Renaissance design in two stories, the lower Doric, the upper Ionic, in red and white marble, the hearth having a red and white

\* See Builder, Sept. 16, 1885, p. 416, and Dec. 19, same year, p. 877.  
† See Builder, Oct. 2 and 9, 1886, pp. 431, 539.



marble pattern similar to the mantelpiece, and the dog-iron and grate are evidently of contemporary design. The tapestry in this room is from designs by Rubens. The next room has a fine plaster ceiling of rather simpler pattern and good chimney-piece; beyond this is the long gallery, which extends the whole depth of the house. This room is panelled with dealblock moulded panelling, and contains an interesting collection of curios of all sorts. The legend of the mistletoe Lough used by Haines Bailey and Rogers, is associated with this house, but Sir William Cope stated that no bride in the family had ever died on the day of her marriage, and the only way he can account for the origin of the legend was that an ancestor who lived in Italy a long time probably bought a chest in which an Italian lady is said to have died under circumstances somewhat similar to the ballad. This chest, of which a photograph was shown, is not at present in the house. The Morgan family at Newport, Monmouth, also claim this legend, and show what purports to be the original chest. To the right of the staircase is the drawing-room over the hall, a charming room with the circular bay over the entrance, from which a fine view is obtained. The ceiling in this room is elaborately wrought. Opening out of this room through a four centred arch is the chapel, which is quite a museum, and contains a fine piece of tapestry dated as early as 1450. But the principal feature of the house is the terrace, which measures 131 ft. in length, and has at either end a double-arched summer-house. All the pictures of this restore the balustrade, but Sir William, who has had the coping carefully examined, is of the opinion that the short pieces at either end are all that ever existed. The time allowed was all too brief to do justice to the house, and the host gave a cordial invitation to pay another visit next year.

PROFESSOR T. HAYTER LEWIS ON THE  
LAYING-OUT OF TOWN AREAS.\*  
SANITARY INSTITUTE OF GREAT BRITAIN.

In availing myself of the privilege of addressing the members of this Congress in this active and stirring town, which is spreading itself out in every direction, I have thought it well to bring before them a subject of great interest, but which has not been hitherto much discussed, viz., the extension of our great cities and the erection of new ones; and to suggest such a course as would ensure that such requirements as are now considered to be necessary for their healthful occupation may be provided for at the outset.

Of the conditions to be noted in selecting a site for a new city, we have descriptions by writers of all ages, from Vitruvius in the first century, to Dr. Parkes in his well-known work of our own time. But this is a subject too large for a short address, and it is of the extensions only that I wish now to speak. They have, almost invariably, been carried out by speculators without any general definite guiding plan, with little or no forethought for future extension, and with slight provision for supplying the inevitable future wants of the inhabitants. Thus, in course of time, spaces have to be cleared out for churches, schools, institutes, baths, and such like edifices as are now required for a large population, and clearances have to be made to allow for its free breathing. The extension of the cities takes place in different directions and from different motives.

The well-to-do citizens leave their smoky town and confined houses to form new suburbs, where they may breathe freely in their open gardens.

The artisans cluster together at first for cheapness and for nearness to their work. Then comes over-crowding and then Sanitary Acts, and then suddenly the neighbouring fields are invaded, and acres of ground are covered with new small houses, put up as a speculation in the cheapest way, with just so much breathing-space as the local by-laws (if there be any) will allow.

Now if this be the time of activity in building new towns and extending old ones, it is also pre-eminently the time of activity and power in corporate bodies. From Town Councils to Vestries, from Trade Guilds to Trade Unions,

from companies formed for their own benefit and companies formed (all honour be to them) for the benefit of their fellow-citizens,—an active part is being taken in public work.

New and extensive powers are being acquired and exercised by Corporations for the sewage, the supply of water\* and of gas, for providing open spaces, regulating the width of streets, and even the height of rooms and size of windows. Your own by-laws are sufficient evidence of this.

Now I simply wish to extend these powers. I wish that when it may appear evident to a Corporation that any district will require before long a large accession of houses for a population which is clearly increasing to an overflow, such Corporation shall have the powers (and I think that public opinion will require it to exercise them) to acquire control over the requisite land,—to formulate a general plan, giving the width and direction of the streets,—to provide spaces for such public buildings as are certain to be required in a well-regulated community, and for such open spaces as are required for its healthy enjoyment.

My scheme is not a very grand one in any respect; I simply want to provide at first for those requirements which must eventually be provided, which can only be fulfilled at a great cost, and even then imperfectly, if not so provided at first. I do not even suggest that the Corporation should build, but that it should give general guiding directions, leaving the working-out to private persons, or to such companies as have of late done so much good in building dwellings of various classes, from the highest to the lowest.

To show that such powers as I have indicated might well be called into being on behalf of even a high-class district, I might have brought before you the earnest attempt made, some thirty-five years ago,† by the late Professor Cookerell, R.A., to obtain a public control over the proposed buildings at Hampstead, a suburb now covered with houses.

As I was reminded by my friend, Mr. Rogers Field, the Professor drew out a design by which the whole of that suburb might have been built over on one definite plan, utilising the various hills and valleys, so as to take every advantage of its picturesque beauties. Public opinion was not ripe for such a course then, and this grand opportunity was lost.

[Professor Lewis then described, with the aid of a map, a district of London, and the mistakes made in laying it out, and proceeded to point out in detail on another map the manner in which the same district might have been laid out, by forethought, so as to accommodate the same number of persons with more convenience for traffic and with greater attention to provision for healthful and enjoyable life. The details of Professor Lewis's remarks, however, can hardly be intelligibly followed apart from the diagrams, and we proceed to the more general remarks arising out of the subject.]

I now ask you to bear with me whilst I enter, in some detail, as to the public works and buildings for which provision should be made. I assume that, as a matter of course, the sewers, water, and gas supplied, will be provided in the usual way, so I need not detain you as to these.

In the first place, I would set aside a strip of land outside the whole district for the park, which I take for granted would ultimately be required, no matter what the rank of the adjoining houses may be. Its distance from the furthest point would be about that suggested by Mr. Besant, viz., half to three-quarters of a mile. The size which I suggest here is about the same as that of the Hesketh Park at Southport, which is in one of the best parts of the town, and much smaller than the one here. The position of this open space would provide well, also, for the future extension of the town, and would afford the advantages obtained in the same way as, e.g., at Hastings, where the pretty St. Andrew's Gardens, starting from the old town, pass round at the back of the houses, and are continued to St. Leonard's, making an admirable belt of free open air and foliage. Neither in this case, nor in that of public buildings, do I propose the work to be undertaken at the first, but only so to arrange, at the first, that the sites shall be so reserved as to be available when required. As to these, I need do no more than mention offices for the

local authorities, and the library, reading-room, science and art schools, and other buildings required for the particular locality.

In the arrangement of these public buildings it would be difficult to take a better example than that of Southport, whose Lord-street and Albert-road form one of the prettiest vistas that I know (I trust that Birkdale will pardon me for classing it with its neighbour).—and I use the word "prettiest" advisedly, as I could not, of course, compare it with such grand thoroughfares, each unrivalled in its way, as the High-street of Oxford, or Princes-street at Edinburgh.

At Southport the chief public buildings are located behind a group of trees, and I know of few more pleasing views than that of the spires and turrets of Christ Church, the Presbyterian Church, and the municipal and other buildings, towering above the foliage, whilst between the trees the buildings themselves are picturesquely seen.

Outside the park I should place the infirmary and convalescent home, a position in which they would have free light and air. If any one suggests that such a position would be too public, and lessen the enjoyment of the park, I would refer him to your own infirmary and children's hospital (the latter the gift, I believe, of your townsman, Dr. Chadwick, and his family), and ask him whether, as a simple matter of landscape effect, to say nothing of the value of such an outlook to the patients, he would wish this picturesque building, designed by one of your able townsmen, Mr. Knill Freeman, to be removed. Or, again, think of the charming way, and without the slightest feeling of sadness, in which the promenade at Southport ends with such a building, whilst at two such different places as Manchester and Hastings the Infirmary forms one of their most prominent buildings. Next to your noble Town-hall and the old churches, the most prominent building is, I think, the market. I do not, of course, propose any such grand building as yours for my district. It might be open at the sides, but covered, as at Preston and Blackpool, or be enclosed as here and at Southport, or St. John's at Blackpool. I know that many towns of importance (I may, I think, name Norwich and Cambridge amongst them) have still little more than open and uncovered market-places, healthy-looking and pretty, with fruit, and flowers, and vegetables, on a fine day; but we often have quite other days in our country, and the attempts at covering up and protecting the stalls then turns the market-place into a wretched collection of tumble-down huts,—I had almost said as bad as Fleetwood. If the quarter be chiefly for artisans, public wash-houses will be indispensable, and, in any case, no matter what the class of inhabitants may be, I look upon public baths also as a provision which can scarcely be valued too highly. For these baths and wash-houses I have suggested no definite site, as this would depend so very much on the kind of inhabitants.

Nor have I marked out definitely sites for churches, chapels, or schools. All these are provided for in the district as it exists, and sites would undoubtedly be claimed for and provided, whatever the general plan might be.

I come now to some other details, as to which I may not possibly have your assent. First, as to drinking-fountains. That such small ones as are now commonly seen should be provided, you will doubtless quite approve. There are many excellent examples in most of the towns in these parts, each combining a drinking-fountain with a public lamp, and being really an ornament to the streets. But I want something more than these, as much for the sake of health as for ornaments to the town.

You know well enough that all the water in use for your houses is stored in cisterns; and although in past times these cisterns were looked upon as being worthy to be seen, and so were ornamented in a way which is now the envy and admiration of workmen and artists alike, they are now rough ugly things, stored away out of sight in any convenient closet or loft which will hold them, and for all their owners know of them may be considered as the property of the spiders. You depend upon your plumber to clean them out once a year. Perhaps he does; perhaps he doesn't. You are none the wiser. But imagine what often happens in the houses of a poorer class. I need not go into details, but I say that a good supply of water, pure for drinking, is an element of health which ought to be provided

\* From the Address given by Professor T. Hayter Lewis, F.R.I.B.A., as President of Section II., Engineering and Architecture, at the Bolton Congress of the Sanitary Institute.

\* Bolton Corporation Waterworks, 1881, and Bolton Corporation Acts, 1872, 1877, and 1882, pp. 8, 28.

† Vide *Builder*, vol. xi. (1853), p. 417.



and that you cannot provide it in a better way than by fountains. These, in what are now called "the Dark Ages," formed some of the chief ornaments of a town, and I see no reason why they should not do so now.

I don't want to bring in such vast bodies of water as were brought through miles of aqueducts into Rome, or such lavish displays as you have seen, e.g., in Paris, or even such things as our fountains in Trafalgar-square. Nearly all these send their waters into the drains.

There are fountains even now in most of our towns,—a very elegant one at Southport, for example; but, again, with all the water running to waste; whereas in some of the most picturesque Mediaeval examples, it came out in small useful jets, as I would have them here; and I feel no doubt that, by a skilful arrangement of gas jets, the effects of frost might be prevented, and a great boon thus conferred in winter, on rich and poor alike; whilst, by a skilful design, they could be some of the most pleasing ornaments to the town that could be conceived. And, as part of the water must go to waste, send it to feed a small stream in the park, like the one here or at Hastings.

Another accessory I must mention is that of seats placed at intervals between the trees. I shall, no doubt, have the same objection made to them as to the trees, and my answer would be the same.

Then, to complete my plan, I would have a small open space opposite to each railway station. Now we have to see, before entering into the question of the kind of houses to be provided, how much the plans which I have suggested have trespassed upon the space now occupied.

I have laid out my main roads in very much the same general direction as the present ones, though in less circuitous lines; but I have made them 60 ft. wide instead of 40 ft., and have set apart spaces for public buildings, &c. The smaller streets I have made 40 ft. wide, the width required by the Model By-laws being 36 ft. The space which I have assigned to the park need not be taken into our calculation, as it is altogether outside that now built on; and I think you will readily see that the great waste of space necessitated by the irregular plan of the district, as now actually existing, would allow to a very great extent, if not altogether, for the extra space which the suggested re-arrangement would require.

As to the general arrangements of the streets and houses, I will call your attention to some methods, unusual to us, with which one meets abroad. I omit any notice of the large many-storied houses which are familiar to you on the Continent, and I shall take, as examples, one of the northern towns in Europe, Hamburg, and one of the southern ones, Naples. Several years since, I was commissioned to make a detailed report on the former town, for one of the principal Insurance Offices (the Union) of London, and I was thus led to see more of it than, perhaps, most of the people who visit it. The arrangement is peculiar. The main streets are wide, and give to a casual passer-by scarcely any indication of their affording access to any other streets. But a nearer inspection shows numerous doorways, so low and narrow that they appear to lead only into cellars, and through which you have often to descend by steps, and these lead into the streets behind, locally named *Hofs*, which we should call alleys, and which are, of course, completely closed against ventilation from the main street. They vary from 20 ft. to as little as 5 ft. in width, the houses in the wider streets overhanging on each side and being densely populated. They usually abut on canals, and when these are dry the result in hot weather may be imagined. This arrangement, intended, no doubt, to bring different classes of people together, reminds one of the Wynds of Edinburgh, but with all their evils intensified, and a worse result could scarcely be imagined. Very many of these have been demolished, but a large number still remain.

I take you down now to the sunny south at Naples, where the same attempt has been made. It is not in my province now to describe the ordinary houses there, of the horrors of which Sig. Gallenga and Mrs. Oliphant have given most vivid descriptions, but only the particular class to which I have alluded, and which may be seen to perfection in the drive through Portici. The streets throughout are wide, and lined for the greater part of their length with

frames of macaroni hung out to dry, and many here will no doubt well remember both the sight and the smell. The houses on each side are several stories high, the first floors (*piani nobili*) having wide balconies, and altogether having a cheerful look and being tenanted by well-to-do and often wealthy people, whose apartments are entered from an internal court approached from the street by a lofty carriage gateway, through which one has lovely glimpses of beautiful gardens sloping down to the Bay of Naples. But the lower stories throughout, close on the ground, are tenanted by humbler classes, their rooms entered from the street. Here, again, we meet with an attempt to combine the classes, and thus to prevent one neighbourhood being given up to the poor and another to the rich.

But again this fails. The lower rooms have no windows or other openings at the back, and derive the whole of their light and air from the street. The state of the inner rooms, usually parted off by a curtain as sleeping apartments, in the heat of an Italian summer may be imagined; and these rooms are not inadequately described by Mrs. Oliphant as "dark caverns with one vast door, giving all the light that can penetrate." Were it not that the people live almost entirely in the open air, they must be decimated. The same arrangement will be found in most other Italian towns, but in them there is, usually, some opening, however small, at the back.

Something of the same kind would appear to be adopted, judging from the plan only, in a flourishing town in our own country,—viz., Great Yarmouth, the arrangement of which is very peculiar, and unlike that of any other English town with which I am acquainted. I show a drawing of this, enlarged from one which was kindly drawn for me by Mr. Arthur Hewitt, an architect in the town, who has supplemented the Ordnance Map by many important details. The main streets are wide and well ventilated, and lined with good houses (mostly shops) several stories high; and running between these streets at intervals of about 45 ft. are long narrow alleys, termed Rows, out of which lead houses of an inferior class. Looking at the plan only, this would seem to be no better than Hamburg; but in reality they are vastly better. The entrances are open for their whole height to a wide street at each end, or to the spacious quay; the alleys are cleanly kept and well paved, the houses in them are low, so as to intercept the light and air very slightly, and each has a small court attached to it; and the whole arrangement, so far as I can ascertain, is not prejudicial to health. Nevertheless, the narrowness of the streets does, no doubt, to some extent, clash with the golden rule which Dr. Richardson put very strongly in his well-known lecture at Croydon (1879): "Make the sun your fellow-workman," which is much the same as the Italian proverb, "Where the sun does not enter the doctor does."

Now, in remodelling our district, what system shall we adopt as to the houses? The first question is as to their number of stories. This subject is a serious one, for hundreds of acres near our towns are now being covered with two-storied dwellings, clustered close together in populous neighbourhoods, or semi-detached when more in the suburbs. As to this, I do not wish to lengthen my paper by going into any argument, but I must briefly allude to some of the leading facts. The governing idea in respect of the self-contained houses of two stories is, of course, that of privacy, or, in the better class of houses, the absence of stairs; but in many of our new London squares one large open space, garden, or yard (according to the class of house), is common to all; and the separate houses are being largely superseded by the dwellings in flats. At the first sight the two-storied dwellings would appear to have the recommendation of ensuring a less dense population than in the many-storied ones; but I wish to consider the subject on the basis of the area gained by inhabitants in each case, the area gained by the extra stories being appropriated to open spaces in the way of yards or gardens, so that no question as to the bearing of the density of the population upon their health will arise here.

In considering the relative merits of the different styles of houses, the first fact which presents itself is, that with those of two stories only, the whole of their inhabitants must live and sleep either immediately over the ground or directly under the roofs.

I need scarcely say that the nearer to the earth the ground-floor is the cheaper it is to build, as less height of wall is required; and the consequence is that the floor is raised a few inches only above the street level, and the occupant has only that space between him and the earth. The rest of the inhabitants must live and sleep directly under the roof,—not a very pleasant experience even in well-built houses, whether through the heat of summer or cold of winter; and very many here, doubtless, know what is the case where the house is run up cheaply merely to sell. In point of economy of building, and of course of rent, it must be borne in mind that, though the thickness of the lower walls must be somewhat greater in a high house than a low one, one roof will cover, and one foundation hold up, four or more stories, as well as they will cover and hold up two.

As to the general feelings with respect to the subject, I recall and agree with the words of my predecessor, Professor Roger Smith, in his address at Glasgow in 1883,\* that the system of flats is opposed to the general feeling; and I agree with him, also, when he says that they are not so unpopular now, and have many advantages.

Of course, the height of houses, whether in flats or separate, varies very much, buildings of five, six, or seven stories being common enough,—my own house has six; but I propose, in the comparative plans which I show, to limit our consideration to four stories, which is the limit suggested by Professor Robinson, in his address at Newcastle, 1882.† My plan shows, first, the actual space at present occupied by two blocks, each of fifty-eight two-storied houses, and their open areas of streets and yards; and, secondly, the space which would be occupied and the area gained, if the same number of inhabitants lodged in half the number of houses, but four stories in height. The contrast as to open space is rather striking, and with increased height the size of that space will of course increase.

One thing more. In his well-known address in 1879, Dr. Richardson spoke of his ideal cities as competing with each other in the beautiful as well as the useful, and I have spoken all the way through of doing what we have to do in the streets, the buildings, the fountains, in such a manner as to give a cheerful aspect to the scene, and afford some scope, however slight, to the feeling of beauty which is inherent in mankind, whether for colour or form, for a flower or a building, and not to offend the eye by the mean and the ugly.

Years back, in the prime of his life, Mr. Ruskin pointed out‡ most forcibly "that it is chiefly by private and not by public effort that a city is adorned, and that it did not matter how many beautiful public buildings it may possess if they are not supported by and in harmony with the private houses (and, I may add, of the factories) of the town," and if it be held that all we have to do is to provide houses which shall be fairly comfortable, whether for rich or poor, and that rows of such houses will answer all the purpose if built with windows large enough and numerous enough, and that nothing else in them need be studied, then I say that our town lacks one great feature which might conduce to the pleasure of its inhabitants, and in neglecting that we have neglected one means, however slight, towards that healthful mental state which helps the bodily so well.

**Masonry and Construction.**—Mr. Lawrence Harvey's valuable class instructions on the subject of Geometry as applied to Masonry and Construction will be resumed at the City and Guilds Institute, on Monday evenings, from October 17th. The instruction is divided into three courses. The first course comprises the lessons given last year, by which a general idea of the different methods of stone-cutting will be obtained. In the two following courses, the applications of geometry and drawing will be more kept in view, and the exercises of cutting made subordinate to that. The present course deals with only half the subjects which a complete course of scientific masonry should treat, and it is hoped that a higher series of lessons will be initiated next year.

\* Transactions of the Sanitary Institute, 1883.

† Transactions of the Sanitary Institute, 1882-3, p. 185.

‡ Lectures at Edinburgh, 1854.



## THE BRADFORD WATER SUPPLY.

THE following is the preliminary report of the Bradford Waterworks Committee, submitted to the Town Council last week, as to the scheme for additional water supply. After stating the circumstances under which, after the drought of 1884, the Committee, considering it necessary to provide an extended area of water-supply, instructed their engineer (Mr. Binnie) to go thoroughly into the whole subject, the report says the first investigation, directed to the utilisation of our existing Parliamentary powers, proved that the works authorised by them would be as expensive as the works already executed, and that as they had been designed merely as additions, none of them would prove more than temporary expedients to overcome present difficulties, and that the advantages gained by their construction would be exhausted nearly as soon as the works could be completed. Pending the investigations which Mr. Binnie was making, a pamphlet was published by Mr. Paterson and sent to each member of the Council respecting a scheme in the Masham district. Mr. Joseph Smith and Mr. Rooke also kindly suggested a scheme on the Cragg Brook, a tributary of the Calder; and various other gentlemen contributed other suggestions of more or less value through the newspapers or otherwise. The whole of them received the most careful consideration. Without entering into unnecessary details, it may be stated, as the result of Mr. Binnie's investigations, that the Cragg Brook scheme presented very serious difficulties; and that the only practicable schemes which would meet the requirements of the Corporation were a supply from the Wharfe at Buckden, and a supply from the Masham district, so laid out as to deliver the water by gravitation and without pumping into the Heaton Reservoir, and so designed as to give a service reservoir at some point near the town. The Committee deemed the matter of such importance as to require personal investigation, and therefore the Buckden district was inspected by the whole Committee, and the Masham district was inspected by the Works Sub-Committee. It being the opinion of the Committee that the choice of site for the new works must rest between the Buckden and Masham schemes, they considered it proper that, on a subject of such importance to the town, and likely to involve heavy expenditure, it would be wise to obtain the opinion of Mr. Hawksley as to which of the two schemes was preferable. It was known that Mr. Hawksley had on former occasions to make himself familiar with the peculiarities and distinguishing features of each of these districts in reference to other schemes for the supply of other towns, extending back as far as 1854. His authority on the subject was invaluable; and, accordingly, in the early part of last year, the whole subject was laid before him, including the scheme suggested by Messrs. Smith & Rooke, and Mr. Paterson's pamphlet. The instructions to Mr. Hawksley were to give the Committee his unbiased opinion after duly considering all the materials laid before him and making such inspections of the districts as he thought necessary; and, accordingly, having considered all the information laid before him, and having visited the sites, he attended the Committee on Tuesday, the 30th of August last, to state his views. He advised that the Cragg Brook scheme was impracticable, on account of the small supply that would be derived therefrom, and of the enormous opposition that would be met with; and as regards the Buckden and Masham schemes, that although a copious supply could be obtained from Buckden at a little less cost than from Masham, it was harder water than that from the latter district, and that the Masham water was much better adapted for the supply of the manufacturing industries of Bradford. He did not apprehend any formidable opposition to either scheme, and found that the Masham scheme would enable the Corporation to adhere to their system of giving compensation by separate gathering-ground and separate reservoir, whilst at Buckden the Corporation would have to undertake the supply of a guaranteed quantity daily to the mill-owners. In these views Mr. Binnie fully concurred. After enumerating the several grounds of agreement in opinion on the part of Mr. Hawksley and Mr. Binnie, the report adds that whilst Mr. Hawksley was before the Committee, a number of questions were put to him, and

amongst them whether he had considered Mr. Paterson's pamphlet, and in reply he stated that he had done so, but considered the scheme suggested by Mr. Binnie to the Committee as the better. At the same time he added that it was not his business to come into conflict with any of the gentlemen who had kindly volunteered projected schemes, but it was simply his duty to tell them which, in his opinion, was the best course for the Corporation to adopt. As the Council will naturally wish to have some information supplied as to the cost of the alternative schemes of Buckden and Masham, the Committee have to state that the estimated expense of the Buckden scheme would be 1,133,200*l.*, and for the first instalment 831,250*l.*; in the case of the Masham scheme, the cost would probably be 1,292,000*l.*, the first instalment required would be 966,000*l.* In conclusion, the report states that the Committee have felt very great anxiety on this business. They are unanimously of opinion that the supply of water ought to be such as will meet the growing requirements of the town, not only as regards purity, but also as regards softness, and they are equally unanimous in their desire to avoid embarking unnecessarily in any costly enterprise, but they are convinced that an increased water-supply must be obtained so as to meet the growth of the population and trade of the district, which, before the construction of any large works, certainly requiring from eight to ten years for completion, will, in the ordinary course of things, outrun any present available supply.

## MR. J. HAMBLET'S BRICKWORKS.

ON the occasion of the recent West Bromwich meeting of the Association of Municipal Engineers, a visit was paid to Mr. Joseph Hamblet's Piercy brickworks, at the Albion. The visitors were met by Mr. Hamblet and his nephew, who conducted them over the works, explaining without the slightest reserve the various processes in making bricks, tiles, and fancy articles. First came the blasting process in the marl-hole, where great quantities of marl and rock were blasted by dynamite and conveyed by tramway to iron wagons and thence to the grinding-mills. One of the most remarkable features of the marl is the fact that (according to the report in the *West Bromwich Weekly News*) it is suitable for either red goods or blue, and every article manufactured is from exactly the same clay, the only difference being in the length of time in burning, the hardest and most durable being caused by increasing and longer continued heat, the blue bricks being exactly the same as the red, only burned longer. The rock and marl, some of the pieces being of great size, is tipped into and passed through two pairs of rolls into the first mixing-pan and watered. Then it goes through another pair of rolls, after which it is conveyed by endless bands into a fourth pair, and passed into the second mixing-pan. This is then sufficiently prepared for the ordinary wire-cut blue or brindle bricks. For the best blue facing and paving bricks, the marl and rock in a plastic condition is passed through a fifth pair of large rolls, through another mixing-pan, and conveyed by an endless elevator band to the machine, and made into the best blue bricks for paving, &c. Upwards of 200-horse power is employed in the various processes of manufacturing. The bricks are taken from the machine in barrows by women and youths, and put on flues heated by fire, where they remain until sufficiently dry for pressing or otherwise. Mr. Hamblet's patent steam presses are excellent, being worked by friction discs, which are computed to give a pressing strain of 120 tons on each brick or paviour when in a semi-dry state, and any pattern can be pressed on the face of them. It is claimed that the bricks finished by this process withstand the highest crushing strain for bricks yet known, viz. 1,064 tons per square foot, as tested by Kirkaldy. Copings for walls are here made by means of wood moulds, some of the stock kinds being made by steam press. The kilns, known as Scotch kilns, are lined all over the insides with firebricks, but are soon destroyed by the heat required for the burning of blue bricks. About a fortnight is required to fill, burn, and empty, the bricks being subjected to the fire for about eight days and nights. They are afterwards loaded into boats and conveyed by rail to various parts of the country. One of the most interesting processes is the manu-

facture of encaustic tiles and terra cotta of every description. The fancy tiles have the patterns pressed on to them by a very simple but interesting process, some of them having to undergo as many as six different pressings. The ridge and chimney-pot machine is a very interesting one, and the articles are stated to be superior to the ordinary hand-made goods. Mr. Joseph Hamblet has recently added several branches of trade to his extensive works. Foremost of them is the architectural terra-cotta department; here there are being produced at the present time great blocks of richly foliated and delicately modelled red terra cotta of the finest surface, and as true as blocks of stone. Great technical skill is required in the manipulation of these blocks, and locally it is anticipated that South Staffordshire will soon be in the van of the clay trade in artistic productions as well as in the enduring material with which Mr. Hamblet's name has been associated.

## Illustrations.

## WINDOW, CHESTER CATHEDRAL.

THE large south transept window of Chester Cathedral, of which the stone-work was re-designed by Mr. A. W. Blomfield, has been filled with stained glass, the gift of Lord Egerton of Tatton. The subjects represented are the Crucifixion, Nativity, and Ascension, occupying the three centre lights, and sixteen subjects illustrating "Faith," taken from the eleventh chapter of Hebrews, are grouped around, filling up the lights on either side, the tracery being filled with a representation of the Angelic Choir. The window is designed in the spirit of "Old Glass," no attempt being made to copy the "Munich" or "Pictorial" school, Lord Egerton wishing to have a mosaic effect of colour, combined with figure drawing after the Italian Gothic school. The work was designed and executed by Messrs. Heaton, Butler, & Bayne, under the architect's supervision.

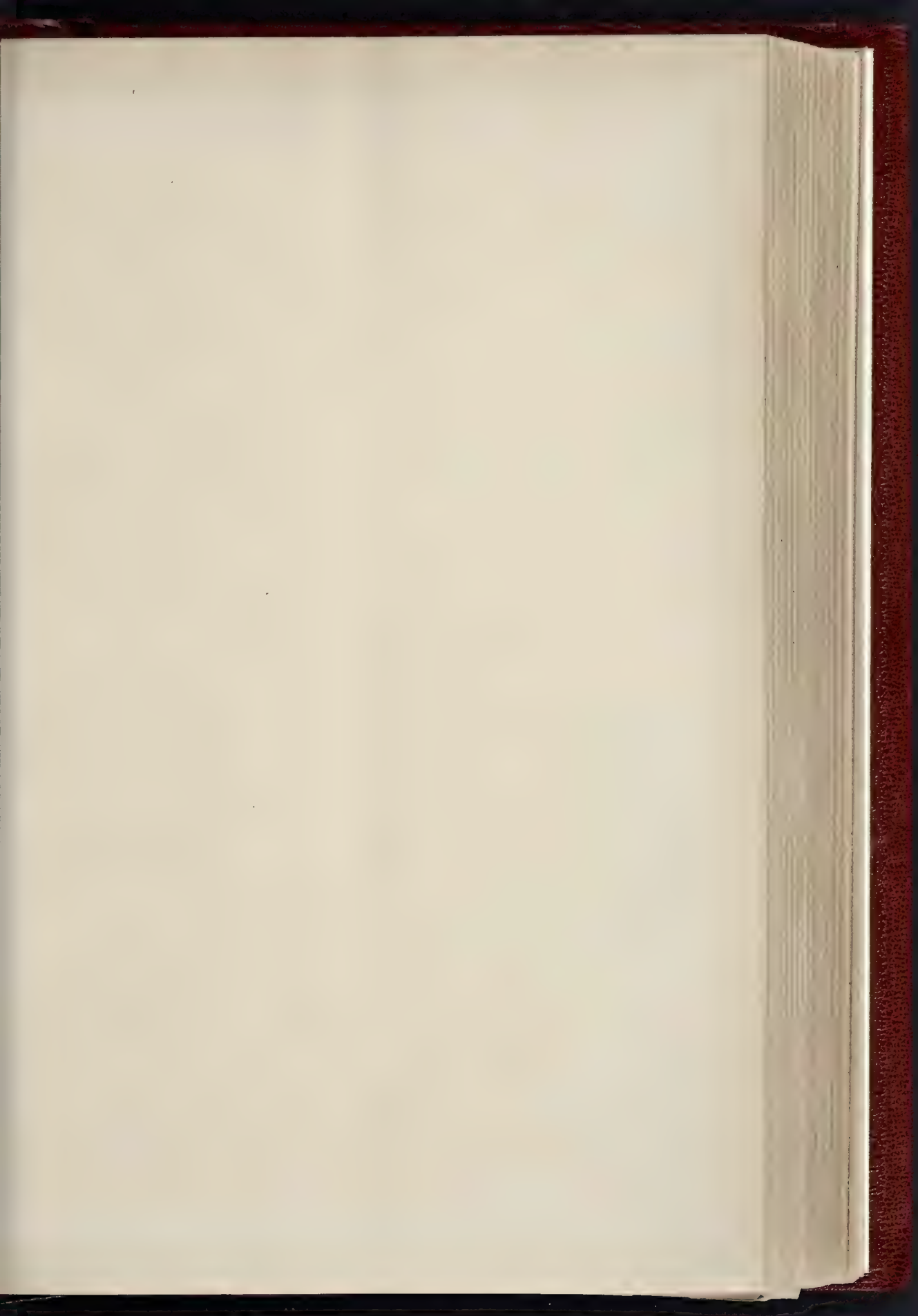
## NEW FREE LIBRARY, NORWICH.

THE building shown in our illustration is now being erected on Knight's Hill, Lower Norwich, for the Lambeth Libraries Commissioners, and is the first of several new libraries which are in contemplation. The site adjoins the new Post Office premises. The front is to be built of red bricks relieved with Ham Hill stone and terra-cotta, the arches and other parts being of gauged work. The plasterers over the main entrance will have busts of some men eminent in literature; all the other carving is to be emblematic of the use for which the building is erected. In the basement are lavatories, a large book-store, heating-chamber, &c., and over the front portion is a librarian's house. The fittings have all been specially designed by the architect, and the bookshelves are adjustable to any size book. Every book in the library will be shown on the indicator which is on the counter. The floors will be of wood blocks, and the ventilation, warming, and lighting have been carefully considered.

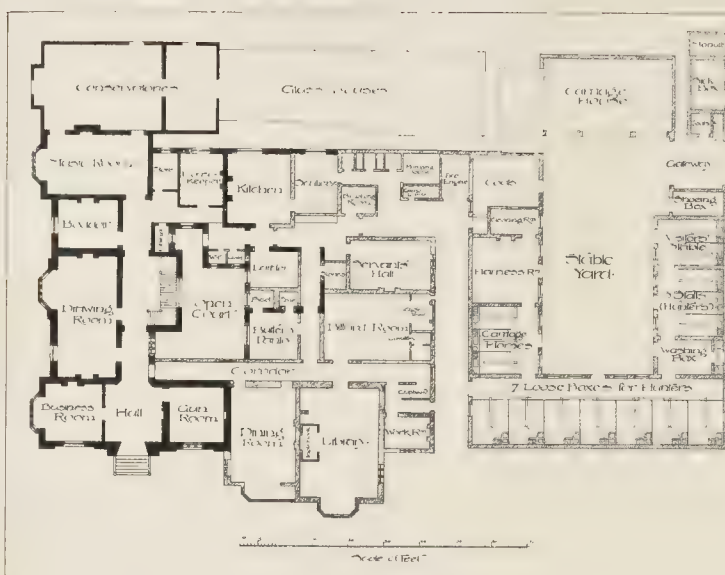
The builders are Messrs F. & H. F. Higgs, of Loughborough Junction, S.E.; the architect is Mr. Sidney R. J. Smith.

## FOLKINGTON MANOR, SUSSEX.

THE view of this house, the residence of Mr. T. E. A. Gwynne, J.P., shows the additions that have been made and those that are proposed (shown in the plan by a grey tint). A visitor who knew the estate a few years ago would no doubt be sorely puzzled to recognise it now. The old public road passed within 20 yards of the drawing-room windows, the old cramped stables were close to the front door, and the mansion was so shut in as to be practically hidden. Now the site of the road is occupied by flower-beds and terraced gardens, the old stables have been pulled down, and the hunters and hacks are stabled in luxurious quarters shown in the view. What the dining-room and library are completed the mansion and its belongings will without doubt be one of the most perfect in Sussex. Mr. Gwynne is his own contractor, employing a regular staff of estate workmen, by whom the work has been carried out in very substantial and creditable manner. The architect is Mr. Peter Dollar.





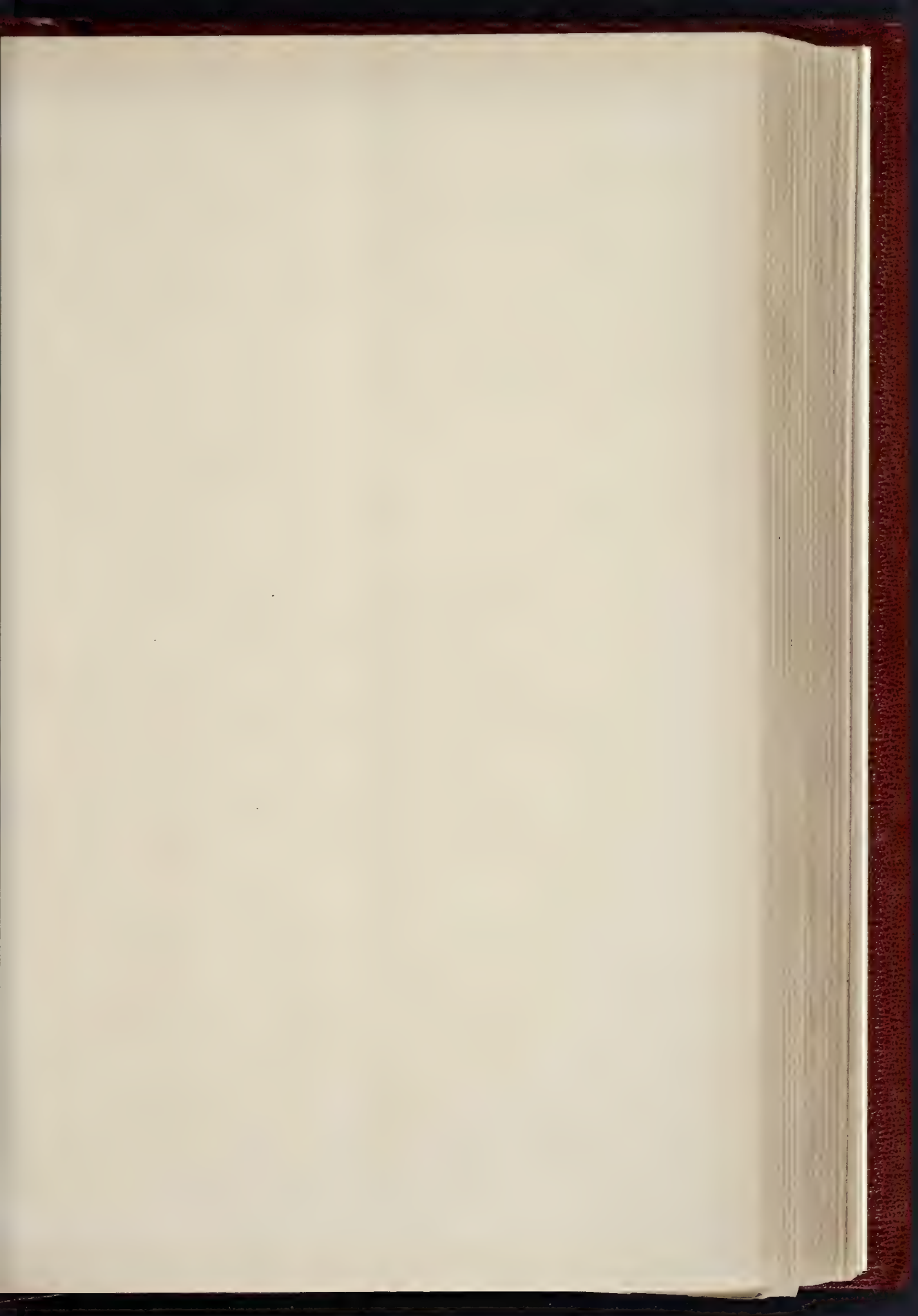




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THE BUILDER, SEPTEMBER 24, 1887.



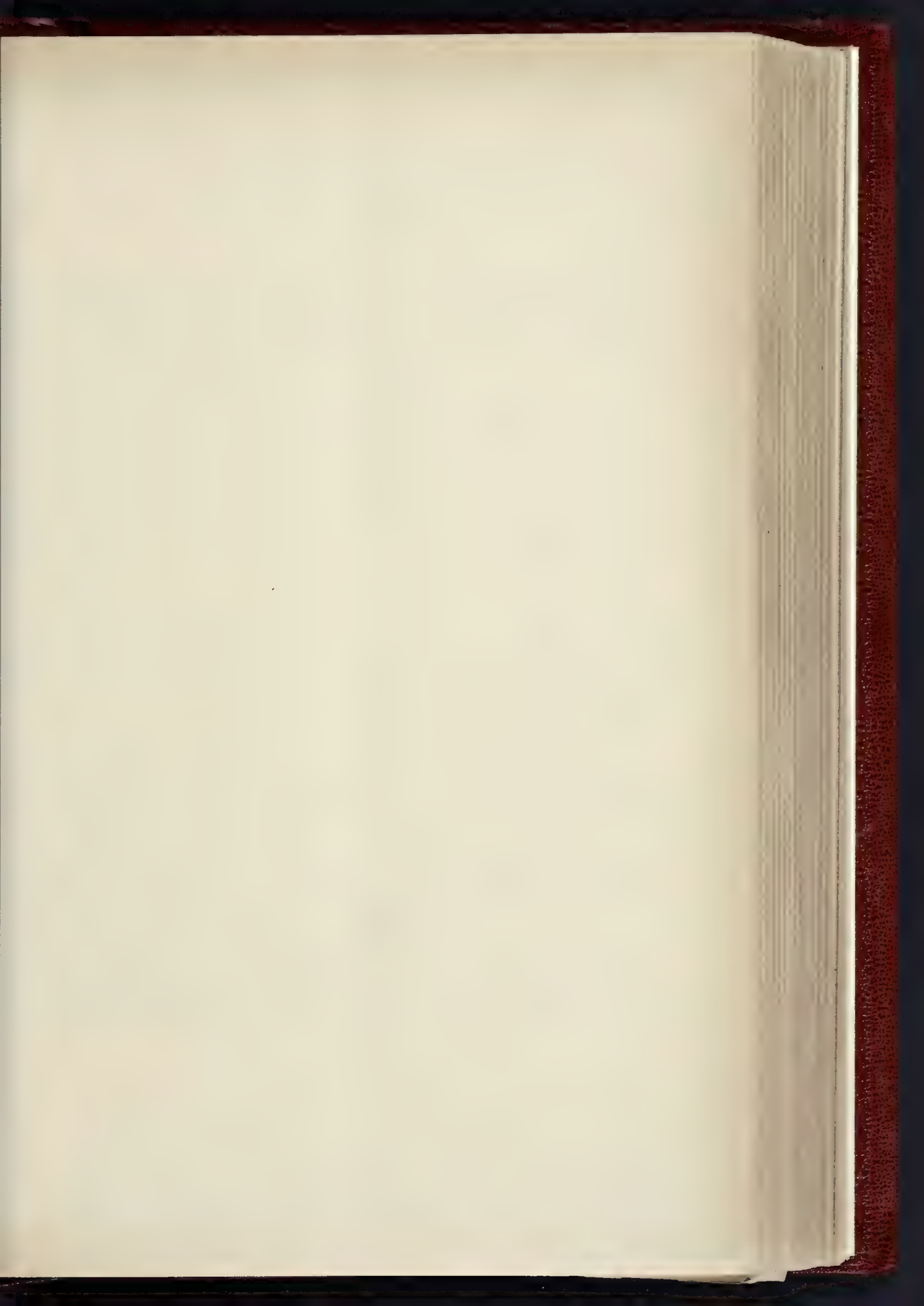




ON THE LEADS AT NORWICH—FROM A SKETCH BY MR. H. H. STATHAM

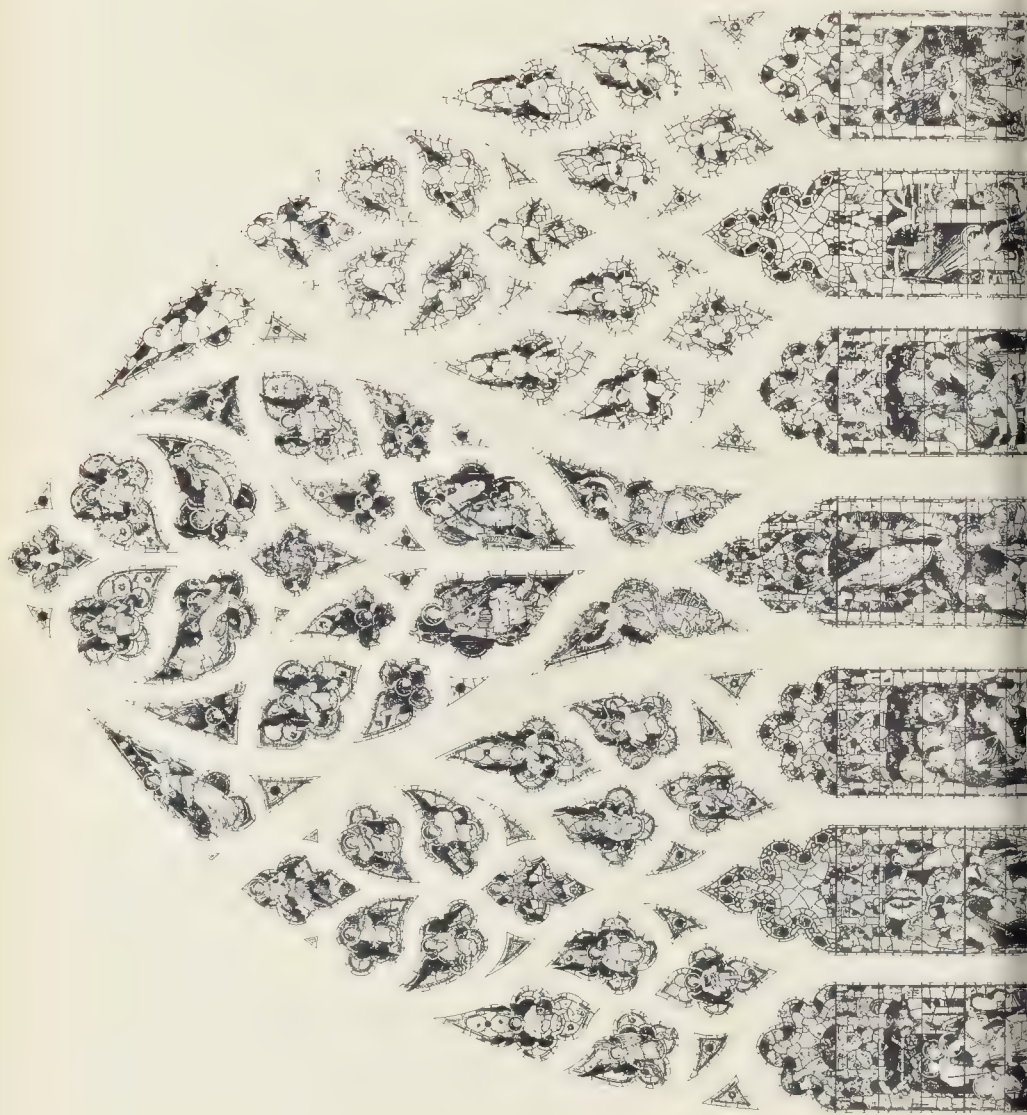








THE BUILDER, SEPTEMBER 24 1887



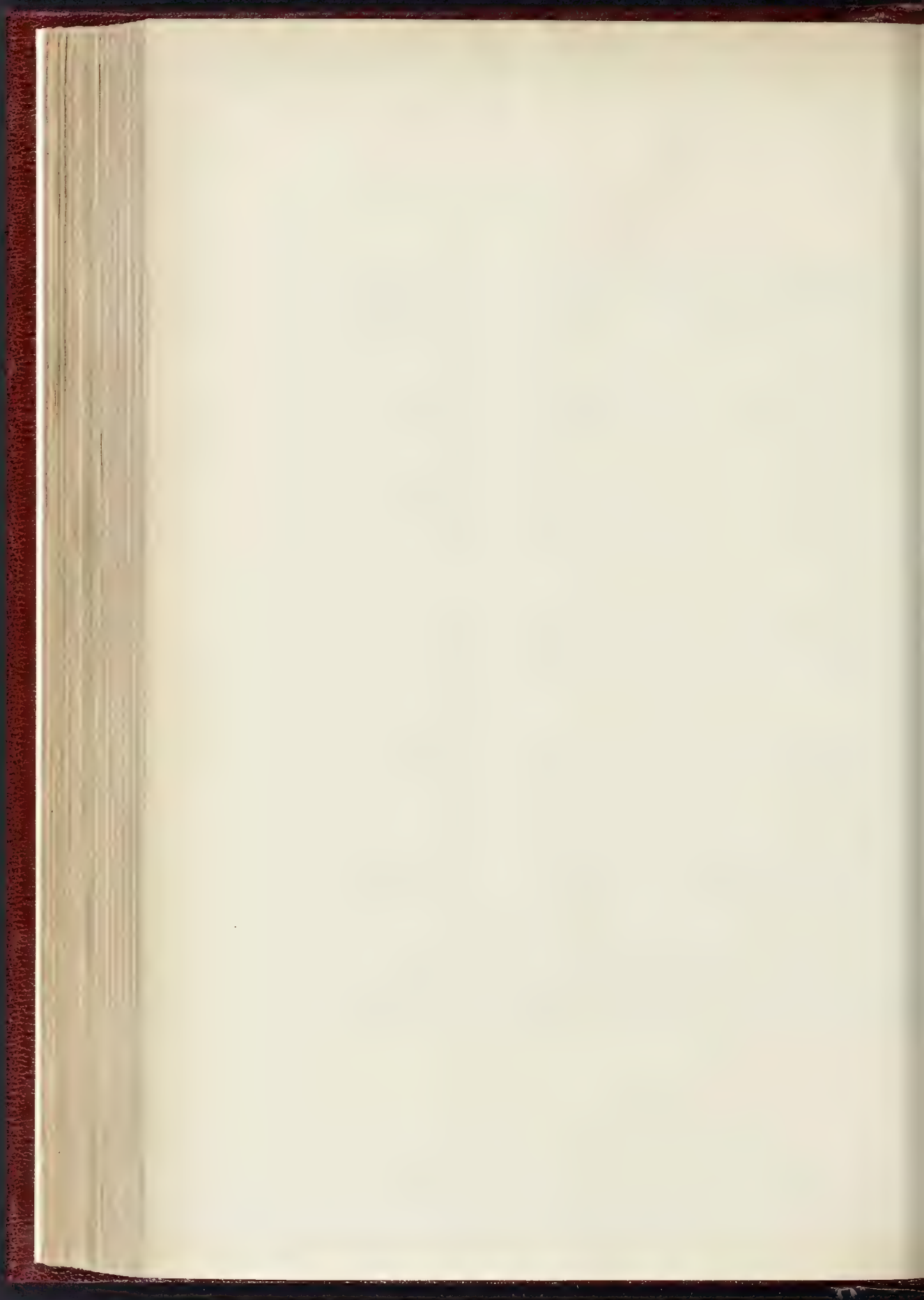


WINDOW, SOUTH TRANSEPT, CHESTER CATHEDRAL.

Designed and executed by Messrs. HEATON, BUNTON & PEARCE, under the supervision of Mr. A. W. BRONFIELD, M.A., Architect.

THE ARTS AND CRAFTS SOCIETY, LONDON.





SUGGESTED AMENDMENTS IN  
SANITARY LAWS.

THE Right Hon. Lord Basing, F.R.S. who (then Mr. Slater-Booth) was President of the Local Government Board from 1874 to 1880, is President of the Congress now being held at Bolton under the auspices of the Sanitary Institute of Great Britain, and on Tuesday evening he delivered the opening address of the Congress, from which we extract the following:—

For my own part, I do not wish to appear before you as an optimist or a pessimist,—certainly not as an optimist. Passing by for the moment the question of the standard or ideal at which we should aim, I find plenty of material for legislation, change, and improvement stored up in various ways, and ready to be put forward when time can be afforded for anything except questions affecting the condition of Ireland. The more important of these (of which I shall presently give a catalogue) have been derived by what I have already described as the most legitimate and satisfactory of all methods, viz., from applications to Parliament on the part of private Bill promoters, mostly our larger and more populous cities and towns, during the last six or eight years. I have twice during that period acted as chairman of the Parliamentary Committees to which the more important of these Bills have been referred; referred, however, with the view of curtailing rather than encouraging exceptional legislation, and of moderating the tendency to extravagant expenditure by means of borrowed money. Many of the provisions mentioned in the list have been conceded, others are so far recognised as needful to be provided that they will undoubtedly be included in the next, may I hope the approaching, amendment of the Public Health Act, 1875.

I well remember, amongst the most striking and comprehensive of the applications which have been made to Parliament of late years, an elaborate consolidation and amendment of the Bolton Improvement Act, which, together with some others of the like authority, has exercised no small weight in the process of selection to which I have alluded.

Although the Public Health Act, 1875, may be said to be complete as a general measure, so far as regards the accepted sanitary requirements at that time, subsequent experience has shown it is now capable of amendment in several important particulars.

The following are some of the amendments which have been suggested:—

1. The importance of separating sewage from surface water is now recognised.

The Act is, in its present form, practically prohibitive of schemes for that purpose; and power is therefore wanted to enable Local Authorities to provide a dual system of drainage. The Corporation of Reading were so sensible of the importance of this arrangement that they were mainly induced by a consideration of it to promote their local Act of 1881.

2. Provisions are needed to prevent injury to the structure of sewers and their obstruction, and the evolution from them of specially noxious vapours from chemical works, &c.

3. It has been frequently urged that communications between drains and sewers should be undertaken by the Local Authority, at the cost of the owner, instead of by the owner. The central authority should be empowered to decide upon the junction of the sewers of one Authority with those of another.

4. Local Authorities might have power to regulate, in addition to materials, size, &c., the ventilation and height of sleeping-rooms, the trapping and junction of drains, &c., in connexion with dwelling-houses. More powers are also needed with regard to enforcing the repairs of vaults, &c., under streets. Provision is also needed for the regular inspection of houses during their construction, to see that proper materials are used.

5. Provisions would seem desirable for prohibiting the construction of rooms over privies; and power might be given to impose a penalty on persons who, after notice, neglect to repair or cleanse their water-closets, earth-closets, privies, or ash-pits.

6. Local Authorities, who undertake or contract for the removal of house refuse, cannot make by-laws relatively to such removal. They should have power to make by-laws ancillary to the work so undertaken by them or their contractors.

7. Larger powers should be given to Sanitary Authorities for the protection, both within and beyond their limits, from pollution of water courses from which they derive their water-supply; and lords of manors might be empowered to make grants of waste lands for purposes connected with water-supply.

8. Parliament has very generally accepted in local Acts proposals for the prohibition of the use as dwellings of premises constructed, and ostensibly intended, solely for use as "lock-up shops." There might now be a general enactment to this effect.

9. A Local Authority should have power to cancel the registration of a common lodging-house. They cannot do so now.

10. Back-to-back houses should be prohibited in future.

11. Power should be given to proceed against offenders when an article of food has been found unfit for use after it has been sold, or where it has not been exposed for sale, but delivered under contract.

12. Many local Acts empower the Local Authority to disinfect houses. This might now be made general.

13. A considerable number of Local Authorities have obtained Acts enabling them to require medical practitioners to notify any occurrence of dangerous infectious disease. Power should be given to the central authority to clothe Local Authorities with this power on application, so that they need not incur the expense of a local Act for the purpose.

14. Sanitary Authorities should be authorised to issue notices and advertisements warning the inhabitants against conduct likely to spread infectious disease.

15. It is desirable that some power should be given to remove to hospitals persons attacked with infectious disease, when isolation is not otherwise practicable.

16. Local Authorities should be enabled to provide, temporary shelter for members of a family in which infectious disease has appeared, whilst the house is being disinfected and cleaned, and to provide nurses for attendance upon persons suffering from infectious disease.

17. A penalty should be imposed on persons ceasing to occupy houses where there has been infectious disease without previous disinfection or notice to owners, or making false answers.

18. Bodies of persons dying in hospital of infectious disease not to be removed except for burial, and corpses not to be carried in public conveyances other than hearses.

19. The Medical Officer of Health should be empowered to enter a house where he has reason to suspect the existence of infectious disease on obtaining a magistrate's order.

On the other hand, I certainly do not wish to appear before you as a pessimist, and I feel bound, as the final result of my experience, such as it has been, to say, that, having regard to the comparative novelty, and to the difficulty and obscurity of the subject, to the dislike of control, and to the great expense attending works of sewerage and water supply; still more, when we remember the disinclination of Parliament to turn aside from the more striking and generally interesting matters which make or mar the fortunes of Governments and parties,—I feel more than satisfied, on looking back over a period of thirty years, to find that so much has been really accomplished. At this moment, my apprehension undoubtedly is that, in the anxiety to escape from the irksomeness of detail, and in the hurry to establish local government, generally on a wider and more popular basis, mischief may unwittingly be done through misappreciation of the difficulties under which that which now exists has been built up, and of the great risk which may be run if such central control as is really still required were to be hastily surrendered.

But, further, that a pessimist view is really unjust and untenable, statistics abundantly prove. I have already given more than sufficient for my case, but I will take the liberty of borrowing, what I am sure our veteran champion, Mr. Chadwick, will readily lend, a few of the more striking illustrations which he gave to the world on a recent occasion when celebrating the Jubilee of Sanitary Science:—

"The present reduced annual death-rate for the metropolis may be stated at 19 in 1,000, but the sanitary engineer could undertake its reduction by 5 in 1,000, and at a cost greatly below the existing insurance charges for sickness, loss of work, and death. On what experience, it may be asked, are the statements as to that conclusion based? The answer may be, that they are based on that which has been done for the common lodging-houses,—old buildings, once the seat of pestilences, but now cleared of

them by very rudimentary sanitary measures; and on what has been done in blocks of buildings in the metropolis, and in old urban districts, such as Salisbury, where the death-rate, as high as 40 in 1,000, has been reduced to 16 in 1,000; in Dover, where 28 in 1,000, is now about 14; in Rugby, where 24 in 1,000, is now under 12; in Croydon, where 28, is now 10 to 15; in Matlock, where 18, is now 9."

Mr. Chadwick then proceeded to make some remarks leading up to the important subject of the economy of sanitation which he has recently worked into shape, and which I trust he may be able to lay before this conference, no branch of the subject being more likely to influence the popular imagination.

These and similar statistics have been put before the Sanitary Institute by Presidents and other speakers year after year, but they cannot be repeated too often. The period of activity is too soon followed by a relapse into apathy, and even when, through the agency of epidemics or other exciting causes, the time for constructive legislation comes round again, we shall find that the growing tendency to disparaging and fault-finding criticism on the part of public writers and speakers, coupled with the spirit of obstruction which now seems to be paramount in Parliament, will render the task of the Government increasingly difficult. They will accordingly require all the backing which public opinion can confer, enlightened as it must be by efforts such as this and other kindred associations are making, to carry them safely through the rocks and quicksands which will most assuredly beset their progress.

The address which I have thus ventured to lay before the Congress has been couched for the most part, in abstract terms. But we must not forget that we are meeting in one of the most thriving industrial centres of the great county of Lancaster, and I trust that considerable attention will be given to the application of sanitary science to the needs of the populations which have grown up in these manufacturing districts. The cotton manufacturers have exercised no small influence in times past over the financial policy of the country. If the wealth and prosperity which followed, and in some degree flowed from, that policy, have caused an aggregation of human beings in and about the central towns to multiply with a rapidity and to an extent prejudicial to healthy conditions, it is here that we should look for activity in remedial measures, and a ready recourse to all that can be done in the way of amelioration. Can it be said that the result is perfectly satisfactory? Is not the death-rate higher than it should be, and that even in Bolton, which is more healthy than many places that might be named hereabouts? Does it not, for instance, compare unfavourably with that of London? And, if so, do we find earnestness and discrimination on the part of the local authorities in pressing forward remedial measures, and acquiescence on the part of the people in submitting to the necessary expense? I have referred to the Bolton Improvement Act; but there are few towns of any size in the County Palatine which are not provided with similar facilities in the same way, and all are subject to the provisions of the Public Health Act, which, in the greater part of Lancashire, is doubly effective, as the sanitary districts are mostly of an urban character. In fixing their Congress at Leicester the year before last, the Sanitary Institute was not afraid to beard the lion of anti-vaccination in his den (to little purpose, I fear, if the statements of a letter in yesterday's *Times* are well founded). Let it not be said that we come only to prophesy smooth things at Bolton. We know the energy and capacity of the Lancastrian population. We must not shrink from holding up before them the highest ideal, and, I may add, the material advantages which are involved in determined efforts after sanitary improvements. Thus our visit to the North may become, as we should desire, a useful stimulus locally, as well as a signal manifesto of the principles we profess, and of the great national objects we have in view (applause).

Mr. H. Shepherd Cross, M.P., in moving a vote of thanks to Lord Basing for his address, expressed the indebtedness of the country to sanitarians, by whose labours and researches improvements in sanitary conditions had been brought about with the result, not only of diminishing the death-rate, but of preventing sickness. And it should, he thought, be more often borne in mind that the reduction of the death-rate did not half express the advantages which the nation gained from the labours of the sanitarians. Let them remember the amount



of sickness which was prevented by the observance of sanitary conditions, and the consequent gain to the community, as contrasted with the privation and penury which often followed through the illness of the wage-earner of the family, even when the illness did not terminate in death. He thought the Congress was much indebted to Lord Basing for his excellent address, in which he had clearly traced the course of recent sanitary legislation and its results,—results which the noble Lord himself had some share in bringing about (applause).

Professor J. Russell Reynolds, M.D., F.R.S., President of Section I. of the Congress (Sanitary Science and Preventive Medicine), in seconding the motion, said that he was glad to find that there was a growing opinion in favour of the compulsory registration of disease as well as death, and when that opinion ripened into action, and complete statistics of disease were collected, some more than doubtful assumptions, based upon or deduced from mortality statistics, would be corrected or verified, while the increased precautions which would inevitably follow from the publication of such statistics would, no doubt, tend to reduce death-rates still further. Speaking as a physician, he was able to testify that,—until within the last few years especially,—nothing could be more slovenly, not to say dishonest, than the way in which the existence of disease of an infectious sort had been concealed. As illustrating the importance of having statistics not only of deaths but of disease, he might call the attention of the Congress to the fact that while much was being said just now as to the prevalence of scarlet fever in London, the mortality had, happily, not been high; indeed, during the present epidemic the mortality from that disease had been below the average of previous years. The proposed compulsory registration of infectious disease, to which Lord Basing had referred in his address, was thus a matter of the greatest importance (hear, hear).

The motion for a vote of thanks, having been put to the meeting by Professor Corfield, was carried by acclamation.

Lord Basing, in acknowledgment, referred to the labours of Lord Norton (formerly Sir Charles Adderley) in connexion with sanitary legislation and administration.

#### REFUSE DESTROYERS AND THEIR RESULTS UP TO THE PRESENT TIME.

A fortnight ago (p. 360, *ante*), we gave the substance of a paper on this subject read by Mr. Charles Jones, Surveyor to the Local Board of Ealing, at the Leicester meeting of the Association of Municipal and Sanitary Engineers and Surveyors. In the discussion which followed the reading of the paper,

Mr. Lemon (Southampton) said,—I, together with my friend, Mr. Jones, visited Leeds, and went back rather impressed with the value of the destructor; and, with other members of the Town Council, succeeded in getting a destructor erected. At the first blush of the thing, a destructor looks like an expensive and wasteful article. In Southampton the refuse was sold for about 1s. 6d. per ton. The cost of the destruction, you have been told by Mr. Jones, is about 1s. per ton. Thus the actual loss is about 2s. 6d. per ton. This is rather a large item in the expenditure of a town, but on the other side you get the advantages from the burning of the refuse. This, I think, ought not to be lost sight of. In conversation with Messrs. Fryer the other day, I found that in towns where the power generated is utilised, the loss is remarkably small. I do not think, according to what he told me, that 20 per cent. of the towns in England where destructors are used turn the power generated by burning the refuse to any advantage. Now Mr. Cartwright, the Borough Surveyor of Bury, in the paper read by Mr. Santo Crisp, gives some results bearing on this point. He says that sixteen tons of refuse daily would enable an 8-horse-power indicated engine to be worked twenty-four hours by the steam generated. If you work this out, you will find it is  $\frac{1}{2}$ -horse-power per ton. I think that is a very simple and useful fact to remember. In my own borough the amount of refuse burnt daily is about 50 tons, and we get about 30-horse-power, a somewhat higher result than that given by Mr. Cartwright. But you must bear in mind that the quality of refuse varies considerably during the year. I do not think Mr. Cartwright has

over-estimated the power, and if you take his datum, which is a very simple one, you will have something on which you can found your calculations. If the refuse of Leicester, which has a population of about 140,000, were utilised, you would get a useful effective power of about seventy horses. This is a thing which ought not to be overlooked; and this is to be set off as against any increased expenditure in the use of a destructor. As time is short, I will turn to the burning of sludge. I do not agree with the conclusions of my friend Mr. Jones as to the burning of sludge. I do not think that is the solution of the difficulty. In my own borough, we had a very long litigation with cement manufacturers, and that was occasioned by the complaints of their works being a nuisance to the neighbourhood. Now, if the burning of the mud of cement is a nuisance, under careful management, I am quite certain that the burning of sludge containing about 90 per cent. of water must be a nuisance, unless it is very carefully managed indeed. I should hesitate, myself, to adopt the method of burning sludge referred to by Mr. Jones. I have seen his works; they are admirably arranged and excellently managed. But, as to burning sludge with the refuse, I must say I do not think it is the right thing to do. However, he gets rid of a nuisance, and that is saying something for him.

Mr. Hewson (Leeds).—I am glad of the opportunity of speaking, because I wish to do some service to the Association. I am not here to advocate any of the processes named by Mr. Jones; I am here simply to give the Association the benefit of my experience on this subject, to state what the Leeds Corporation have done. You have been told that the Corporation of Leeds were the first Corporation to build destructors. About the working of these destructors, the management of them, and my experience of them, I think I can give a few useful notes to those who have destructors but have not had much experience, and those who may have destructors. At Leeds, we had no sooner built the destructor than, of course, there were complaints of the disagreeable smell from the chimney. I ought to say that the destructor is built practically in the centre of the town, where there is a dense population; and you can readily conceive that if there were any cause of complaint, we should soon hear of it. There being cause for complaint, we did soon hear of it. The Corporation naturally endeavoured to remedy the evil by raising the chimney. But that did not remove the evil. There were still discharged out of the chimney quantities of disagreeable fumes and dust. For a certain distance around the works, according to the direction of the wind, there was a sort of "salting and peppering" constantly going on. From that time to the present this difficulty has existed, and to get rid of it has been the primary object of the different experiments we have made. To get rid of this dust, we first of all made recesses in the horizontal flue which passes between the two rows of furnaces. True, I ought to tell you, is something like 6 ft. wide with sunk recesses on the right and left, forming store chambers for the dust passing along to deposit in. We found this did not answer because of the smallness of the provision. We found, indeed, that after two days these chambers were filled with dust, and the nuisance was as bad as ever. The result to-day is this:—We make these recesses in the bottom of the flue as large as we can, but every Sunday we clean out the bottom of the shaft,—that is, the bottom of the chimney. Notwithstanding that we make the horizontal flue the length of this room, the 6-ft. chamber at the bottom of the chimney-shaft, after a week's work, is pretty nearly stopped up. In fact, there is a struggle between the draught and the specific gravity of the dust, until there is only just enough space to allow the heated fumes to escape, no doubt bearing with them a great quantity of dust. Well, gentlemen, this dust difficulty remains with us until to-day. With a view of getting rid of it we visited Mr. Jones's crematory at Ealing a fortnight ago, and were very pleased with the result. We were told by Mr. Jones that he got a very high heat,—1,500°, whereas at Leeds we only got 700°. Therefore his crematory is very effective, because if you get a furnace at 1,500°, through which these fumes have to pass, you will necessarily get a great deal more perfect combustion. That I think will be patent to all of us. With regard to the nuisance of the smoke, there is

another thing we have found it necessary to do, and that is to watch very carefully the charging. The men very much preferred to charge the ten or twelve cells right away, and then light their pipes and go and skulk for an hour or two. They preferred that system to the one we have now adopted in Leeds of charging only a pair of cells at a time. We used to charge the cells as quickly as the men cared to do it, every 2½ hours. The cells are back to back, and we now make them charge every twenty-four minutes. The result is that we do not have coming out of our chimney-stack for half the time large volumes of disagreeable fumes from the cells being charged regularly. Only a very small quantity is now visible. By this system, too, we get a more uniform heat. Under the old system, immediately after the general firing the temperature went down 150 degrees. Among the other things we tried to secure better combustion was that of making a great number of holes in the fire doors, so as to let in a quantity of oxygen over the fire, and to make this more effective we put in bafflers on the soffit of the arches. These we secured to the arched roof by pieces of sheet iron, which would have the effect, when the current passing through these holes struck against these bafflers, of throwing it down upon the fire. These were very useful, and the two things together did a great deal towards giving us a redder fire and less dead matter on the top of the burning fire. The committee wished to do something better, for still we had complaints; we then raised the chimney-stack 30 yards higher. Even to-day, however, the fumes which come from the top are very heavy, and when the wind is quiet the lee side of the country suffers from a very disagreeable smell, within a radius of perhaps a mile,—the peculiar dry smell of burning wet, dank, vegetable matter. We tried after this a system of blowing. I laid round the whole of a block of ten furnaces a line of 12-in. pipes, and out of each of these I took a junction of 10 in. into each ash-place, and I got the mouth of each ash-place bricked up round each junction. Well, of course, when I came to utilise this system I found I had not the necessary power. Although we consumed 50 tons of refuse per day, I found we had not more power than some sixteen or seventeen horse-power,—that is, break power outside the engine. I then wrote to the most noted men in the country who make blowers,—who make this a speciality and supply large blowers. I got from three firms estimates of the cost of machinery and blowers sufficient to do the work, with a guarantee that the machinery would be sufficient to produce the necessary blasts in each of the cells. But it came to this, that I really could not undertake it without 50 horse-power at command. A system of blowing into an enclosed ash-place practically requires 5 horse-power per cell. After the pipes had been laid, whilst thinking about this and talking over the question with the man who had done the work, he said, "What do you think about putting a steam jet under each fire-grate? Rip your machinery out, and take steam actually to the work to be done." I replied, "We will try it." Well, we have attached it to a pair of the cells, in the manner you see in the section before you. A steam pipe is turned into an open pipe which passes into the built-up ash place. We found that, acting in a sense after the manner of an injector, it induces a current of air to press under the fire-bars, which gives me most readily over 1,500 degrees of heat. The effect upon the fire, of course, is much more rapid consumption and much more flame, due to the admission of hydrogen in the shape of steam. This, in fact, is what we are doing now. When I speak of a jet of steam I speak of a quarter of an inch jet, and a pressure of anything between 25 lb. and 30 lb. The committee have ordered me to attach the system to the other furnaces; but, at a meeting which we had the other day, we were not quite sure whether it would not be better to adopt a system of furnaces like those attached to Mr. Jones's crematory. One of the members of the committee, not a scientific man, but a hard-headed Yorkshireman, put a very plain proposition. He said, "I know, of course, that heat is heat, but that will not do everything. I can understand that heat will make substances break up, and reorganise themselves as different gases, but I can understand that heat might not be a perfect cure. I cannot help thinking that if these fumes were passed through clean fire they would really come out less harmful



man if passed through high heat where the re was not clean." Personally I am not chemist sufficient to deal with this aspect of the question. However, as some testimony to Mr. Jones's efforts in this matter, I thought had better name it. Then as to cost: I may say we have made all sorts of attempts in the way of economy in dealing with our destructors. We have two destructors, so that the carting is so great as if we only had one. But I cannot get the cost any lower than 10d.,—that is, including every charge for capital and depreciation. I think I have now told you all we have done; and to the future, whether the steam we have at present will be sufficient for the ten bells yet remains to be seen. I think it will, because we know we can now work 15 to 18 horse power continuously, in the way of making mortar. We certainly ought to be able with 100 degrees through the twenty-four hours, these units of heat are obliged to go somewhere; and if we utilise them by putting them into water, we shall have a better supply of steam in proportion.

Sir Robert Rawlinson.—This question of effuse destruction is so important that I have induced the Local Government Board to permit me to authorise one of the inspectors to undertake the collection of information on this point. I entrusted this to Mr. Codrington, one of the inspectors, whose report has not yet been completed. He has been visiting the various places, and I dare say he has come into contact with some of you gentlemen. He is getting together such information as he can obtain on this point.

The discussion of the subject was resumed at the recent West Bromwich meeting of the Midland District of the Association, when

Mr. Andrews, of Bournemouth, stated that after a good deal of inquiry they had erected where a destructor on the principle advocated by Mr. Jones, and started it last week. It cost them about 3,000l.,—600l. for three acres of land, 900l. for the ironwork, and 1,500l. for the brickwork and chimney-shaft; the latter costing about 500l., and being 137 ft. high.

Mr. Dent, of Nelson, said that with the "Beehive" destructor they were destroying refuse at a cost of 1s. 3d. per ton, apart from the cost of the cremator.

The President (Mr. Gordon) remarked that taking the cost of destruction at 1s. per ton, they had to add to that the cost of carriage to the place. If they could reduce that cost it appeared to him they would do much to end the difficulty found in getting these destructors accepted, and the destruction of noxious emanations, so that destructors could be erected in the centre of populous localities, was involved in that. That was claimed to have been attained by Mr. Jones. But he was not sure they had arrived at the best method yet. Still, they owed a debt of gratitude to Mr. Jones for the pains he had taken in working up the subject, and the information he had laid before them.

#### COMPETITIONS.

**Helston Public Rooms.**—The Helston Public Rooms Company invited architects by public advertisement to submit plans and specifications for their new buildings, and offered a premium for the best design. Twenty architects competed, and the committee appointed to report upon the drawings advised the adoption of the design bearing the motto "St. Michael," the author of which is Mr. Charles E. Dyer, of Plymouth. The new buildings will occupy a central position, upon a site part of which is at present occupied by the Old Grammar School. This building is a well-built and substantial structure, and possesses more merit as an architectural composition than the majority of buildings of its period. It has, in addition, many interesting associations connected with it, and on these grounds, and upon the score of economy, it has been considered advisable to retain and embody with the new building the more important portions of it. In addition to the reading-room and library (to which the Old Grammar School is devoted) the buildings will comprise a business-room, a large committee-room for the use of friendly societies, smoking and billiard rooms, and a large hall, with suitable retiring-rooms.—*Western Morning News.*

**Kingswinford Board Schools.**—In the competition for the new schools at Mount Pleasant,

Quarry Bank, Brierley Hill, for the Kingswinford School Board, the Board have accepted the design submitted by Messrs. G. B. Nichols & Son, of Birmingham, and have given them instructions to proceed with the contract drawings.

#### THE WALLS OF CHESTER.

Sir,—The question is not what the eminent antiquaries, whose names are published by Mr. Thompson Watkin [p. 411, ante] as supporting his theory of the age of the walls of Chester, thought in 1886; but what they think now, after the publication of the impartial verdict of Sir James Picton, Mr. Loftus Brock, and the meeting at Chester of the Archaeological Association.

At the Congress of the Archaeological Institute the evidence brought forward by Messrs. Shrubsole and Watkin was of an *ex parte* kind; and Mr. Shrubsole, from his long residence at Chester, was accepted, too hastily, as possessing a correct knowledge of the age and character of the walls. I know that some of the gentlemen then marshalled on the side of the Jacobean theory are now opposed to it; and we do not see one writing to support it.

The partial construction of Roman town walls with the monuments of an earlier time has been long well known as of frequent occurrence. I may instance Bordeaux, Dijon, Sens, Narbonne, in France; and Arlon, in Belgium, so well described by Mr. H. Schermans, President of the Court of Appeal at Liège. The walls of London afford an example in this country, as the Guildhall Museum, through the exertions of Mr. J. E. Price, will testify. All these walls appear to have been partly built by the Romans with these sculptures. It was at first supposed that the portions containing sculptures were reparations, but additional evidence appears to show that they are of the age of the walls themselves.

All the sculptures found in the walls of Chester are Roman. That adduced by Mr. Watkin as a Medival ecclesiastic is a Romano-British girl holding a mirror, an example of which from the walls of Bordeaux I have given in my *Collectanea Antiqua*.

Mr. Watkin says I have said nothing of the superstructure of the walls of Richborough, Reculver, and Lyme. Surely it is not needed for me to repeat in such a discussion what I have published over and over again. They are faced with small squared stones, and bonded at intervals with tiles. The Chester walls have large squared stones, and no tiles. This was adduced by Messrs. Shrubsole and Watkin as evidence for their not being Roman. They did not consider the walls of *Isurium* (Aldborough), nor those of the *castra* to the north, nor the Great Wall itself. C. ROACH SMITH.

Strood, Sept. 19, 1887.

Sir,—Mr. Thompson Watkin, in your issue of the 17th, refers to the jointing in the unmortared masonry of the walls of Chester and to some (alleged) change of opinion on the part of Sir James Picton when I "remarked upon the close joints of the stones." The words referred to convey the impression that Sir James's opinion was suddenly expressed, and after this piece of evidence only had been adduced.

Such was not the case. As I have elsewhere said, nothing could be more complete than were the facilities, not only for Sir James, but for all our members present, to see the work laid open for observation, and for all to form impartial and unbiased opinions. It was only at the close of the long tour of inspection, and after the last of the evidences had been inspected, that he summed up the results of the visit, and his opinion was expressed. I heard it then for the first time.

I have no need now to notice many of the other points named in your correspondent's letter, since I shall have many other opportunities of doing so, but it may be of service at this stage of this interesting discussion if I refer to what he says of the section of the wall at the position named, west of the Phoenix Tower, one of the places laid open by the excavations. My doing so will render a better idea of the nature of the wall to your readers who may not have inspected the work, and be of service for future discussion. The wall of Chester here consists of a massive base of huge stones,—sandstone, set without mortar, having fairly close joints in front (outside the city), and resting on solid rock, which is, beyond the wall,

scarpred to a considerable depth to form the external ditch, the site of which is now the canal. The foundation consists of a projecting course, bedded level in the rock. There is then an irregularly-chamfered plinth, from which the wall rises to a height of about 10 ft. without mortar, and 8 ft. with mortar, the whole having a considerable batter inwards. There is then a neatly-worked chamfered course, and the wall terminates in an ordinary parapet, breast high, coped with a doubled splayed course. The whole of the interest in this discussion centres in the lower part, the unmortared masonry. This is of coursed work, laid fairly horizontally, but with a tendency to follow the inequalities of the ground. The stones are of great size and weight, some being as much as 5 ft. in length. The thickness at the base is about 8 ft. The upper mortared portion consists of smaller stones, generally in poor condition, while the reverse is the case in the lower part. On the inner side are clear traces of a sloping bank of earth, which appears at some time to have formed a means of manning the wall, such as we see, of Roman date, at Silchester; of Medieval date on a Roman base, at Chichester; and of Medieval date entirely, at Great Yarmouth and many other places. On this bank, on the inner face, a rough supporting wall, 7 ft. high, is built with mortar, having no foundation at all, and with hardly any sort of bond or support from the solid wall of masonry, but exhibiting the open joint described by Sir James. The inner face of the wall has been apparently removed before the formation of this wall, although its face originally may never have been so smooth as the outer one, consequent upon the backing of earth. Earth now fills many of the interstices of the unmortared stones, which I hold to be Roman, but whether formed so or the result of percolation, I am unable to say, although I think the latter.

This inner wall carries the present paved way within the parapet, which forms the well-known and greatly enjoyed promenade which goes all round the city.

It is in the unmortared part of the wall that the recent remarkable discovery of Roman inscribed, moulded, and sculptured stones has taken place,—a discovery which is still in progress, for hardly a single day seems to pass without some fresh result being obtained. Not a single stone has been found in the mortared part of the wall.

This distinction is not alluded to by your correspondent, but since it is so significant as to the date of the wall it is of importance to be stated. It was in this part that his "ecclesiastic" (so called) was found.

Such is, briefly, the wall which is referred to. While this is the description at the point named, it is in fact the same generally all round the city wherever it has been opened, the most apparent differences being that near the north gate the unmortared masonry rises much higher and ends in a moulded cornice; that at the Roodeye it goes down very deep, and the plinth has not yet been met with, and there is some mortar to the large stones; and elsewhere, as at the Kaleyards, the foundation consists of layers of small stones set in puddled clay where there is no rock. There are, however, many technical details to be referred to, and since their discussion will be so well understood by the tribunal of your readers, I will speak of them fully as soon as your correspondent will favour me with some more definite statement than he has yet done as to what he considers to be the age of the oldest portion of the wall. I need not trouble him relative to the small part called the Kaleyards wall, which stands by itself, the present wall of the city here making a small irregular bend, and thereby leaving it outside the line. This, I understand him to say, is Edwardian in date. His statement as to the other parts is not so clear. In a recent number of the *Chester Courant* he believed it to be the work of some Puritan builder. In his recent letter, p. 411, he states its date to be "in the reign of Anne." We are both referring to the large Roman stones on the face and at the base of the wall. Will he kindly tell me (1) which of these statements he considers most likely to be true? (2) Do not his remarks apply (as I understand them to do) to the whole of the walls of Chester, the Kaleyards wall alone excepted? The period he may name will imply the building at that time of the whole of the wall, since these stones form the base and the portions above the base.



I will conclude these remarks promptly on being favoured with replies to these two inquiries, and I hope my reply will be sufficient to convince the majority of your readers and perhaps even your correspondent that wherever the unmortared stones occur there is Roman work *in situ*, especially since he already admits that the site of the walls is Roman, that the large walling stones are Roman, although removed from elsewhere, and that the cornice next the north gate is also Roman, but under similar conditions. As he must be aware, each of these three important items has been denied, and their assertion was among the principal things to which I had to address myself at Chester (*minus* the removal theory).

E. P. LOFTS BROOK.  
36, Great Russell-street, W.C.

#### SAFETY IN THEATRES.

SIR,—Amongst the many letters written lately respecting the safety of the public in theatres, the true cause of accidents has often been lost sight of. Suggestions are being made generally of safety from fire, whereas it is not a question of fire simply, from and water curtains to the proscenium are undoubtedly useful in case of fire on a stage, always provided they are kept in working order and used when required.

It is, however, not merely a question of fire, as witness the disastrous accident at Sunderland and elsewhere, where accidents and loss of life occurred from panic only.

Amongst the many proposals are the following:—  
1. Outside balconies. This is really impracticable. In the first place, it would spoil any elevation, and again a rush from the inside on to the balcony means death as certain as down a staircase.

2. Going up steps to exit. This is a good idea, but unfortunately cannot be applied to a gallery.

3. Doors to open outwards by pressure from the inside is a good suggestion, as you remark in your last issue, but is no new idea; such doors are at present in use and have been so for some years.

4. Wide staircases are a great mistake, people cling to the handrails on either side, and in the rush persons in the centre are almost sure to be pushed down by those behind.

5. And lastly, it cannot be too strongly impressed upon the minds of theatrical managers, a second exit in case of a panic is almost an absurdity, as any playgoer will admit upon giving the matter careful consideration. Suppose the public to be admitted to the gallery up a certain staircase; in case of panic, where will they rush? Not to a different staircase to which they entered, be exit printed over it in letters ever so large. They will endeavour to go down the same staircase they entered by; they are certain that leads into the street. Other exits may not do so, or doors may be locked and bolted at the bottom. The public have no faith in second exits. Again, if the public were admitted by two separate staircases, confusion would still arise: the playgoer again makes towards the door he entered. There would doubtless be less crushing, and more persons would escape.

The only way I can see out of the difficulty is to make a very broad staircase, as already suggested, but with this addition,—a new wall, say about 4 ft. 6 in. high (so that a person could look over it), should run down the centre of it, forming, as it were, two separate staircases, side by side, each say 5 ft. wide. The audience on entering can then see that the two staircases are real exits, the doors being side by side both at entrance and exit. No pass doors, as they are called, should be allowed to enter this staircase from other parts of the building. The staircase should be built of concrete, and enclosed by brick walls from top to bottom, with a concrete flat or roof over (no daylight is required in theatre staircases), thus making it absolutely fireproof, provided it be lighted either with oil lamps or electricity, so that in case the gas fails, the public can see their way out. PLAYGOER.

\* \* In regard to suggestion 3, we may observe that the form of door referred to in our note (p. 387) is entirely new in the principle and manner of working it. In regard to 4, the *Builder* has repeatedly and strongly pointed out the danger of too wide staircases without a centre balustrade. As to No. 1, we entirely concur with our correspondent.

#### "SHONE'S EJECTORS IN THE RECENT RAIN-STORMS."

SIR,—In your issue of September 17th [p. 411] there appears a letter, signed "John Phillips, C.E.," in which an attempt is made to controvert statements about the incapacity of the Shone installation to deal with the rainfall, made at a meeting of the Society of Engineers by engineers to whom the epithet of uncivil is applied. As I was one,—I believe the only one,—who made the statements referred to, I feel sure you will allow me space to reply to the letter signed by Mr. Phillips.

My views were backed up by uncontrovertible

arguments, stated plainly and straightforwardly, but without the slightest taint of rudeness or discourtesy. If Mr. Shone and his friends cannot bear honest criticism without indulging in personalities, they should neither read papers nor write letters challenging public discussion.

The statement made by myself was simply this, that the cellars of the Houses of Parliament would be worse flooded than they have been before if 1 in. of rain fell in one hour, when the maximum height to which the sewage has to be raised from the ejectors is equal to 30 ft. Mr. Shone may well say "Save me from my friends!" The contents of the letter prove, beyond question, that the cellars under the assigned condition would be flooded. Accepting Mr. Phillips's statement that the four gas-engines and three ejectors could deal with a rainfall of  $\frac{3}{4}$  in. in an hour, with the exception of 2,000 gallons, it follows that the remaining two-fifths must be stored up somewhere within the precincts of the palace, *i.e.*, in the sewers and cellars. If 2,227 gallons per minute is the result of rainfall at the rate of  $\frac{3}{4}$  in. per hour, an increase of two-fifths would add 1,484 gallons to the rate of flow per minute, or a total during the hour of 89,040 gallons, so that storage would have to be provided for 91,000 gallons below the average level of the sewage in the metropolitan sewers because, previously to the Shone installation, there was a slight flooding of the cellars, when the height of the surface of the sewage in those sewers corresponded with the 20 ft. lift of the Shone installation.

The description of a rainfall of 0.59 in. per hour as tropical simply comes from the guess of an unwriter of the letter. A fall of 1 in. per hour is not by any means uncommon, and rain has been known to fall in the neighbourhood of London at the rate of more than 3 in. per hour for a period of fully half an hour. If, therefore, any of the archives of the Houses of Parliament are stored in the basement, it is plainly the duty of the officials in charge to remove them to safer quarters.

The whole contents of the letter are, however, from beginning to end a tissue of mistakes. Unless the official reports are wrong, although the whole area occupied by the Palace is ten acres, the rainfall from eight acres only enters the sewers. Certainly Mr. Phillips cannot object to my taking the lesser area as the basis for discussing the question. A rainfall of 1 in. per hour on eight acres is equivalent to 3,025 gallons per minute; so that if the three ejectors could discharge against a 20 ft. maximum head 2,200 gallons a minute, as Mr. Phillips affirms they did, reservoir capacity for 48,000 gallons only would suffice to prevent the flooding of the cellars. In the installation there are two ejectors of 300 gallons capacity, and one of 500 gallons. So that Mr. Phillips's statement that the three ejectors contain 1,100 gallons is correct. The discharging capacity of the ejectors does not, however, depend upon the capacity of the ejectors, but on the size of the inlet and discharge pipes, and the power expended in producing the flow. Now the size of these pipes is the same in all the ejectors. Why, then, did Mr. Shone specify the 500-gallon ejector, seeing that it can discharge no more per minute than either of the 300-gallon ejectors?

At my request the foreman in charge of the works measured these pipes, and the 6-in. pipe outside diameter was only 6 in. This I found to agree with the diagrams in the pamphlet presented by Mr. Shone to the members of Parliament. The inside diameter cannot, therefore, exceed 5 in. In order, therefore, that the three ejectors should discharge 2,227 gallons a minute, each must discharge  $\frac{2}{3}$  of a gallon a minute, which means really discharging 371 gallons in fifteen seconds, if the times of filling and discharging are equal. The velocity of discharge in the 6-in. pipe must, therefore, have been nearly 30 ft. per second. Leaving out of consideration the resistance due to friction and valve motion, the head necessary to produce this velocity would be 14 ft., which added to 20 ft., the dead lift, makes up a total of 34 ft. The corresponding air pressure is 15 lb. to the square inch. Taking into account the neglected resistances, the result claimed by Mr. Phillips could not have been produced with less than 18 lb. air pressure. Of course an equal pressure would be required to produce the same inlet velocity, or the surface of the sewage in the pump must have been at least 14 ft. above the top of the ejectors. How does Mr. Phillips reconcile this with the statement that only 2,000 gallons were stored at the end of the hour in the subway above the 12-in. pipe?

I shall be obliged if Mr. Phillips will state how the height of the sewage in the metropolitan sewers was ascertained. There are no means of doing this within the precincts of Speaker's Green, except the pump connected with the ejector, and if the statement that 2,000 gallons only were stored in the laboratory is correct, the surface of the sewage in the pump can never have been more than 6 in. above the 12-in. pipe.

I have carefully kept within the limits of the question raised by Mr. Phillips's letter, but if challenged, I am quite prepared to maintain the correctness of all the statements I made at the meeting. I enclose my card, and beg to subscribe myself as one of the

MISCALLED CIVIL ENGINEERS.  
September 20th.

#### RE LITTLE QUEEN-STREET.

SIR,—I observe in the *Builder* of the 10th inst. a "Note" drawing attention to the desirability of effecting a public improvement in the rounding off the angle of Little Queen-street and Great Queen-street, and I therefore write to inform you that the Board of Works for the St. Giles District, in which district the property is situated, has for several months been negotiating with the owners for the acquisition of the property for that purpose, and am pleased to add that such negotiations are likely to be satisfactorily completed and the improvement carried out.

G. WALLACE, Surveyor to the Board.  
197, High Holborn, W.C.

#### A CURIOUS POSITION.

SIR,—Will you allow me to ask any of your readers if they ever were in a scrape like the following; and if so, how they got out of it?

A year or two ago a gentleman was about to build four houses,—two pairs,—to cost about 2,000 each pair. He asked me to prepare the drawings, specification, and agreement for them. I did so, and, luckily, arranged with a most respectable builder to build them, who began one pair. When these were ready for the roofs, my client wrote me a letter, saying he would be his own architect for the second pair, and accordingly ordered the builder to begin them, using my plans and specification and specifying the pair first begun. My position was really ridiculous, but I was powerless; as soon as I got up a floor, he got the builder to build the same in all respects with the second pair, and so he continued to do, till both pairs were finished, and the owner refuses to pay me a farthing for the second pair. If none of your readers have been in a similar difficulty, may I ask you to give your opinion on the point?

A. B. C.  
\* \* The question is essentially a legal one, and the legal right of the client to act as he did depends, we should imagine, a good deal on the precise wording in which the commission was given. If our correspondent means to press the matter, he had better consult a lawyer and give him full particulars.

#### REFUSE CREMATORS.

SIR,—In your issue of the 10th inst. (p. 360), I notice a report of the paper read by Mr. C. Jones, of Ealing, before the Association of Municipal and Sanitary Engineers. He has rightly found that certain local authorities have discarded the cheaper forms of destructors, which he names, but he omits to state that the cost of working his "Fume Furnace," as at present constructed, is so excessive that in one place at least it has already fallen into disuse. I would point out the "fume furnace" on his patent No. 8,690, dated July 18th, 1885, is not novel, as my patent, No. 7,703, dated June 25th, 1885, covers the entire substance of his so-called invention. As a matter of fact, a furnace corresponding almost line for line with his Patent drawing was built and worked several months prior to July 1885, at South-street, Bradford, and it is now working in connexion with four of my refuse cremators, Mr. Wilde, the manager of the Bradford Corporation destructors, being the real inventor of that furnace. Should evidence of this be required, it will be forthcoming, as also the fact that the use of separate coke fires has been found to be very costly where steam is not required. Mr. Jones is entirely wrong in his remarks about alterations of and experiments made with my cremators at South-street, Bradford, as the accompanying extract from a letter from the Borough Surveyor clearly proves:—

"Borough Surveyor's Office,  
Town-hall, Bradford,  
February 25th, 1887.

Dear Sir,—... Your South-street Destructor has for over three years done the same amount of work with the same degree of efficiency as Fryer's Destructor at Hammeton-street, in proportion to the number of cells. Complaints were, however, made by residents in the neighbourhood of each destructor, about a nuisance or smell arising from the vapours and fumes discharged from the respective chimney-shafts; in order to remedy which your South-street Destructor is now being altered, and you must expect experiments and made several alterations at your South-street Destructor, but with little or no success.

The experiments were tried at South-street in preference for Hammeton-street, not because the nuisance was greater from your destructor than from Fryer's, but merely because it was more convenient, both on account of its position and on the score of economy.

The South-street Destructor is not in use at present, simply because the Corporation have a very convenient and suitable tip for the drier portion of the midden refuse made in that locality. This tip will probably remain open for nearly another twelve months, after which it is intended to resume operations at South-street. ... Yours truly,  
(Signed) J. H. Cox.

B. D. Healey, Esq."

The report of Dr. William Odling is freely quoted by Mr. Jones, but he does not appear to be aware of the fact that, when Dr. Odling asked to be put in communication with one of those by whom

\* It seems a little odd that at Burnley the "Beehive" works as satisfactorily as the "Fume Cremator" does at Ealing, proving the local interest in each.



radford furnaces were constructed, I was the person called in to confer with him and the Borough Engineer. It is desirable to have more positive information from disinterested authorities as to cost of fuel for the "Fumes Cremator." As to generating steam by the otherwise waste heat, most engineers now what can be done in that direction, but many theories do not require steam from every cremator or every building, and consequently the cost of fuel in such cases is very great.

My Economic Duplex Cremator, patent No. 9,342, D. 1886, which is constructed to burn its own gases, is provided with large reversing valves similar to those used in a Siemens gas furnace. The fumes from the green refuse in one grate are passed over the grate of the adjoining furnace, his arrangement carries out in the fullest degree conclusions arrived at by Dr. Odling in his report of September 9th, 1885, to the Bradford Corporation. The furnaces are charged alternately, so that one grate of a pair is always at a good heat when the other grate is giving off its smoke and spout. I enclose full description of this furnace or your future reference.

B. D. HEALEY, Assoc. M. Inst. C.E.  
Liverpool, September 15th, 1887.

#### PROVINCIAL NEWS.

**Ashburton.**—The foundation-stone of a new Cottage Hospital was laid at Ashburton, on the 9th inst., the site being situated on the eastern outskirts of the town, near the Newton-road. The building will have a south frontage of 60 ft., with a depth of 50 ft. in the centre, but the side wings will not have so great a depth, being only one story high. There will be four wards, all of which will be on the ground-floor, and on each side of the entrance the matron's apartments will be situated. Next to these rooms will be other small wards for special cases. At one end of the ground-floor will be the male ward, and at the other extremity will be the female ward. There will be two large and two small wards, the larger being 13 ft. 6 in. high, and will each contain four beds. The small wards will be 10 ft. high. On the ground-floor will be the operating-room, which will be at the back; and near to it a bath-room will be provided. At the back of all will be a kitchen and laundry. The second floor will be used as the committee-room and servants' apartments. The building will be fitted with all conveniences, and the ventilation and sanitary matters will be of special attention. Mr. P. E. Masey, of Old Bond-street, London, is the architect; the contract for the erection being taken by Messrs. Turrell & Roberts, of Plymouth, for the sum of £1,240l.

**Kingston-on-Thames.**—An extensive range of new buildings, forming a depot and warehouses, as just been erected at Kingston for Messrs. Pickford & Co., the well-known carriers, as a centre for their increasing business in the district. The building has a frontage of 80 ft. and a depth of 87 ft., thus covering a ground-area of about 7,300 ft. It is between 40 ft. and 50 ft. in height, and contains four floors. It is faced with red Chelmsford brick, relieved by moulded brick string courses and dressings of Portland and Corsehill stone. The ground-floor arches of the gates and windows are all in blue Staffordshire and red gauged brick, the window lights being all of wrought iron. In cutting in the foundations it was found necessary to go down to a depth of about 15 ft., which is about the level of the bed of the Thames. On the ground-floor there are two large goods sheds, both sheds being covered in with massive iron girders and joists, upon which is laid a concrete floor, forming a fireproof screen between the goods sheds and the depositories overhead. On this floor there is a large extent of stabling. The whole of the floor is paved with Norwegian granite cubes laid on a bed of concrete. The first, second, and third floors contain large warehouses, shut in by iron doors, and approached by fireproof staircases. The west side of the block contains the agent's residence, and also the offices for carrying on the business of the centre. The building has cost upwards of 8,000l. Messrs. Brassey & Tiddons Walters, of Bishopsgate-street Within, are the architects, and the contractors are Messrs. Harris & Wardrop, of Limehouse. Mr. Thrush has acted as clerk of the works.

**Ryde.**—The Ryde Art Society will open its eighth annual exhibition on the 28th inst., under the presidency of Sir William Levinge, Bart. The judge of the competition works will be Mr. Drinkwater Butt.

**Southampton.**—The second annual exhibition of the Southampton Art Society will take place

early in October at the Philharmonic. The private view and a *conversation*, with an address by Mr. G. D. Leslie, R.A., will be on the 11th, when a good show of the works of local and other artists is expected. Among the exhibitors will be Major-General Lacy, the President; Messrs. Thomas Skeats and H. Masters, of the Ordnance Department; Mr. Drinkwater Butt, Mrs. Keary, &c.

**Westbury (Wilts).**—Extensive additions are now being made to the Angel Factory, Westbury, Wilts, for Mr. W. H. Laverton, which comprise thirty new looms, engine and boiler houses, &c. Messrs. Taylor & Challen, of Birmingham, are the engineers. Messrs. Halliday & Anderson, of Cardiff, are the architects.

#### CHURCH-BUILDING NEWS.

**Abergwynn (Glamorgan).**—A mission church is about to be erected here, from the designs of Messrs. Halliday & Anderson, architects, Cardiff and Llandaff.

**Bickington.**—The new reredos recently erected in the newly-restored parish church of St. Mary's, Bickington, three miles or so distant from Ashburton, has just been wholly completed by the introduction of some sculpture by Mr. Harry Hems, consisting of figures of angels upon pedestals at either side of the base of the central gable, and of three large panels carved in high relief. The scene of the Nativity is in the centre, whilst angels swinging thuribles occupy the flanking panels at either side. The parishioners are indebted to the Rev. William Smith, their vicar, for the gift of the work.

**Kilburn.**—The Church of St. Paul, Kilburn-square, has just been reopened, after extensive alterations and repairs. The old high pews have given place to modern seats of polished pitch pine, a new aisle has been made in the centre of the nave, a new choir vestry has been made under the south gallery, and the chancel window has been considerably enlarged. The chancel platform has been enlarged, and the altar-rails set forward, and the building has been fitted with Keith's patent heating apparatus. The whole of the interior has been repainted and decorated. The old flooring has been taken up, the accumulated rubbish of fifty years has been carted away, lime concrete has been spread over the whole surface, of the ground, and, after making provision for the free circulation of fresh air beneath, new flooring has been laid. New slating has been put on the roof, and new lead gutters, the old bad compo, has been cut away and replaced by new, the clock face has been renovated, and the whole exterior face of the building has been repainted. The work has been executed from the plans and under the direction of Mr. Alexander N. Hansell, by Mr. R. A. Yerbury, of Kilburn, at a cost of about 930l.

**North Witham (Lincolnshire).**—For some months past the parish church has been under repair, and was completed and re-opened on the 15th instant. The nave and chancel are of Norman work, the tower and spire, windows, and roof being of late fourteenth-century work. The walls have been underpinned, and all stone-work carefully repaired, new buttresses, organ-chamber, and vestry being added. The roofs have been reconstructed to old pitch in Dantzic oak, the old lead being recast in churchyard and relaid. The whole of the interior fittings are of oak. The inside walls have been repointed. Mr. Wade, builder, St. Neots, executed the works, under the direction of Mr. Withers, architect, London.

#### RECENT PATENTS.

##### ABSTRACTS OF SPECIFICATIONS.

11,637, Dry Glazing. M. Macleod.

According to this invention, an improved sash bar of zinc or other soft metal is used. This bar is so formed as to allow for the insertion of an iron rod or pipe, or is strengthened by bars of metal or other rigid material of T or H rail, or other forms. Upon this are sprung or silled caps of zinc retained in their places by rivets or by clamps of steel &c., sprung over the outside of the cap when it is in place. Drip channels are provided for, and brackets or lugs for carrying the improved forms of sash bars are also described.

12,514, Window Sash Fastenings. T. E. Lane.

This fastener is mainly designed to prevent the opening of the windows from without, and for rendering them perfectly draught and snow proof, and

obviating the rattling in windy weather. A lever latch or catch is so made that when it is pulled forward it wedges the sash fast, and slips into a recess fitted to receive it, and by a turn of the front screw the whole fastening is effected.

13,035, Gas Chandeliers and Fittings. G. J. Williams.

The object of this invention is to dispense with the water-slide by employing folding rods or hollow arms jointed like lazy tongs. The arms of the said lazy tongs are hollow, and the gas is led along and through these. Weights are fitted as in ordinary chandeliers.

13,416, Lead Pigments. J. B. Hannay.

It is claimed that by this invention a pure or nearly pure amorphous sulphate of lead is obtained by treating lead compounds, ores, slag, waste, &c., in an improved furnace and by the addition of iron pyrites. A very pure white is said to be obtained.

3,431, Improvements relating to Water-closets. James Duckett.

In these closets, waste water, such as surface, roof, or slop water, is utilised. The trap of the closet is formed with an opening or space, the bottom of which is on a level with the surface of the water, and so large that articles deposited in the trap and incapable of being flushed through the same may be readily removed. The trap and framework for carrying the tipper are constructed of one piece of earthenware, so as to prevent leakage in the joints and to obtain a better base.

6,381, Cement Blocks, &c. F. O. Ferguson.

Instead of the iron or lead pipes attached to buildings, blocks or bricks with hollow tubes or perforations are, according to this invention, used, each fitted so as to form a continuous pipe in any direction, and jointed in cement. This will obviate the necessity of painting, &c., and the tube is far less subject to changes in temperature.

9,908, Cowl or Chimney Cap. H. F. Henry.

According to this invention, a Y-shaped cap is fitted so that the products of combustion will be divided and deflected outward in their passage through the cap. Shields or plates and cones are fitted so as to obtain the greatest force of wind for exhausting the chimney shaft.

#### NEW APPLICATIONS FOR PATENTS.

Sept. 9.—12,195, R. & G. Ellis, "Dog" for Fastening together Timber.—12,207, J. Cartland, Bolts for Doors, &c.—12,239, R. Johnson and T. Benton, Hand Saws.—12,247, A. Spamer, Shaping and Trimming Slat.

Sept. 10.—12,266, J. Bradshaw, Chimney Pot.—12,271, J. Davies, Brick Kilns.—12,279, E. Williams and J. Morgan, Domestic Fire-grates.—12,291, W. Fraser, Automatic Door Closer.—12,301, A. Van Ralle, Steam File Drivers or Hammers.—12,307, J. Peckover, Stone Saws and Sawing Machines.

Sept. 12.—12,328, A. Melville, Fireproof Curtains for Theatres and other Buildings.—12,341, E. Kirby, Window Fastenings.

Sept. 13.—12,362, P. Barrett, Counterbalancing Window Sash.—12,377, T. Sharp, Preventing the Spreading of Fire in Theatres, &c.—12,383, B. Cocker, Protection for Gas-piping in case of Fire.—12,420, G. Paxton, jun., Corrugated Sheet Metal Roof, &c.—12,434, F. Alford, Ventilator.

Sept. 14.—12,466, R. Hunter, Locks for Doors and Gates.—12,467, A. Winrow and H. Tandy, Bookmaking Machines.—12,488, J. McConnell, Ventilating, Warming, Cooling, &c.

Sept. 15.—12,534, W. Duckor, Portable Buildings.—12,538, G. Redfern, Tile-making Machines.—12,539, G. Redfern, Draught, Wind, Rain, and Fog Excluders for Doors and Windows.

#### PROVISIONAL SPECIFICATIONS ACCEPTED.

10,548, W. Burt and C. Payn, Sliding Window Sashes, Panels, &c.—10,556, T. Buck, jun., Brick and Tile Making Machines.—11,007, C. Rüs Bonne, Staircase Lift.—11,045, A. Harris and Others, Window Fastenings.—11,321, W. Harrington, Adjusting and Attaching Door Knobs to Spindles.—11,324, J. Stanna and T. Shillington, Stoves.—10,969, W. Akerman, Roofing Tiles.—11,265, H. Baugert, Flush Bolts.—11,566, R. Breumehl, Door Furniture.—11,863, D. Kempeon, Drawback and Rim Locks.

#### COMPLETE SPECIFICATIONS ACCEPTED.

##### Open to Opposition for Two Months.

13,139, A. Berriman, Preventing the Escape of Gas when Taps are left accidentally open.—13,984, W. Lindsey, Moulding Bricks or Blocks.—14,206, R. Lee, Fastenings for Windows.—14,674, W. Scott and Others, Portland Cement, &c.—15,012, H. Macevoy and Others, Portland Cement.—13,390, J. McKee, Register Grates or Stoves for House Fireplaces.—11,889, F. Lyte, Manufacture of Pigments.—14,848, G. Barker, Ventilating Buildings.—15,144, W. Phillips, Water Taps.—9,783, A. Bayer and C. Mott, Cramp for Flooring and Other Woodwork.





represent the base, G E the perpendicular, and E the hypotenuse, of a triangle for determining the correct trigonometrical expressions be employed. In the triangle B F E we have F as the base, F E as the perpendicular, and E as the hypotenuse. To determine the length of the tangent lines, B F or B G, we assume a radius which fixes the length of the side of the triangle denominated as a "perpendicular," and then we calculate the length of the "base," by the application of the equivalent furnished by the tables for "the length of the side divided by the length of the perpendicular," a triangle having the angle F B E. Similarly to determine the length of B H, we calculate the length of the hypotenuse from the assumed length of the perpendicular in the triangle, and subtract from the length of B E the length of the radius H E.

Fig. 3 shows the method of holding the box tangent over the point B in fig. 2, when taking the angle A B C. The value of the angle so obtained is bisected, and the direction of the line B E is set out by placing a ranging rod anywhere in the line B E, so that the angle B A is half the angle A B C. The position of this line B E should be checked by setting at the line B E, from the side B C. If any difference is found by this checking, in the position of the pole to be placed upon the line bisecting the angle, A B C, we have only finally fix the pole E midway between the two points arrived at, after taking the half-angle separately upon each side of B E, as indicated by the dotted lines in fig. 4. But when two poles are set up for view upon each of the lines B A and B C respectively, and the pole at E is carefully pulled upon one side out of the perpendicular, as shown in fig. 3, to enable the centre of the instrument to be vertically over the point B, and at the same time in line with the two poles viewed, the angle A B C may be taken with sufficient accuracy by means of a sextant to obtain the half-angle correct enough for all practical purposes.

To determine intermediate points in the curve between F and H, and between G and H (fig. 2), we can apply the formula given in Case I (Builder, Sept. 17, p. 412), for the measurement of offsets from the tangent lines F B and G B, as it will be observed in the diagram which illustrates Case I, that so long as the tangential angle B A D remains comparatively small, the length calculated for B S may be measured from D at right angles to the tangent line, to determine a point in the curve. Hence, substituting the term "distance" measured along the tangent line for the term "chord" in the equation (Case I), we obtain for Cases 2 and 3 the formula,—

$$\text{Offset} = \frac{\text{distance}^2}{2 \text{ radius.}}$$

## Books.

*Common Health.* By B. W. RICHARDSON, M.D., F.R.S. London: Longmans, Green, & Co. 1887.

Of the thousands of those who daily move about in various occupations and constitute our population, how few give even a passing thought to the art of living, beyond what applies to their immediate wants and pleasures. We devote of any special time or attention to acquiring knowledge on such a subject would seem to many actually ridiculous. The morality of people live their lives in easy acquiescence with things as they find them, and do little trouble to acquaint themselves with the physical problems of life. There is no cause now for their being ignorant of the fundamental laws of health, for Dr. Richardson's little book, which he has appropriately dedicated to Mr. Godwin (the late Editor of *The Builder*, one who has spent so much of his life in trying to get people to look at the truth in regard to sanitary matters), will bear more than one reading, so startling is the matter and so binding on the attention.

Dr. Richardson commences his dissertations *in initio*, and shows into what mistakes we fall during the seedtime of health; perhaps he rather overdraws the picture, for if we are to accept his view as the normal state of things, we would seem matter for wonder that any children at all emerge from that perilous position, let alone in the proper condition of mind for after-life. To childhood succeed education and recreation, the latter of which only look upon as a matter of convenience,

while the education is piled on with ruthless disregard to the too often weakly frame that has to bear it; and now that the system of competitive examinations, which formerly only applied to boys and young men, is extended to girls, the evils induced are more patent than ever. Dress, in all that relates to health, naturally has a chapter devoted to it, and as naturally brings woman to the fore as to her capabilities for nursing and as a sanitary reformer. Upper and Lower, or in other words, London as it should be, is deeply interesting, although perhaps a little Utopian, especially as to the renovation of Upper London. However, it is good to hear such plain speaking as Dr. Richardson gives us, even if a little exaggerated (as all "prophets" do exaggerate); and let us hope that the advocated reforms may soon follow.

*Notes on Concrete and Works in Concrete.* By JOHN NEWMAN, Assoc. M. Inst. C. E. London: E. & F. N. Spon.

A VERY practical little book, carefully compiled, and one which all writers of specifications for concrete work would do well to peruse. The author does not lay down his own opinion without proof, but he gives quotations from various indisputable authorities, and then draws evident conclusions from them. The book contains reliable information for all engaged upon public works. The author deals with the question of the comparative fineness and weight of Portland cement. He shows that to specify too heavy a cement is to invite a manufacturer to deliver residue, and that a weight test alone, without naming a specific degree of fineness, can give no certain indication of strength. He draws attention to the importance of specifying either the number of meshes per lineal inch in a sieve measuring both ways, or else to state the size of the wire in a sieve, and the size of the openings when used for testing the fineness of the grinding in a cement. He recommends that a detailed analysis of the composition of Portland cement should accompany its delivery at the works. The time at which cement is weighed, whether immediately upon its receipt from the manufacturer's or after some days' storage, is also seen to exert an influence upon the result. The period and conditions required for tests of neat cement are further enlarged upon. In a series of very elaborate and useful experiments made by Mr. Grant, of the Metropolitan Board of Works, when acting as resident engineer for the main drainage works of the metropolis, the cement was required to pass through a sieve of 400 holes to the square inch, and the weight of the shifted cement had to be 110½ lb. per struck bushel. At the Dover Harbour works the same degree of fineness was required for a cement weighing 120 lb. a bushel. The cement employed is often stated to be required to pass through a sieve of 2,500 meshes to the inch, leaving a residue of only 10 per cent. These references show how different are the general opinions that are entertained upon the subject, and yet how often, when concrete work is to be specified, the designer takes up the first specification he can lay his hands upon, and blindly copies it, supposing it will be adopted. A perusal of Mr. Newman's valuable little handbook will point out the importance of a more careful investigation of the subject than is usually supposed to be necessary. The author's chapter upon sand, gravel, and stone is thoroughly practical. He also deals with the shipping and air-slacking of cement, the composition, mixing, and setting of concrete in different situations, and the depositing in place by barrows, blocks, and bags.

*Designing Wrought and Cast Iron Structures.*

By HENRY ADAMS, M. Inst. C. E., M. Inst. M. E. London: 60, Queen Victoria-street.

THIS little pamphlet, consisting of thirty pages and two large folding plates, forms Part IV. of an instructive series, and contains notes, calculations, tables, stress diagrams, and working drawings for a trussed fir beam with a rolling load, a cast-iron stanchion calculated to bear a required dead load, and the consideration of the arrangement and calculations required in riveted joints. Such pamphlets, containing actual examples which occur in practice, properly worked out, are of great value, but we regret the occurrence of certain misprints, such as on p. 6 the expressions  $\frac{Wl}{70}$  and  $\frac{Wl}{140}$  ought certainly to be reversed for a distributed and

central load respectively. On p. 11, line 2, in describing holding-down bolts, the letter "t" is omitted in the copy before us. On page 12, under the heading "Weight of Structure," the angle-iron 4 in. x 3 in. x  $\frac{3}{8}$  = 2 x 2½ cub. in. x 1 ft. 7 in. long, should be 26 lb., not 8 lb. On p. 13, the item cast-iron strut (exclusive of pattern), 60 lb. at 2d. would be 10s., not 10s. 6d. as stated; and the item, wrought-iron in bolts, nuts, washers, tie-rods, and short pieces angle-iron, weighing 2 cwt. 0 qr. 17 lb. at 20s. would cost 2l. 8s., not 2l. 2s. 1d. Also, same page, the item for flanged rail and bending, 3 cwt. 0 qr. 16 lb., at 10s., would come to 1l. 11s. 6d., not 1l. 11s. 7d. Again, on p. 25, under the heading "Cost of Stanchion," the weight should be 0.31 tons, as stated on p. 12. The decimal point is omitted on p. 13. The author has probably entrusted the working out of his results to an assistant, and not checked them with sufficient care himself. Those who are studying the subject for the first time, can not be otherwise than puzzled at these blemishes, which we trust may be corrected in a future edition.

The author would have done well to explain the introduction of the constant in the expression  $\frac{Wl}{140}$  upon page 6. His remarks upon the use of

double rods in page 9 are very practical. There is an unfortunate ambiguity in the author's description of cruciform and  $\pi$  section stanchions. We think the expression "least breadth," which is usually adopted in the application of Gordon's formula, would be more intelligible than "diameter over arms" upon page 16. When comparing the strength of a cruciform section upon page 18 with a hollow cylindrical column, the author seems to have forgotten that at the commencement of his chapter he led us to judge that he would have said something about the relative strength of an  $\pi$  section. According to Hodgkinson's experiments, the relative strengths are in the following proportions, all the pillars being of the same weight and length and rounded at the ends (see "Phil. Trans.," 1840, pp. 413-449).

Hollow cylindrical pillar	— 100
$\pi$ shaped stanchion	— 75
+ shaped pillar	— 44

Hence the author's remark of "nearly double the strength" upon page 18 applies only to the cruciform section.

## STAINED GLASS.

*Andover.*—Three stained-glass windows have been placed in the chancel of Christ Church, Swannell, Andover, to the memory of the late Lieut.-Col. Earle. They represent our Saviour's sayings of himself,—*"I am the Bread of Life," "I am the true Vine,"* and *"I am the good Shepherd,"* and were designed by Mr. P. H. Newman. When funds are forthcoming it is proposed to fill the other windows of the building with illustrations of Scriptural allusions to agricultural subjects, as appropriate to the locality.

*Dundee.*—We learn from the *Scotsman* that Messrs. Barnett & Sons, glass-stainers, Leith, have just completed for St. Joseph's Roman Catholic Church, Dundee, a large memorial window, which consists of three lancets, having overhead a circular light in which is represented a dove (emblematic of the Holy Spirit) hovering over the group of figures below. The latter consists of the Virgin with the infant Jesus in her arms, and in the side lights sitting and kneeling figures of saints. The Virgin is represented standing on a globe on which the greater part of the western hemisphere is faintly outlined, her foot upon the head of a twining serpent. In the side lights are representations of St. Anna, St. Joseph, St. John, and St. Dominic. These are flanked by two smaller lancets containing figures of St. Andrew and St. Patrick.

*Taunton.*—A memorial window on the north side of the chancel of the Church of St. Mary Magdalene, Taunton, has just been erected by Messrs. Clayton & Bell. It is a three-light window, representing St. Mary, B.V., in the central compartment, St. Joseph being in the western, and St. John in the eastern light. It is stated that the oak screen, which originally stood in the church, has been erected in Bampton parish church, which has lately been reopened after the completion of repairs and alterations.

*Wangford.*—The old parish church at Wangford, Suffolk, has lately been restored, and a



four-light west window has been erected to the memory of the late Earl of Stradbroke, by the members of his family. The window represents "Our Saviour driving the Money-changers from the Temple" in the left-hand light, while the two centre openings are occupied by the subject of "Solomon Building the Temple" (as appropriate in reference to the recent restoration of the church), and the fourth light represents "The bringing back of the Ark to the Temple by the Priests." These three subjects are surmounted by perpendicular canopies, having in each case a corresponding base. There is some very intricate tracery in which floating angels bearing shields, with the "Alpha" and "Omega," and emblems of the four Evangelists form the principal part. The window was designed and executed by Messrs. Gibbs & Howard, of London, under the superintendence of Mr. E. L. Blackburn, architect, of Winchester.

#### RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

SEPTEMBER 12.	
By WOODS & SNELLING.	
Rotherhithe—13, Prince's-street, freehold .....	£275
By SCHOFIELD & EVANS.	
Marylebone—12, Great Chesterfield-street, 11½ years, ground-rent 13s. ....	240
SEPTEMBER 13.	
By H. RUTLEY.	
Holloway—2, Cornwallis-road, 78 years, ground-rent 6s. ....	275
Kentish-town—71, Fortess-road, 77 years, ground-rent 10s. ....	380
Edgware-road—26, Queen-street, 13 years, ground-rent 13s. ....	255
By W. S. LYON.	
Richmond, Peaslie-road—Two freehold houses, and a schoolroom .....	1,000
Brompton—30, Ovington-square, 37 years, ground-rent 10s. 10s. ....	1,800
By T. STEVENS.	
Marylebone—25, Sanford-street, 33 years, ground-rent 4s. ....	220
By J. MORGAN.	
Sutton, Grove-road—Freehold ground-rents of 12s. 10s. per annum, reversion in 63 years ....	3,015
By DERENHAM, TAYSON, & Co. (at Lowestoft).	
Suffolk, Hopton—Hopton Hall Estate, containing 71a. 2r. 19p., part freehold and part copyhold ..	3,000
SEPTEMBER 14.	
By WARD & CLARKE.	
Teddington, Lodge-road—Two plots of land, freehold .....	325
By C. P. WHITELEY.	
King's-cross—Freehold ground-rents of 40l. per annum, reversion in 59 years .....	875
Soho—24 and 26, Peter-street, freehold .....	610
By ALFRED SPAIN & SON.	
Harwich, George-street—A plot of freehold land ...	31
Poplar—227, High-street, freehold .....	495
11 and 13, Hill-street, freehold .....	180
SEPTEMBER 15.	
By F. J. BISLEY.	
Rotherhithe—480, Rotherhithe-street, freehold ....	185
34, Abbeyfield road, 63 years, ground-rent 4s. ....	240
By FOSTER & CHAMBERLAIN.	
Hornsey, Etherley-road—The residence called "The Limes," 90 years, ground-rent 12s. 12s. ....	290
15, Wadgrave-road, 92 years, ground-rent 6s. ....	220
79, Westfield-road, 50 years, ground-rent 5s. ....	145
Kingston-on-Thames, Birkenhead-avenue—The residence called "Brooklands," 80 years, ground-rent 10s. 1s. ....	270

#### Miscellaneous.

**Automatic Controlling Appliance for Lightning Conductors.**—The *Electrotechnischer Anzeiger* remarks that lightning conductors have been found defective in one respect, there having been no means of ascertaining whether lightning has been conveyed through them. According to a method patented by Messrs. Hoyer & Glahn (of Schönebeck, on the Elbe), an insulated copper wire is introduced into the conducting apparatus and is wound round an iron core. The core ends in a plate, over which a small magnetic steel plate is suspended. The latter communicates with a registering appliance, by which its movements are recorded. When a current of electricity passes through the conductor the iron core becomes magnetised and attracts the corresponding pole of the small steel plate. After the cessation of the magnetic action the small plate will remain in its position on account of the attraction existing between one of its poles and the iron core previously mentioned. From the position of the indicator it will then be possible afterwards to determine whether lightning has passed through the conductor, and in what direction. In order to restore the appliance to its original condition the indicator is turned back, the small steel plate being thus liberated and again suspended. It is stated that several hundreds of these appliances are already in use.

**Excavations of the Ancient City of Sybaris.**—According to a statement recently made in a Naples journal, the Italian Government has decided upon granting the funds required for excavating the site on which the ancient city of Sybaris stood, the home of the Sybarites, situated in the bay of Tarento. In a work on "Great Greece," the well-known French archaeologist, M. Lenormant, clearly and distinctly fixes the site of the city destroyed some 2,400 years ago, so that no more difficulty is anticipated in finding it than was the case with Olympia. By the bay of Tarento, in the domain which has justly been called Magna Græcia, Sybaris was the leading city, excelling in wealth and magnificence any other Hellenic colony along this lovely coast. However, as is generally known, the effeminate Sybarites were conquered by the inhabitants of the sister town Kroton, the city of Pythagoras. It was razed to the ground, and the ruins caused temporarily to disappear by diverting the waters of the river Kratis across the site. In the course of centuries a layer of earth nine metres in thickness has been formed over the ruins. The destruction of the city took place in the year 510 B.C., but it is nevertheless believed that objects may still be found among the ruins which will give a vivid picture of Hellenic culture and life at that remote period, perhaps as vivid as those of Rome at a later period rendered by Pompeii, particularly as the latter was only a little village, whilst Sybaris was the principal city of the Hellenic colonies in Italy. The ruins of the city are situated near the railway station of Buffalonia, in the fertile valley through which the river Kratis runs, close to the little town of Cassano.

**Destruction of Zinc from Contact with Brickwork.**—The *Deutsche Bauzeitung* remarks that in the Berlin Market Buildings, Nos. II. and III., zinc roofing, which had been laid upon brickwork without the employment of any intervening substance, exhibited after a short time perforations and other signs of injury. These were more particularly apparent at the eaves, and only at the portions where the zinc had been in immediate contact with the brickwork. Analysis proved that the latter contained soluble salts to the extent of 1.14 per cent., and that this proportion was sufficient to cause the injury which had resulted. The destructive process had, moreover, been hastened in its operation by damp from the brickwork which had not completely dried. The use of a layer of *carton-pierre*, or similar material, between the zinc and the brickwork is consequently strongly advocated by Herr Schulze in the above-named journal.

**Whicford Memorial.**—Our readers will be interested to know that a memorial to the late Mr. John Whicford, F.S.A., who died January 9th, 1885, aged sixty-one years, has been erected by his widow at Kensal Green Cemetery, where it forms a conspicuous object, the height being 12 ft. 6 in. The material is Portland stone, and the design is by Mr. E. R. Robson, F.S.A.

**Sale of Building Land.**—On Thursday evening last, at the King William the Fourth Tavern, East Greenwich, a sale was held of sixty-one plots of building ground, in Marsh-road, and a newly-formed street leading therefrom, and called Azof-street. The plots were mostly of 15-ft. frontage, and those with a depth of about 50 ft., realised from 42l. to 45l.; those with a depth of 75 ft. to 90 ft., 52l. to 55l. Three front plots, 16 ft. 6 in. frontage and 80 ft. in depth, realised 63l. each. Most of the plots were sold, all of which were charged with a contribution of 4l. each towards roads and sewers.

**Action of Frost upon Fresh Mortar.**—The *Deutsche Bauzeitung* recently quoted the results of experiments made at Schandau as to the effect produced by adding salt in various proportions to the water used in mixing mortar; the fact that mortar made with sea water resists frost better than that made with fresh water having suggested these tests. Samples were subjected to variations in the winter of at least 14 degrees between day and night temperature (the latter descending as low as 17° F.). Those which had been mixed with fresh water were found after twenty-one days' exposure and seven days' sojourn in a heated room, to have lost their consistency, while those with which salt had been mixed (up to the proportion of eight per cent. of the water) possessed various degrees of resistance, indicating the efficacy of the admixture.

**Registration of Plumbers in Manchester.**—The master and operative plumbers of Manchester last week respectively met to consider the question of registration in the trade, and each meeting has declared in favour of the scheme. The matter is one of considerable public moment, and the present movement is intended not only to raise the status of the craft, but also to afford the public some protection against bad workmanship. The "Worshipful Company of Plumbers" is one of the London Guilds that has endeavoured to make itself really useful to the trade it represents. It is 500 years since the Plumbers' Company made an ordinance that "no one of the trade of plumbers shall meddle with works touching such trade except by the assent of the best and most skilled men in the said trade, testifying that he knows how well and lawfully to do his work, so that the said trade may not be scandalised or the commonalty damaged and deceived by folks who do not know their trade." He would be a bold man who ventured to assert that there are not instances within this district,—not to go further afield,—where the commonalty is "damaged and deceived by folks who do not understand" the trade of plumbing. To say that there are incompetent men and incompetent masters in all trades may be true, but is neither consolatory nor a good argument against the adoption of any feasible plan by which efficient plumbing may be secured. Probably no artisan holds the keys of disease in his grasp so completely as the plumber, who by good workmanship may exclude forces inimical to health, or by his incompetency may give entrances to malignant influences that inflict suffering and even death upon their victims. As the result of the Congress convened by the Plumbers' Company at the Health Exhibition, there has been established a "General Council to secure the greater efficiency of plumbing and draining work in dwelling-houses." This Council includes representatives of the trade and of the general public, and its Registration Committee decides upon the claims of all candidates to be considered masters of their craft. The man who satisfies an impartially constituted body receives a certificate as a registered plumber. Degrees are becoming more varied in form, and R.P. will give the public to understand that the rightful owner of that literal addendum has given substantial proof that he is a master of the art of plumbing. Much will, of course, depend upon the constitution of the Local Council. The Manchester masters have elected twelve representatives, the operative plumbers have nominated the same number, and at a subsequent meeting the public will be asked to appoint a third dozen. In this way the interests of the trade and of the community are harmonised, the competent workman is duly recognised, and the public safeguarded from absolute ignorance and incapacity. *Manchester Guardian.*

**Paint for Soft Boards.**—The *Thonindustrie Zeitung* quotes a receipt for a paint, equally effective and durable, which can be applied with an ordinary brush to soft boards:— $\frac{2}{3}$  lb. good joiners' glue,  $\frac{1}{4}$  oz. powdered bichromate of potash,  $\frac{3}{4}$  oz. aniline brown, 2½ gallons water. These materials are mixed in a metal pot and six hours afterwards heated to boiling point, the mixture being applied at a moderately warm temperature. The object of postponing the heating is to allow the glue to expand and dissolve easily without burning, the cohesive properties being thus unimpaired. In a few days, under the influence of daylight, this coloured paint becomes quite waterproof and insoluble. The above quantity, which would be sufficient for five medium-sized rooms, costs about 3s.

**Protection of Lightning Conductors on Chimneys.**—The *Illustrirte Zeitung für Elektroindustrie* recommends the following method of protecting the copper wires of lightning conductors on factory chimneys from being affected by the fire gases to the influence of which they are subjected. The wires thus exposed should be first provided with an insulating covering of india-rubber, over which a protective composition should be applied of the thickness of 2-5½ths of an inch. The latter is prepared by mixing ground fire-brick with finely chopped straw and clay-water into a moderately thick paste. After the composition has dried, asbestos string should be wound round it so as to prevent its crumbling away.



**Romney-on-Sea.**—The Littlestone Estate, lying three-quarters of a mile of the town of E. Romney, has been laid out as a new watering-place, the land having been disposed of for that purpose by the Corporation of that ancient borough, one of the original Cinque ports. Between forty and fifty houses have already been erected, and others are being built on the parade facing the sea. The whole of the land is freehold, with the land-tax and the redeemed. On the 9th inst. the first portion of the estate was offered for sale at the Railway Station Hotel, Romney-on-Sea. There was a good attendance of visitors, the South-eastern Railway Company having run a special train from Charing Cross and Cannon-street. About eighty plots were laid, including a site for a large hotel on the Parade. This plot, 150 ft. by 150 ft., which realised 950l., was sold subject to the condition that the purchaser is to erect a hotel in accordance with plans approved by the licensing authorities, and for which a provisional licence has been granted. Four corner plots on the Parade, 30 ft. by 80 ft., were sold, three for 15l. per plot, and one for 120l. Twenty other plots on the Parade were sold; these were 20 ft. by 80 ft., and they realised from 95l. to 105l. per plot. The other land offered was situated in three new roads, at right angles with the seaport, viz., the Littlestone-road, direct from E. Romney to the sea (the railway station in this road, midway between the old town and the sea), the Queen's-road and the Victoria-road. In the Victoria-road and Queen's-road, plots 20 ft. by 150 ft. were sold for 50l. per plot. In the Littlestone-road plots 20 ft. by 80 ft. were sold for prices varying from 50l. to 57l. 10s. per plot. With the exception of the hotel plot, the buildings on all the foregoing plots are to be private houses. Near to the railway station in the Littlestone-road fifteen plots were sold for shops, 15 ft. by 120 ft. these realised prices varying from 65l. to 75l. per plot. It is proposed to offer a second portion of the estate for sale in the spring of next year. The roads of the new town are already started by gas. The promoters of this enterprise for changing an old Cinque Port which has, it is quite recently, been without a railway station nearer than fourteen miles, expect that the very extensive sands extending to Dymchurch, three miles to the north, and to Dungeness, five miles to the south, will prove a great attraction to visitors. At places these sands are nearly a mile wide at low-water, and a country folk toll of races once having been held on them, and they are now used as a playing ground by the neighbouring gentry.

**Copenhagen.**—At the last meeting of the Corporation of Copenhagen, it was decided to erect a new town-hall in that city. It will be situated in a central position facing the Haymarket, and continued to the West Bridge. The building will be located the whole civil administration of the city of Copenhagen. As, however, designs and estimates have to be submitted for the new hall, and decided upon, it is hardly probable that the work of erection can be taken in hand before the early part of 1889. The same occasion the subject of improving overcrowded and unsanitary part of the city was discussed, as well as the extensive building operations decided upon to be effected during the next few years. There are to be erected new prison, new workhouses, and barracks, besides which the market-places are to be regulated, the fire-brigade extended and reorganised, the hospital at the Blegdamsenged, and the water and gas supplies of the city extended and improved. The total cost of these extensive works is estimated at about 1,000,000l. It was also stated that there were then over 4,000 residences (flats) in Copenhagen, most of which were intended the humble classes, being 750 more than the same period of 1866. The medical and hygienic journal *Ugeskrift for Læger* (weekly journal for physicians) recently discussed the proposal for new hospitals in and near Copenhagen, and expressed the opinion that it would far more preferable to erect a number of all buildings than one large one.

**The English Church at Copenhagen.**—A stained-glass windows in the chancel of the church have been presented by Sir Francis Hon. Sir Edmund Monson, K.C.M.G., her Majesty's Minister in Denmark, the whole work being by Messrs. Heaton, Butler, & Bayne, of Brick-street, London.

**The New Post-office Buildings in St. Martin's-le-Grand.**—Active preparations are being made for the commencement of the new Post-office buildings in St. Martin's-le-Grand, and this week the second sale of the materials of the buildings to be removed has taken place. Messrs. Horne, Son, & Eversfield disposed of the materials of the Queen's Hotel, the building known as the Railway Receiving Offices, together with a large block of warehouses and other premises in Angel-street, Bull and Mouth-street, and King Edward-street, previous to the demolition of the buildings and clearing the site. The block at the corner of Bull and Mouth-street and King Edward-street, and also a large block between Angel-street, King Edward-street, and the churchyard of St. Botolph, Aldersgate-street, have already been taken down; and when the materials of the buildings sold this week are removed the entire site for the intended new Post-office buildings will have been cleared, with the exception of the French Protestant Church, which still remains standing, owing, we learn, to a difference between the church authorities and the Post Office as to the sum to be paid by the latter in compensation. It is stated that the Post Office authorities have offered 20,000l. for the church and grounds, but that the representatives of the church want 31,000l., and the probability is that the claim will have to be decided by arbitration.

**Proposed Agra Water-works.**—A plan for furnishing Agra with a purer supply of water has been under discussion for some years. Heretofore, however, it has been but a scheme. Now that the Municipality have resolved to push forward the project, it may be considered that there is every prospect of the inhabitants seeing their wishes fulfilled. The source of supply is to be the Jumna, which will provide comparatively clean water, and in sufficient quantity, during ten months of the year, the discharge falling in the hot weather, i.e., May and June, to about 50 ft. per second; and, in addition to the decrease in the supply, the water at this season contains an amount of organic matter. The system of filtration has not been finally settled; the choice is said to lie between the lime and metallic iron processes. The distribution of water is to be effected through twelve miles of piping, furnished with stand-posts on three patterns, viz., the ordinary one with two or four taps, those with roofs and cattle-troughs for bazaars, &c., and others for filling bullock muzzaks to provide a supply for the outskirts of the town to where the pipes do not lead. *Indian Engineer.*

**A Dust Destructor for Hornsey.**—The Hornsey Local Board, on Monday night, decided, with only one out of fourteen members in opposition, to adopt the scheme of their surveyor and engineer, Mr. T. de Courcy Meade, C.E., for the erection, at a cost of about 12,000l., of a destructor for cremating the dust and house refuse of the parish of Hornsey, which contains a population of 40,000. Mr. Meade submitted a set of elaborate plans, and his scheme, which was characterised as a most complete one, was adopted in its entirety. The destructor is to be fitted with the Jones Fume Cremator, and it was asserted by several members who have inspected most of the sixty destructors now in operation in various parts of the country that, built upon the lines laid down by the Surveyor, it cannot possibly create any nuisance to the inhabitants. The site selected is on a piece of land abutting on High-street, Hornsey, in close proximity to the mortuary recently erected by Mr. Meade.

**Institution of Mechanical Engineers.**—An ordinary general meeting of this Institution will be held on Friday evening, the 30th of September, at 25, Great George-street, Westminster, by kind permission of the Council of the Institution of Civil Engineers. The chair will be taken by the President, Mr. Edward H. Carbutt, and the discussion will be resumed on the paper read at the Spring meeting on the 17th of May last, by Major English, R.E., entitled "Experiments on the Distribution of Heat in a Stationary Steam-engine." The following paper will be read and discussed, as far as time permits:—"On Irrigating Machinery on the Pacific Coast," by Mr. John Richards, of San Francisco.

**Metalurgy.**—A series of lectures and demonstrations on metalurgy will be commenced at King's College, London, on October 10th, by Professor A. K. Huntington, with the assistance of Mr. W. G. McMillan as demonstrator.

PRICES CURRENT OF MATERIALS.

TIMBER.			
Greenheart, B.G. ....	ton	8 0 0	7 10 0
Teak, E.I. ....	load	8 0 0	13 0 0
Sequoia, U.S. ....	foot cub	0 2 3	0 3 0
Ash, Canada ....	load	3 0 0	4 10 0
Birch " ....	"	2 0 0	3 10 0
Elm " ....	"	1 10 0	4 10 0
Fir, Dantisc, &c. ....	"	1 10 0	4 0 0
Oak " ....	"	2 10 0	4 10 0
Canada " ....	"	3 0 0	6 0 0
Pine, Canada red " ....	"	2 10 0	3 10 0
" " yellow " ....	"	2 0 0	4 0 0
Lath, Dantisc " ....	1000	3 0 0	5 0 0
St. Petersburg " ....	"	4 0 0	5 10 0
Wainscot, Riga " ....	"	0 0 0	0 0 0
" Odessa, crown " ....	"	2 10 0	3 0 0
Deals, Finland, 2nd and lat. ....	std. 100	7 0 0	8 0 0
" " 4th and 3rd " ....	"	6 10 0	7 0 0
Riga " " ....	"	5 10 0	7 0 0
St. Petersburg, 1st yellow " ....	"	8 0 0	13 0 0
" " 2nd " ....	"	7 0 0	8 0 0
" " white " ....	"	6 10 0	9 10 0
Swedish " ....	"	6 0 0	14 0 0
White Sea " ....	"	0 0 0	0 0 0
Canada, Pine, 1st " ....	"	16 0 0	24 0 0
" " 2nd " ....	"	10 0 0	16 0 0
" " 3rd, &c. ....	"	6 0 0	9 0 0
" Spruce, 1st " ....	"	8 0 0	9 0 0
" " 2nd " ....	"	5 0 0	7 0 0
New Brunswick, &c. ....	"	0 0 0	0 10 0
Battens, all kinds " ....	"	4 0 0	10 10 0
Flooring Boards, sq. 1 in., pre-			
pared, First " ....	"	0 8 0	0 11 0
Second " ....	"	0 6 0	0 7 5
Other qualities " ....	"	0 4 0	0 6 0
Cedar, Cuba " ....	foot	0 0 3 1/2	0 0 3 1/2
Kondur, &c. ....	"	0 0 0	0 0 3 1/2
Australian " ....	"	0 0 2	0 0 0
Mahogany, Cuba " ....	"	0 0 4	0 0 0 1/2
St. Domingo, cargo average " ....	"	0 0 4	0 0 5 1/2
Mexican " ....	"	0 0 3 1/2	0 0 5 1/2
Tobacco " ....	"	0 0 3 1/2	0 0 0
Honduras " ....	"	0 0 3 1/2	0 0 0
Maple, Bird's-eye " ....	"	0 0 5	0 0 7
S. Rio " ....	ton	8 0 0	11 0 0
Bahia " ....	"	7 0 0	9 0 0
Box, Turkey " ....	ton	8 0 0	12 0 0
Satin, St. Domingo " ....	foot	0 5 0	0 0 0
Porto Rico " ....	"	0 6 0	0 10 0
Walnut, Italian " ....	"	0 3 1/2	0 0 5 1/2
METALS.			
Iron—Bar, Welsh, in London. ....	ton	4 15 0	5 0 0
" " in Wales " ....	"	4 2 6	4 10 0
" Staffordshire, London " ....	"	5 10 0	6 0 0
COPPER—			
British, cake and ingot " ....	ton	43 10 0	44 0 0
Best selected " ....	"	44 10 0	45 10 0
Sheets, strong " ....	"	50 0 0	0 0 0
Chili, bars " ....	"	39 10	39 10
YELLOW METAL " ....	lb.	0 0 4 1/2	0 0 4 1/2
LEAD—			
Pig, Spanish " ....	ton	12 0 0	0 0 0
English, common brands " ....	"	12 5 0	0 0 0
Sheet, English " ....	"	13 5 0	0 0 0
SPELTER—			
Silesian, special " ....	ton	15 7 6	15 10 0
Ordinary brands " ....	"	15 5 0	15 7 6
TIN—			
Straits " ....	ton	102 15 0	0 0 0
Australian " ....	"	103 0 0	0 0 0
English ingots " ....	"	106 0 0	0 0 0
OILS.			
Linseed " ....	ton	20 5 0	20 10 0
Cocunut, Cochiti " ....	"	31 0 0	32 0 0
Ceylon " ....	"	23 15 0	24 0 0
Palm, Lagos " ....	"	22 10 0	22 0 0
Rapeseed, English pale " ....	"	24 0 0	24 5 0
" brown " ....	"	22 15 0	0 0 0
Cottonseed, refined " ....	"	21 10 0	0 0 0
Tallow and Oleine " ....	"	25 0 0	45 0 0
Lubricating, U.S. " ....	"	5 0 0	6 0 0
" refined " ....	"	5 0 0	12 0 0
TURPENTINE—			
American, in casks " ....	cwt.	1 4 9	0 0 0
TAR—			
Stockholm " ....	barrel	0 14 0	0 14 6
Archangel " ....	"	0 9 6	0 9 9

TENDERS.

**BECKENHAM.**—For the erection of house, stable, coach-house, &c., in the Wickham-road, for Mr. James Edgcombe. Mr. Alfred Farnscott, surveyor, 156, Westminster Bridge-road, S.E. —

Kydd " .....	£1,293 15 4
Astell " .....	1,280 0 0
Syme & Duncan " .....	1,225 0 0
Lovelock (accepted) " .....	1,191 0 0

**BERMONDSEY.**—For the erection of shop on forecourt, and alteration to house, No. 104, Jamaica-road, Bermondsey, for Mr. S. Wilson. Mr. E. Cross, architect —

A. White & Co. (accepted) " .....	£146 0 0
[No competition.]	

**CHERSEA.**—For the erection of Holy Trinity Girls' and Infants' School, Upper Chelsea. Mr. F. W. Roper, architect. Quantities by Messrs. Barber, Boxall, & Barber —

Richardson & Son " .....	£4,995 0 0
S. J. Jerrard " .....	3,677 0 0
T. Boyce " .....	3,673 0 0
J. Holloway " .....	3,680 0 0
C. Wall " .....	3,515 0 0
W. Johnson (accepted) " .....	3,500 0 0

**CHIDDINGTONSTONE (Kent).**—For Great Mill Bridge, Chiddingtonstone. Mr. F. W. Ruck, County Surveyor. Quantities by Messrs. Ruck, Son, & Smith —

Dover, Wood, & Co., Blackfrars " .....	£269 0 0
Ball & Gammon, Strood " .....	938 0 0
E. Wilkins, Loose " .....	649 0 0
G. E. Wallis, Maidstone " .....	644 0 0
Money Mansland, Chislehurst " .....	633 1 1
Pennett & Son, Tonbridge " .....	613 10 6
James Farrow, Maidstone (accepted) " .....	589 0 0



## CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

## CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Firewood	City of London Union	Official	Sept. 26th	ii.
Public Offices, Kilburn	Willesden Local Board	E. Harner	Sept. 27th	ii.
Broken Guernsey Granite	do.	O. Claude Robson	do.	ii.
Firewood	West Ham Union	Official	Sept. 28th	ii.
Asphalts Paving, Owen-street	Clerkenwell Vestry	do.	Sept. 29th	ii.
Repairing Albemarle-street	do.	do.	do.	ii.
New Sewers, &c.	Holborn Board of Wks.	Lewis H. Isaacs	October 3rd	xii.
Supplying and Laying Victoria Stone	Leyton Local Board	Official	October 4th	xii.
General Ws. House Drainage, &c.	do.	do.	do.	ii.
Mill-Shed, Bath-Rooms, &c.	Edmonton Union	T. E. Knightley	October 5th	xii.
Wood-Paving Works.	Westminster Bd. of Wks.	G. R. W. Wilever	October 5th	xii.
Drainage, Roads and Fencing	Putney Burial Board	J. C. Radford	October 13th	xii.
Police Station, Sutton Coldfield	County of Warwick	Wm. Lait	October 14th	xii.
Rebuilding Residence, Cadogan-place	do.	W. M. L. Seaman	Not stated	xii.

## PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Surveyor and Engineer	Tottenham Local Board	40 7.	October 11th	xvi.

**HAMPSTEAD.**—For building an additional story and other works at West-hill Lodge, Hampstead, for Mr. Horatio Webb. Mr. George Edwards, architect:—  
Wall Bros. .... £297 0 0  
Ward & Lambie ..... 865 0 0  
Green & Lee ..... 877 0 0  
Longmire & Burge ..... 678 0 0  
S. Barnett (accepted) ..... 678 0 0

**HORSMONDEN (Kent).**—For alterations and additions to Sherenden House, for Mr. J. G. Hodgkin. Mr. Thomas Potter, architect, Sevenoaks. Quantities supplied:—  
Pryor & Co., Maidstone ..... £297 0 0  
Walls & Clements, Maidstone ..... 658 0 0  
Wiltshire, Sevenoaks ..... 648 0 0  
Martin, Horsmonden ..... 624 0 0  
Wm. Brown, Shepherd's Bush\* ..... 655 11 0  
\* Accepted.

**KETERING.**—For the erection of club premises in Wellington-street, Kettering, for the Kettering Working Men's Club. Mr. H. A. Cooper, architect. Quantities supplied by architect:—  
Rudd & Son, Grantham ..... £1,432 0 0  
Wm. Clough, Broughton ..... 1,372 10 0  
Margate & Neal, Kettering ..... 1,270 0 0  
Chas. Sharman, Kettering ..... 1,240 0 0  
Saml. Manby, Kettering ..... 1,197 0 0  
Jno. Colman, Kettering ..... 1,190 0 0  
Jno. Bellamy, Kettering ..... 1,180 0 0  
C. & F. Hanson, Kettering ..... 1,127 0 0  
H. F. Hanson, Kettering ..... 1,177 0 0  
Dickens & Mutton, Kettering ..... 1,176 0 0  
Geo. Ginn, Kettering ..... 1,172 0 0  
Geo. Hanson, Kettering (accepted) ..... 1,169 0 0  
Edward Barlow, Rothwell ..... 1,150 0 0

**LAMBETH.**—Accepted for pulling down and rebuilding The Angel public-house, Lambeth-walk, for Mr. J. Craig. Messrs. Stock, Page & Stock, architects, 9, Denman-street, London Bridge, S.E.:—  
John Beale, Westminster Bridge-road ..... £2,592  
[No competition.]

**LLANDAFF.**—For the erection of a billiard-room at Llandaff House, Llandaff, for Mr. John Gunn. Quantities by Mr. Norman Wight, Cardiff. Messrs. Halliday & Anderson, architects, Cardiff and Llandaff:—  
Turner & Son, Cardiff ..... £260 0 0  
Chas. Bird, Cardiff ..... 607 0 0  
D. J. Davies, Cardiff ..... 497 0 0  
S. Smallbridge, Cardiff ..... 480 0 0  
J. Hopkins, Cardiff ..... 480 0 0  
A. Trotman, Cardiff ..... 475 0 0  
W. Ashley, Cardiff ..... 472 14 9  
T. & W. Cox, Llandaff (accepted) ..... 389 0 0

**LONDON.**—For alterations and additions to No. 28, Wimpole-street, W., and stables in rear, for Mr. Merrant Baker. Mr. Alexander Payne and Mr. F. M. Rigold, joint architects:—  
Thomas Boyce ..... £1,427 0 0  
Hall, Biddall, & Co.\* ..... 1,476 0 0  
\* Accepted, with modifications.

**LONDON.**—For alterations to The Dun Cow, and building two shops adjoining, in the Old Kent-road, for Mr. T. Hill. Mr. J. C. Reynolds, architect. Quantities not supplied:—  
Knooch ..... £4,200 0 0  
Parker ..... 3,985 0 0  
Drew & Cadman ..... 3,849 0 0  
Croaker ..... 3,833 0 0

**LONDON.**—For fitting up stabling at Pear Tree-street, Goswell-road, E.C., for Messrs. Carter, Paterson, & Co. (Limited), under the superintendence of Mr. William Eve, Union-court, Old Broad-street, E.C.:—  
Brass & Son ..... £715 0 0  
Harris & Wardrop ..... 695 0 0  
F. & H. F. Higgs, Loughboro' Junction (accepted) ..... 635 0 0

**LONDON.**—For erecting workshop, &c., at Whistler-street, Drayton Park, N., for Mr. R. C. Halse, under the superintendence of Mr. William Eve, Union-court, Old Broad-street, E.C.:—  
Wilshe ..... £237 0 0  
Harris & Wardrop ..... 384 0 0  
Hamlin ..... 359 0 0  
Avis & Son ..... 342 0 0  
Brown ..... 339 0 0  
F. & H. F. Higgs ..... 320 0 0  
Clark, Hornsey Park-road (accepted) ..... 318 10 0

**LONDON.**—For the erection of workshops, warehouse, and show-rooms, in the Westminster Bridge-road, for Messrs. Geo. Wright & Co. Mr. Alfred Parnacott, surveyor, 168, Westminster Bridge-road, S.E.:—  
Fascob Bros. (accepted) ..... £1,168 0 0

**LONDON.**—For repairs, &c., at No. 1, Vernon-place, Bloomsbury, for Mr. Cronin. Mr. T. W. Willis, architect:—  
J. A. Taylor ..... £279 0 0  
Ansell ..... 263 0 0  
Hackworth ..... 340 0 0

**LONDON.** For alterations and additions at No. 78, Goswell-road, for the London Provident Building Society. Mr. T. W. Willis, architect:—  
King & Son ..... £255 0 0  
J. Anley ..... 890 0 0  
Grant ..... 890 0 0  
Flew & Co. .... 837 0 0  
J. A. Taylor ..... 799 0 0

**NORWOOD.** For repairs and alterations to seventeen houses, at Norwood, for Mr. C. Blake. Messrs. J. & J. S. Edmonson, architects and surveyors:—  
Robson ..... £5,168 0 0  
Goold & Brand ..... 1,431 0 0  
Smith & Sons ..... 1,412 0 0  
Kynoh & Co ..... 3,739 0 0  
Crappier ..... 3,419 0 0  
Taylor ..... 2,398 0 0  
Croaker ..... 2,330 0 0  
Mayo ..... 2,164 13 6

**ORTON (Northants).**—For the restoration of All Saints' Church, Orton, Northants. Mr. H. A. Cooper, architect, Kettering:—  
Fred. Barlow, Rothwell ..... £290 0 0

**PADDINGTON.**—For repairs, &c., to No. 12, Talbot-square, Paddington. Mr. A. Parnacott, surveyor, 166, Westminster Bridge-road:—  
Bray & Pope ..... £178 0 0  
Peacock Bros. .... 151 0 0  
Lapthorne & Co. .... 129 0 0

**PAIGINTON.**—For the erection of a photographer's shop and dwelling-house, on the Gorton Estate, Paiginton, for Mr. Rawlings. Mr. S. Woodbridge, jun., architect, No. 210, High-street, Brentford:—  
H. Rablack (accepted) ..... £204 0 0

**PENGE.**—For alterations and additions to Fern Lodge, Oakfield-road, for Mr. Chas. W. Jeffries. Mr. Alfred Parnacott, surveyor, 166, Westminster Bridge-road:—  
Lapthorne & Co. .... £450 0 0  
Burgess & Co. .... 325 0 0  
Lovelock ..... 285 0 0

**ST. LEONARD'S-ON-SEA.**—For the erection of a new bank, Grand Parade, St. Leonard's, for the London and County Banking Company (Limited). Mr. Richard A. Hill, F.R.I.B.A. (Powler & Hill), architect:—  
Naylor, Rochester ..... £4,990 0 0  
Fildes & Son ..... 4,375 0 0  
Adcock, Dover ..... 4,859 0 0  
Hughes, St. Leonard's ..... 4,887 0 0  
Eldridge & Crittenden, St. Leonard's ..... 4,921 0 0  
White, St. Leonard's ..... 4,899 0 0  
H. E. Crutenden, St. Leonard's ..... 4,738 0 0  
Salter, St. Leonard's (accepted) ..... 4,475 0 0

**SOUTHWARK.**—For rebuilding premises in Park-street and Stoney-street, Southwark, for Messrs. White & Son. Messrs. T. Anson & Son, architects:—  
Brown, Son, & Bloomfield ..... £6,150 0 0  
Downs ..... 6,104 0 0  
Ashby & Horner ..... 6,068 0 0  
Patman & Fotheringham ..... 5,963 0 0  
Groves & Sons ..... 5,883 0 0  
Kilby & Gayford ..... 5,770 0 0  
Kirk & Randall ..... 5,7 2 0  
J. & J. Greenwood ..... 5,699 0 0  
Colls & Sons ..... 5,367 0 0  
Brass & Sons ..... 5,637 0 0  
Adamson & Sons ..... 5,825 0 0  
Balcan Bros. .... 5,610 0 0  
Knooch & Co. .... 5,585 0 0  
Rider & Sons ..... 5,570 0 0  
Nightingale ..... 5,430 0 0

**STRAITFORD.**—For the erection of a manufactory at Stratford, Essex. Mr. Edward Monson, jun., A.R.I.B.A., architect, Aton:—  
W. H. Simonds, Reading ..... £4,070 0 0  
W. A. Gibbs, Poplar ..... 4,020 0 0  
F. T. Chisholm, Kenal Green ..... 4,000 0 0  
S. Sabley & Son, Islington-green ..... 3,997 0 0  
E. C. Howell & Son, Lambeth ..... 3,760 0 0  
G. Stephenson, Bishopsgate-street ..... 3,756 0 0  
G. Munday & Son, Savage-garden ..... 3,726 0 0  
H. Ingram, Woking ..... 3,690 0 0  
F. & H. F. Higgs, Loughboro' Junc. .... 3,800 0 0  
G. Stephenson, Bishopsgate-street ..... 3,337 0 0  
L. L. Green, Holborn ..... 3,541 0 0  
J. T. Chappell, Fimlico ..... 3,448 0 0  
Smith Wilkinson, St. Thomas-road ..... 3,425 0 0  
Mark Gentry, Stamford ..... 3,390 0 0  
F. R. Turtle, Northcote-road ..... 3,125 0 0  
W. H. Lascelles & Co., Bunhill-row\* ..... 3,088 0 0  
J. M. Goodwin, Kilburn ..... 3,065 10 6  
\* Accepted.

**STREATHAM.**—For the erection of a new picture-gallery at Park Hill, Streatham-common, S.W., for Mr. Henry Tate. Mr. Sidney R. J. Smith, A.R.I.B.A., architect, 15, York-buildings, Adelphi:—  
With Inner Skylight, only.  
G. Chandler, Brixton-hill\* ..... 720 ..... 638  
\* Accepted.

**SUTTON (Surrey).**—For alterations and additions to Camden House, Sutton, for Mr. S. Ezekiel. Mr. E. Douglas Hayland, architect, 45, Fenchurch-street, E.C. Quantities supplied by Mr. T. Marcus Houghton, Imperial Buildings, Langate-circus, E.C.:—  
Hickesbotham ..... £4,725 0 0  
Brown ..... 4,590 0 0  
Pacey & Lumley ..... 4,195 0 0  
Smith ..... 4,158 0 0  
Knight & Bennett ..... 4,066 0 0  
Page ..... 3,930 0 0  
Potter ..... 3,565 0 0

**TOTTENHAM.**—For works in connexion with the widening of Green-lanes, at certain points between the parish boundary of Finsbury Park and the Alexandra Park Tavern, for the Tottenham Local Board of Health. Mr. W. A. B. de Pape, engineer:—  
J. Butterill, Finchley ..... £3,311 0 0  
Grever & Co., Finsbury ..... 3,380 0 0  
Woodham & Fry, Greenwich ..... 2,021 0 0  
W. Nichols, Wood Green ..... 1,996 4 3  
F. Adams, Kingsland ..... 1,968 8 4  
Williamson, Green Lanes ..... 1,723 16 7  
Bradshaw & Co., Tottenham ..... 1,674 14 11  
A. Catley, Lloyd-square, W.C. .... 1,622 0 0  
J. Rendall, Walthamstow ..... 1,614 2 5  
J. Bloomfield, West Green ..... 1,443 15 0  
J. Wain, Battersea ..... 1,400 0 0

**TOTTENHAM.**—For the erection of an engine and boiler house, chimney-shaft, water-tower, &c., at the Longwater Pumping Station, for the Tottenham Local Board of Health. Mr. W. A. H. de Pape, engineer:—  
C. Dickinson, Loughboro' Junction ..... £4,549 15 9  
Hy. Hilton & Son, Birmingham ..... 4,135 0 0  
Geo. Bell, Tottenham ..... 3,750 0 0  
C. Wall, Chelsea ..... 4,015 0 0  
J. Robson, Snaresbrook ..... 3,804 17 8  
Wilkinson, Snaresbrook Park ..... 3,375 0 0  
F. Hart, West Green ..... 3,588 19 9

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# The Builder.

Vol. LIII. No. 2330.

SATURDAY, OCTOBER 1, 1887.

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### The Proposed Nicaragua Canal.



For late years so much attention has been paid to the progress of the Panama Canal that the consideration of the rival scheme, the subject of this article, has been comparatively neglected. The United States Government have from time to time caused official surveys to be made across Nicaragua with the view of constructing a canal from the Caribbean Sea to the Pacific Ocean through that country, and we will now endeavour to describe the results achieved.

The general direction taken by all the surveys is from Greytown on the Caribbean Sea to Brito on the Pacific side, taking advantage of the Rio San Juan, Lake Nicaragua, one or two minor streams, and the Rio Grande. They vary considerably, however, as to the methods of constructing the canal, as well as in important details of the line of route. Every scheme comprising the main construction must necessarily have Lake Nicaragua as a summit level of the canal, whilst the Rio San Juan being the outlet of the lake (on the eastern side) must also be largely utilised. The lake is about ninety miles long and from thirty-five to forty-five miles wide, and in the rainy season of 1878 its surface attained an elevation of 110 ft. above the mean level of the sea, which is no doubt a fair maximum. From this it will be seen that a canal without locks is impracticable. The chief points to be attended to, then, are how to convert the Rio San Juan into an arm of the lake in such a direction as to obtain the smallest number of locks, with as little expense, and in as short a distance as possible, on the one side; and as to which of the valleys is to be taken in conjunction with the Rio Grande, with the same objects, on the other.

Col. O. W. Childs, a well-known American engineer, in 1850-51, made the first careful instrumental survey for a canal along this route for the "American Atlantic and Pacific Ship Canal Company."

In 1872-73 Commander E. P. Lull, U.S.N., made a more extended survey, and he proposed that the canal should be made from Greytown, through some small lagoons and hills, joining the San Juan at the junction of that river with the San Juanillo, as indicated by dotted lines on the plan (see next page), and along the valley to Lake Nicaragua, thence across the lake joining the Pacific by means of the valleys of the Rio del Medio and Rio Grande,

to Brito. The total distance of the route would be 180.76 miles, of which 61.7 miles would have to be cut. It was proposed to work the canal by means of twenty-one locks with four dams, the length of the summit level being 102 miles, and the estimated cost of the whole 52,577,718 dol.

In 1880 the United States sent another expedition, under Mr. A. G. Menocal, civil engineer, U.S.N., with a view to further examine the ground on the western section from Lake Nicaragua to Brito. The survey of 1872-73, as we have seen, proposed to make the canal by way of the Rio del Medio and Rio Grande. At the same time it was perfectly well known that the Rio Grande could be approached from the lake up the Rio Lajas. No matter which of these two streams were utilised, the position of the nearest lock to the lake, or, in other words, the westernmost extension of the summit level of the canal, would be identical. The deepest cuttings required to reach this point are, by the Lajas route, 43 ft. 9 in.; by the del Medio, 134 ft.; the length of the respective routes being 17.27 miles and 16.33 miles. The estimated cost of the latter route, however, exceeded that of the former by several millions of dollars; but after mature consideration, and by reason of better natural surface drainage (so essential to the stability of a work of this kind, built in a country subject to a large rainfall), the Rio del Medio route was favoured by the surveyors. On this line no watercourse of considerable size would be taken into the canal, and as its watershed is so small, no fears were entertained of damage from freshets. On the Lajas route the conditions were dissimilar. The Rio Grande, which is a mountain stream of extensive and rapidly-inclined watershed and precipitous channel, approaches the canal from the south-east, and turning to the north-east passes through a narrow valley of a width but little greater than that required for the canal. The channel of the river has an average width of 60 ft., and a depth of from 15 ft. to 20 ft. Col. Childs proposed to receive this stream into the canal by a waste-weir, and he estimated its maximum flow at 5,670 cubic feet per second. Mr. Menocal, in the course of his examination of this district, however, shows that the maximum flow may be as great as 10,000 cubic feet per second; whilst it is clear that so large a volume of water could not be received into the canal, at a time when least needed as a feeder, even under the most favourable conditions of flow, without danger to navigation, and to the stability of the works. This was the greatest objection to the Lajas route, and for the time it was deemed almost insuperable.

The principal object of Mr. Menocal's survey was for the special purpose of ascertaining the practicability of turning the Rio Grande into the Lake, thereby leaving the narrow valley now occupied by its channel across the divide, free for the construction of the canal. This was shown to be quite possible by making a dam across the river and cutting an artificial channel for it into the basin of the Lajas, as shown on the plan. Furthermore, this survey showed the expediency of cutting an artificial channel near the mouth of the Lajas in such a position as to cause the waters of that river to enter the lake about one mile south of its present mouth, thus leaving its bed at this point free for the canal.

The head-waters of the Rio Grande having been disposed of, it is evident that provision must be made for its tributaries. Of these, it is proposed to receive the Espinal (just above the highest lock) into the canal by means of a waste-weir. The other streams would be allowed to empty themselves as at present into the main channel, but in some cases where it seems advisable the canal would cut across sharp curves of the river, and artificial channels would then have to be made to accommodate it. It is proposed to pass some small brooks from the northward under the canal to the river. Seven waste weirs are to be constructed at suitable points for the discharge of surplus water. The survey of 1872-73 proposed to overcome the difference of level between the lake and low tide at Brito by making eleven locks; whilst that of Mr. Menocal provides only four locks, as will be seen on the plan. The lifts proposed are as follows:—For lock No. 7, a variable lift of from 24.2 ft. to 33.18 ft., depending on the state of the tide; for No. 6, 29.7 ft.; for No. 5, 29.7 ft.; for No. 4, 26.4 ft. The estimated cost of the work, following out Mr. Menocal's scheme, is much less than that by way of the Rio del Medio. The survey of 1880 in the main confirmed that of 1872-73 in regard to harbours at either end of the canal, about which there seems to be no serious difficulty.

In 1885 Mr. Menocal was ordered to make another survey, the operations of which were to be confined to the re-location of the eastern section of the canal. Two important modifications of the location of the 1872-73 survey were contemplated, either of which would, if found to be practicable, shorten the distance very materially, simplify the engineering problem by the elimination of sharp curves and by a reduction of the watershed that had to be provided for by the old location, and diminish the cost considerably.

One of these changes consisted in the construction of a dam just below the confluence



of the San Juan and Sarapiquí, by which 22½ additional miles of the San Juan could be made navigable, and the actual canal excavation from the dam to Greytown reduced to about 21 miles through a comparatively level country. Col. Childs had proposed to raise the waters of the river about 14 ft. by the construction of a dam at that point; and later, in 1879, M. Blanchett, an enthusiastic Frenchman, had proposed to convert the river above that point into an extension of the lake by the construction of a dam, 74 ft. high, at the same place.

The other proposed change consisted in taking a line from Greytown direct to the valley of the river San Francisco, and through this valley to the San Juan, instead of joining that river near its confluence with the San Juanillo. The alteration would, of course, necessitate cutting through the divide between the valleys of the San Juanillo and San Francisco.

The first-mentioned project failed; for a hill on the right bank of the San Juan, which at first seemed favourable enough, was shown to be surrounded by swamps, and not connected with a continuous range into the interior; whilst on ascending the Sarapiquí for 10 miles no high land was found on either side. It was, therefore, discovered that to raise the water of the San Juan by a dam at that point, as had been so often proposed, was impossible.

The second project fared much better. A systematic survey was carried up the Rio San Francisco and its tributaries leading eastwards, with a view to finding the easiest pass across the divide. About three miles from the San Juan that river divides into two

At length, a suitable way was found across the divide, and the line advanced over it and down the precipitous eastern slope, where a river valley fortunately was found trending for some distance in the direction of Greytown. The elevation of the divide between the western and eastern flowing waters is 280 ft., but as it was found impossible to plan the canal so as to conform to all the turns of the valley, the proposed line cuts several spurs which rise a number of feet above this height. The amount of blasting and excavation required at this point is very considerable, and forms the most expensive item in the estimates; 7,760,312 cubic yards of solid rock must be excavated, the cost of which is estimated at 11,640,468 dollars.

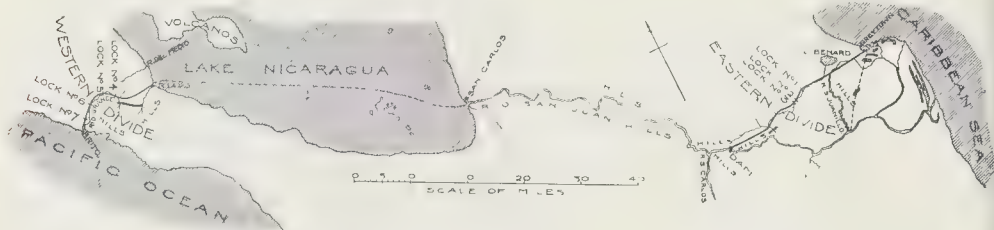
On the eastern slope of the divide, it will be necessary to have a lock (No. 3 on plan). This is the highest lock proposed by the scheme on going from the lake towards Greytown; the summit level of the canal, therefore, is to be preserved from lock No. 4 on the western section to lock No. 3 on the eastern, a distance of 144.8 miles. In order to maintain this level, however, several considerable works have to be executed, the three most important of which are: (1) the construction of a dam across the San Juan, so as to raise its waters to the required height; (2) the cutting through the hills which divide the San Juan from the head of the valley of the San Francisco; and (3) the erection of an embankment across the San Francisco between the place where that stream receives its main tributary and the San Juan.

The site of the dam was fixed at a suitable spot sixty-four miles from the lake (as shown on plan) between two opposite steep and rocky

to insure its safe navigation at night. With ample water power at several points this can be done with but little expense. In 22.37 miles or 57 per cent. of the canal in excavation the prism is large enough for vessels in transit to pass each other; the remaining distance in which large vessels cannot conveniently pass is so divided that the longest is only 3.67 miles in length. The daily water supply is much in excess of that actually required for working the canal. A railroad will be constructed from Greytown to the dam across the Rio San Juan, and between the Lake and Brito.

The estimated cost of the whole is 64,036,197 dollars, which includes 25 per cent. for contingencies and many minor expenses which we have not alluded to. The estimates of the survey of 1872-73 calculated on the same basis and deducted shows a difference in favour of the location of 1885 of 16,921,980 dollars.

The accompanying diagrams represent the designs for the tail-gate of Lock No. 3 of the proposed Nicaragua Ship Canal following out the scheme of Mr. A. C. Menocal in his Report of the 1885 survey. At first he intended to recommend iron sliding gates for all the locks, but for the one in question which, as we have seen, is proposed to have a lift of 53 ft., such gates would not answer. The tail-gate of this lock, with a total height of 88 ft., of which 58 ft. would project out of the water when the lock is empty, required additional provision to counteract possible wind pressure and guide it safely across the chamber. Some difficulty was experienced in setting this point, but eventually Mr. R. E. Peary, Mr. Menocal's principal assistant in the survey, suggested a rolling



branches; the main stream takes a north-westerly direction through a broad and comparatively level valley confined by two ranges of hills, the elevation of the river being about 60 ft. above the sea, having a mean width of about 50 ft. between its clay banks, and a flow in the dry season of not more than 100 cubic feet per second. The other branch, or tributary, runs in an easterly direction through a wide level valley, and in its course receives two or three small creeks. A great deal of attention was paid to this district. It was previously entirely unknown, even to natives. Much of the work was carried on in wet swamps, where travelling was fatiguing in the extreme, officers and men being compelled, in many instances, to go over long distances buried to the waist in mud and water, with a very uncertain bottom to stand upon. At the summit of some of the elevations, high trees were climbed, in order to obtain a view of the country and make sketches of the high ranges surrounding the valley, and in Mr. Menocal's report he states that this method of obtaining information as to the topography saved much labour, and contributed in a great measure to the favourable results accomplished by the party. He suggests that in making an extensive and detailed topographical survey of that region, where the engineer can only ascertain what lies 10 ft. ahead of him by cutting his way through the dense vegetation, the construction of towers of observation on several prominent points, and perhaps reconnoissances by balloon, would be the means of obtaining readily, and at comparatively small expense, information which would require, by the system he was compelled to adopt for want of other means, many months of arduous labour.

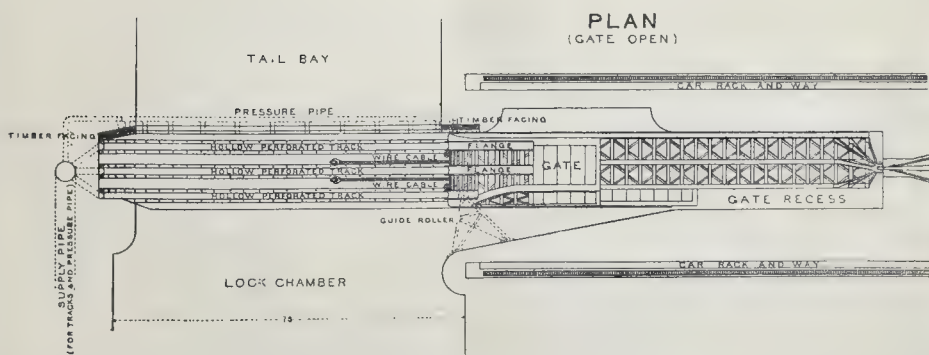
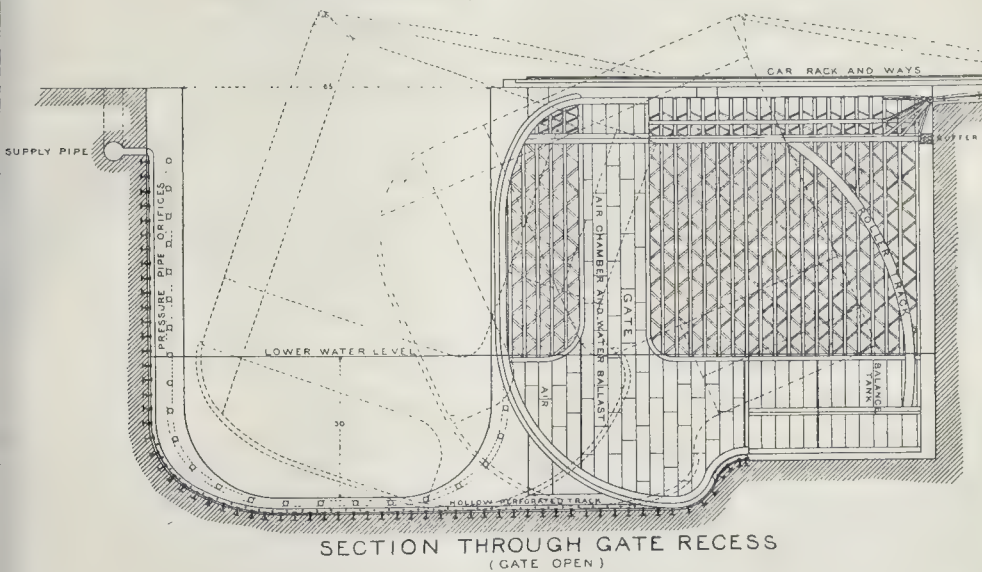
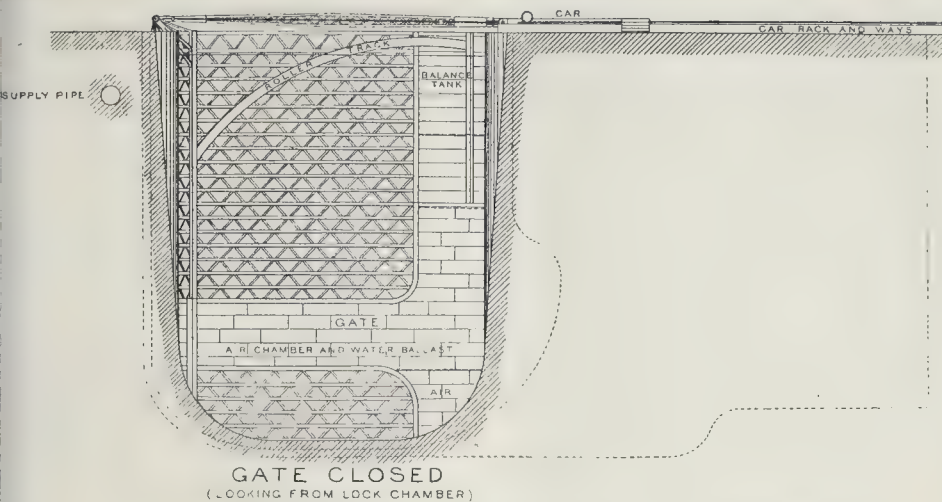
hills, extending on either side to the mountains in the interior. The dam is proposed to be 52 ft. in height, and it will convert the upper valley of the San Juan and that of the San Carlos (a tributary) into an extension of Lake Nicaragua. The valleys of the San Francisco and its chief tributary will also be filled with water, as the hills above alluded to can easily be cut through, and it will be equally practicable to construct the embankment across the San Francisco. The last-mentioned work is proposed to be 6,500 ft. long on the crest, and 51 ft. maximum depth. It having been shown to be possible to extend the summit of the canal to Lock No. 3, the only remaining difficulty is to get rid of the drop to the tide level of the Caribbean Sea. This, Mr. Menocal says, can be done by making three locks, as shown. The drops of these are as follows:—For 26 ft. From Lock No. 1 to Greytown the Lock No. 3, 53 ft.; for No. 2, 27 ft.; for No. 1, canal would pass across the flat basin of the San Juanillo, cutting that stream in several places, and the swamps of the lagoon region. An artificial channel must be cut, south of the canal, to divert the San Juanillo, and another, north of it, to give the Benard lagoon and its tributaries an independent outlet to the sea.

We have now traced the route as proposed by Mr. Menocal from the Pacific to the Atlantic. Its total length is 169.8 miles, of which 38.98 miles are to be excavated canal, and 130.82 miles navigation by Lake Nicaragua, the Rio San Juan, and the basin of the Rio San Francisco; and there are to be seven locks. The time required for a vessel to pass through from Greytown to Brito is estimated at thirty hours. The minimum radius of canal curves is 4,000 ft. Provision has been made for illuminating the route by electricity, wherever necessary, so as

gate which seems to fulfil the requirements of the case.

In describing this Mr. Menocal says that the principal device consists of a rolling or tumbling gate; a lateral recess in one side of the lock-chamber into which the gate retreats when opened; rails upon which the gate travels; a car spanning the recess and travelling backwards and forwards upon a track laid on the top of the lock; and a rod strut, or pivoted truss, connecting the car with the gate. In shape, the gate may be described as a rectangular upper portion resting on a curved lower portion, the inner or rear part of this curve being a quadrant of a circle of such radius that the length of the arc of the quadrant is equal to the width of the lock, so that the travel of the gate in rolling through 90° will carry it entirely within the gate recess. The lower part of the gate, to a point 1 ft. or 2 ft. above the lower water-level, and the inner or rear side of the gate will be built as a watertight compartment, to contain a shifting water ballast; the remainder of the gate being open trusses, plated on the down-stream side; the centre of gravity being kept by this means near the centre of the arc on which the gate rolls, and the balance more perfectly maintained. The gate travels preferably on rails raised above the floor of the lock in order to prevent any accumulation of foreign materials upon their surfaces.

Flanges upon the curved bottom of the gate prevent any lateral movement, and any possibility of slipping backward or forward during manoeuvring is precluded by four chains, each equal in length to the arc of the rolling quadrant, arranged in pairs, one pair being attached at one end to the gate at the upper extremity of the quadrant (the



Rolling Lock Gate for Proposed Nicaragua Canal.



gate being closed and erect), and at the other end to the bottom of the lock directly under the lower extremity of the rolling quadrant. The other pair is placed in the reverse direction, and both pairs are so arranged that one unwinds at the same rate that the other is wound up when the gate is in motion.

The action of the connecting-rod or truss will be seen from the diagrams. It is attached to the car, which is a rigid rectangular frame, spanning the gate recess, and supported on trucks travelling on two rails placed at right angles to the axis of the lock, one on each side of the gate recess. Motion is given to this car by a compressed air or hydraulic engine situated on the car, which drives a shaft bearing two drums, and each of these drums carrying several turns of a fixed cable. The gate and car are worked backward and forward by simply reversing the motion of the drums.

One of the most novel points in the gate is that the displacement of the lower water-tight compartment, when the gate is bearing on the rails, will always be largely in excess of the weight of the gate; therefore it is necessary to admit water, and it will be seen that the amount of it may be so regulated that the gate shall exert a pressure of 5 or 50 tons on the rails, or shall just touch them without exerting any pressure at all; in other words the gate may be adjusted to any weight. It may be worked, therefore, with the expenditure of but little more power than is necessary to give it motion. The minor details of the diagrams will sufficiently explain themselves.

In Mr. Menocal's estimate of the cost of the canal he has simply provided sliding gates for the other locks, though eventually the rolling gate may be universally adopted.

#### NOTES.

**T**HE verdict of manslaughter against the engine-driver of the train which caused the Hexthorpe disaster was a foregone conclusion for every one who could understand the meaning of the evidence. But it shows astonishing blindness and want of perception on the part of the coroner and jury, that they should have entirely passed over, as a matter not worth comment, the conduct of the Railway Company in taking off the safeguard of the usual "block" working on the very kind of occasion when such a safeguard is above all needed. We have commented strongly on this in a previous number, and we are glad to see that since then the *Times* has also done so in a leading article on the catastrophe. The engine-driver was the person directly culpable, no doubt, as if he had obeyed his orders the accident would not have happened; but a railway company which alters the whole system of working the traffic at the very moment of danger, and takes off the attention of its drivers from the usual system of signals to a temporary and much inferior system (for flags held on the road level are much more easily missed than signals on the ordinary elevated post,—which the driver, besides, knows where to look for), cannot escape the verdict of heavy moral responsibility, and it appears to us to be a matter for legislative interference. A characteristic incident of the inquiry,—what might be called an amusing incident if the occasion had been a less serious one,—was the benevolent speech of the Chairman of the Manchester, Sheffield, and Lincolnshire Railway, Sir E. Watkin, who graciously consoled the relatives of the unfortunate victims with an assurance that his Company did not intend to contest any claims for compensation, well knowing that his Company had not the shadow of a case for contesting them.

**A** REPORT has just appeared on the condition of the working classes which cannot fail to offer much that is interesting, as all information about them must be, although, at the same time, it is rather negative in its character, and, what is worse, not altogether reliable in what it tells us. The main object of the Report appears to be directed

towards the distress which was said to prevail about the time that there was such an outcry last year, and as one parish was as good as another for the purpose, four different industrial districts in London were chosen, containing about 200,000 population. Of course, the whole of these people were not applied to, and out of the rest a good many failed to furnish the necessary information. Altogether, about 29,500 were amenable to being questioned. Of these, 73 per cent. were or had been generally in work, and 27 per cent. out of work, the greater part of them being dock labourers. These latter, indeed, have been worse off than any class of workmen since October 31 last year, when the inquiry was commenced. In the building trade, some of the items look rather formidable, the total of the unemployed dock labourers being 89 per cent., masons and bricklayers 79, painters and glaziers 72, cabinetmakers and turners 61, carpenters and joiners, and blacksmiths and coppersmiths, 29 per cent. Dr. Ogle, of the Census Office, states that there is a marked tendency in many of the answers, especially in the poorer classes, to over-estimate the expenses and under-estimate the resources.

**T**HE Metropolitan Board of Works re-assembles this week, after the recess. The *agenda* paper contains a great many items, but only two or three of them are of general interest. Among the communications to be received is a letter from the Strand District Board of Works "expressing a hope that the Board will not permit any building to be erected on any part of the open space at the Piccadilly end of Shaftesbury Avenue." We have already expressed our hope that nothing of the kind will be permitted. After this bit of common sense from the Strand District Board of Works it is the more unpleasant to read the next item on the *agenda* paper, which refers to a "memorial from residents and ratepayers of St. Mary-le-Strand, asking the [Metropolitan] Board to take into consideration the necessity for widening a portion of the Strand by the removal of the Church of St. Mary-le-Strand." It is but just to the Strand District Board of Works to say that the parish of St. Mary-le-Strand is only one of three parishes represented by the District Board, whose collective wisdom will, we trust, outweigh the proposals of the "residents and ratepayers" of St. Mary-le-Strand. We should like to see their names. To refer to another item on the *agenda*, not very pleasant reading to the majority of the Board must be the "letters from the Vestries of Kensington, Camberwell, Shoreditch, Clerkenwell, Paddington, Hammersmith, and Fulham, and the St. Saviour's, St. Olave's, and Holborn District Boards, in favour of the appointment of a Royal Commission to inquire into the Board's past and present system of dealing with surplus lands, &c." We cannot help thinking that the Board would have gained in public opinion if it had consented to the appointment of the proposed Royal Commission a few months ago. To appoint a committee of its own body, as it did, is very much as if it said, "Let us inquire into and report upon our own conduct." We make the foregoing excerpts from the *agenda*, and supplement them by a running commentary, in full remembrance of the indignation expressed by a member of the Board at what he was pleased to term the "monstrous" conduct of "a paper published on Friday morning" (which answers to our description) commenting, in paragraphs and articles "which must necessarily have been written the day before," on the proceedings of the Board! Does not the member in question know that the *agenda* for the Board's meeting on Friday is always sent to the editors of the London papers on Wednesday? For what purpose is it sent, if not for the public information? Does not the honourable member know that an even more august body than the Metropolitan Board of Works, viz., the House of Commons, issues its "Orders of the Day," "Votes," &c., in advance of its sittings? And did he never read articles in the daily

papers based upon those documents, or forecasting the result of a debate or a division?

**P**ROFESSOR CORFIELD, in a letter to the *Times* of the 26th, explains that at the conference of Medical Officers of Health he did not say, as reported, that "there was not a medical officer present who was not better able to certify (as to the sanitary condition of houses than any half-dozen members of the Institutes of Civil Engineers or Architects," but that, with the exception of some half-dozen engineers who have paid special attention to the sanitation of houses, any properly-qualified medical officer of health was better able to give an opinion as to the sanitary condition of a house, even as regards its drainage arrangements, than any number of civil engineers. Professor Corfield is good enough to make some exception in his remarks as regards architects, and to admit that they are becoming "alive to the importance of constructing houses that are fit to live in." This is very kind of him, but we must still take exception to the view that medical officers are always and all round better judges of such a matter than an architect or engineer. The medical officer knows in what hygienic state he wishes the building to be, but he is by no means necessarily an equally good judge of the efficiency of the mechanical aids provided to regulate draining and ventilation. Many a specious-looking patent contrivance is brought forward, with all kinds of promises as to what it will do, which to any man of mechanical knowledge shows its inherent weakness at once; and on such a point an engineer or an architect is unquestionably a better judge than a man who has had medical training only.

**A** REPORT has been drawn up by Mr. Strachan, the able Surveyor to the Chelsea Vestry, on the question of dust collection, and has been printed and circulated, as touching on a matter of public interest. It appears that, in consequence of a number of complaints from inhabitants of Kensal Town about the non-removal of dust, the dust contractor had a special order to clear the dust on certain days from every house in the district, and men were put to check the work done. This supervision disclosed, in the first place, the fact that the contractor had omitted calling at 632 out of a total of 3,180 houses. But the returns of this and of a further and more vigorous collection, when it was proved that every house was called on for its dust, disclosed the fact that for 359 householders who allowed the dust to be removed, no less than 2,549 refused; in round numbers, one in eight saw no necessity for a weekly removal of dust. The answer in many cases was that the dust-bin was "not full yet." The Surveyor proposes that in these circumstances an effort should be made to abolish the brick dust-bin, holding about a cubic yard, and to have zinc covered pails substituted, of such a size as will hold the dust for one week only. The frequent removal would be a necessity then, and the emptying of the zinc pail itself into the cart, instead of carrying out the refuse in separate baskets, would be a much more cleanly method, and give less chance of the scattering and leaving about of unwholesome matter in the process of removal. Mr. Strachan adds the following recommendation:—

"That a few persons be proceeded against before the magistrate for refusing to allow the dust to be removed. By Sec. 126 of the Metropolitan Management Act, 1855, a penalty not exceeding 5*l.* is made the liability of every occupier who refuses or does not permit the dust to be removed from his premises when the dustmen call. The intention of this section was to prevent the householder disposing of his dust to any other than the proper dustman, for it had a monetary value in those days. The section, however, is yet in force, and it can be applied to-day to the higher purpose of compelling the removal of the dust for sanitary, if not for monetary, considerations."

"Is that the law?" as Shylock says. If so, we hope it may be put in force without delay, for the good of the subject, in all quarters of London. The oddest point about the matter is that seven persons out of eight, in a whole



ish, should be so foolish as apparently to resent the offer to remove from their ous rubbish which is not only a nuisance, ut the keeping of which may be even dangerous to their own health, as well as that f their neighbours.

**SIR SAUL SAMUEL**, Agent-General for New South Wales, has just purchased, for the State House Museum, in Sydney, some interesting and authentic relics of Captain Cook's voyage in the *Endeavour*. Cook gave these to Sir Joseph Banks, who bequeathed them to Dr. Robert Brown. The latter stored them in his Museum, No. 17, Dean-street, Soho, at the rear of, and attached to, Banks's residence in Soho-square. Having lain forgotten during many years in a closed-up cupboard, they were discovered in 1859 by Mr. John Calvert, a subsequent occupant, who bought them, together with other articles associated with Captain Cook and with Banks's domicile here. The house of Sir Joseph Banks, in Soho-square, is No. 32 formerly No. 30, and now the Hospital for Diseases of the Heart. Subsequently to his death here, on the 19th of August, 1820, it was occupied until 1855 by the Linnean Society, founded in 1788, who removed thither from Gerrard-street, Soho. Banks and Dr. Solander, a pupil of Linnaeus, were appointed naturalists on the exploring expedition under Lieutenant James Cook's command, which sailed in the *Endeavour*, 370 tons, from Plymouth Sound (1768), to make discoveries in the Pacific and South Seas, and to observe the transit of Venus at Otaheite on June 3rd of the following year. The books and herbarium of Linnaeus were offered to Banks for 1,000*l*. They were purchased by Sir John Smith in 1784, at a slight advance beyond that sum, on Banks saying he could not afford to seize so golden an opportunity. Banks devised this house to the Linnean Society. Herein he used to give his week-day breakfasts and Sunday evening *conversazioni* to the Fellows of the Royal Society, whereof he was elected President in 1777, in succession to Sir John Pringle. The name of Banks does not occur in the list of subscribers to "A Voyage to the Pacific Ocean," 1776-80, by Cook and King, edit. 1784; and is not mentioned in that work. The "Mrs. Cook, Mile End-road," is the Captain's widow, then an inmate of the Trinity Almshouses there.

**I**N the course of the construction of a drain at Rome, from the Piazza della Carrette to the Flavian Amphitheatre, the workmen have discovered two large fragments of a fine marble frieze which is thought to represent a Gigantomachia. The two slabs are published in phototype in the last number of the *Buletino della Commissione Archeologica Comunale* (xv. 8), with an explanatory article by Signor C. L. Visconti. The frieze is undoubtedly of great interest, and of the finest Græco-Roman style, dating probably about the time of Augustus, but we venture to doubt if it represents a Gigantomachia. Since the Pergamene excavations there has been a general tendency to find Gigantomachias everywhere. One of the persons represented is a charming figure of Artemis in short chiton and high boots; she is just in the act of drawing an arrow from her quiver, and the whole pose is closely analogous to that of the "Diana of Versailles" with this peculiarity that the new Artemis is winged. Near her stands a fully-draped matronly figure, with the head veiled. Signor Visconti calls her Gaia, the Earth Mother; but her attitude of complete repose is utterly at variance with the regular tradition of the Gaia of the Gigantomachia, who is uniformly represented as a turbulent and agonised suppliant. At the right side of the first fragment the lower part of a figure remains, and a hand holding a mallet, with which he seems to be cutting at a tree, behind two figures, with torches and excited drapery, evidently Furies or Mænads. We can offer no satisfactory solution to the problem; but Signor Visconti's explanation seems to us not only improbable, but impossible. Influenced by his own theory as to the Giganto-

machia, Signor Visconti is inclined to think that the frieze formed part of the elevation of the Temple of Terra, the Earth, founded by the Consul Publius Sempronius, during the war against the Piceni (A.U.C. 484), rebuilt under the auspices of Cicero, 697, and probably again restored by Augustus. Here, again, though the supposition is interesting, anything like proof is wholly wanting.

**I**N clearing the ground for the new Post-office buildings at Aldersgate it is to be hoped that some efforts will be made to examine, if not, indeed, to preserve, a notable relic of the old London Wall. That structure now stands as the southern boundary of the disused burial-grounds of St. Botolph Without, Aldersgate, and Christ Church, Newgate, which have lately been opened for public recreation. This wall is a portion of the length,—Stow gives its measure as 66 perches,—that lay between Aldersgate and Newgate. It is unquestionably a piece of the City wall. But we cannot agree with the *Times*, which says in a recent article upon "Roman London," that "the line of the City wall was, so far as is known, never changed from the time of its first erection." For the original City wall lay entirely within a later line of defence. Long before London received the honourable style of "Augusta" a strong rampart had been placed around the *Arc* or *Pretorium* which the Romans had planted on the left bank of the Wall brook; and which had Lang bourne to the north and Dowgate and Billingsgate at its southern angles, west and east respectively. This too, be it observed, at a time when the river's northern shore lay further inland than at present. Whether that fortified settlement formed the principal Roman station is open to discussion, since Ptolemy has placed London in the territory of the Cantii, that is, on the southern shore of the Thames. But numerous discoveries tend to show that extensive suburbs had surrounded the citadel by the time of Constantine, and, *teste* Sir William Tite, the later and quite encompassing wall was built during the period 350-369 A.D. Constantine II. and Julian the Apostate were Emperors of Rome in that interval. Circumscribing an area rather less than the 390 acres of Hyde Park, the length of this City wall is variously computed by divers authorities. The return southwards to Mountfitchet (at Blackfriars) from an angle by the present infirmary of Christ Hospital, may be accounted for by the circumstance that here extended the Fleet's steep bluff, along whose elevation the wall was carried. Again, in terms of Edward I.'s charter *ad hoc* to the Black Friars, it was enlarged so as to include the precincts of their Dominican monastery in its south-western limits. A re-entrant angle was made at the present corner of Little Bridge-street and St. Martin's-court, Ludgate, where, until lately, a portion of the re-constructed wall, east and west, remained above ground.

**A**T the last session of the Berlin Archaeological Society Dr. Furtwängler read a paper which should be widely useful to all amateur collectors of antiquities as well as to the professional archaeologist. He dealt with the unhappily now widespread fraudulent terra cottas from Asia Minor. With the exception of gems there is, perhaps, no class of antiquities as to which deception is so easy. A certain modernness of style even in the originals makes falsification comparatively easy. Unless, however, the impostor is a well-trained archaeologist,—a combination happily rare,—he is sure to blunder in the minutiae of style, and he is apt to introduce motives which do not appear actually until the time of Renaissance work. Such motives Dr. Furtwängler classifies. They principally occur in schemes of drapery, the shape and decoration of armour and utensils. Further, there is another pitfall open to the unwary manufacturer. He sometimes introduces motives which he knows to be antique, but which from other sources it is ascertained were out of fashion at the time, e.g., Charon and his boat, a motive which had disappeared by the date of the originals. Dr. Furtwängler's

long and exhaustive study of terra cottas in connexion with the Sabouroff collection make his opinion of great weight. A report of the paper appears in the Berlin *Wochenschrift*.

**C**ONJECTURE is still busy with the restoration of the Hermes of Praxiteles; indeed, it is a problem of which, till some lucky discovery settles the question, archaeologists are not likely to weary. Flasch, in his article on Olympia in Baumeister's last issue of the *Denkmäler des Klassischen Alterthums*, maintains that Hermes is conceived of as cupbearer to the infant god. As such he holds a rhyton, and the little Dionysos a "phiale." The rhyton is natural enough, but the motive of the baby god holding the "phiale" is too formal to be acceptable. We are glad to learn (from the *Berliner Philologische Wochenschrift*, 1887, 38), that Professor Milchoeff, while he brings his high authority to support the rhyton, disallows the "phiale." Hermes, he thinks, holds the rhyton, the little wine-god leans forward to try and get it, but Hermes seems to say, "Not yet; not yet." There is no pouring out of a libation,—a notion utterly inconsistent with the general conception of the group. A paper by Professor Milchoeff, in support of his views, is promised shortly.

**S**OME notable changes have recently been made in the matter of archaeological appointments. Dr. Henzen's recently-lamented death left open, perhaps, the most important and influential archaeological position in Europe,—the Directorship of the German Institute in Rome. This is to be filled by Dr. Petersen. To undertake his new duties, Dr. Petersen resigns the headship of the German Institute at Athens. This falls,—and the appointment must be matter of universal congratulation,—to the eminent architect, Dr. Dörpfeld. Last, but for the future of classical archaeology in England all-important, Professor Percy Gardner leaves the Medal Room of the British Museum to fill the Professorship of Archaeology in Oxford, a chair reconstituted since the resignation of Professor Ramsey. There is great work to be done in Oxford, and there are, happily, no two opinions as to whether Professor Gardner is the man to do it.

**W**E fear that Dr. Lee has not done much good to the cause of economy in Lambeth by his letters in the *Times* against the purchase of land for the proposed Vauxhall Park. We have no doubt he meant well, but it is pretty clear that he has been wrong in some of his facts as to the market value of the land in question. It must be admitted that the fact of a member of the Lambeth Vestry being the owner of the land is, as those in favour of the purchase admit, "unfortunate," and one cannot but think that there has been something "providential," from a Vestry point of view, in the idea of a park at Vauxhall being just now started; but it hardly follows that the purchase of the land and the formation of a park may not be a benefit to the neighbourhood for all that. We imagine it will be so.

**T**HE Richmond and Twickenham Local Authorities, finding that the Thames Conservancy Board refuse to admit the justice of their complaint as to the deplorable condition of the river Thames in their neighbourhood, are organising concerted action for the purpose of promoting a Bill in Parliament for the construction of the often-discussed lock and weir. The Lock and Weir Committee of the Richmond Vestry are now inviting and receiving ideas and proposals from engineers as to a structure which will meet these two conditions,—give the inhabitants in this neighbourhood all the water they desire in the river at low tide, especially during summer; and disturb as little as possible the tidal flow of the river at any period of the year. The contention of the residents of the Richmond district is that, although the recent dredging operations have had the effect of deepening the centre channel, this draws the water from the side shallows and leaves long stretches of muddy banks exposed to view at low tide; and



that these operations have, in fact, been gradually lowering the general level of low tides to such an extent as to expose the foundations of the railway bridge at Richmond. Artists now complain that the river element in the beautiful landscape prospect from Richmond Hill is being destroyed, owing to the narrowing of the stream brought about, not only by the dredging operations, but the filling up of some of the broad reaches, such as that opposite Ham House, with shingle. It is contended that, although all this work is no doubt favourable to the purposes of navigation, the question should be brought to an issue whether the Thames Conservancy Board, in view of the enormous and yearly increasing number of persons who use this portion of the river for purposes of recreation and health, should be permitted to sacrifice the interests of this portion of the community to those of Trade and Commerce. This is, no doubt, a question to be asked. All the engineering authorities to whom we have spoken on the subject are in unison as to the belief that another weir would be detrimental to the tidal portion of the river, by diminishing the "demand," as it is termed, for water, and lessening the scour, and leading to the detriment of the navigable channel in the lower portion of the river; and some, at least, of those who hold this opinion are men of exceptional experience in river engineering. We entirely agree, however, in the opinion that a weir at Richmond would be an immense boon to that beautiful locality in itself, and that the beauty of Richmond is getting seriously deteriorated by the present state of the river; and if it can be satisfactorily shown that a weir can be placed there without injuring the lower river, no one would be more glad to see it than we should.

THERE is satisfaction in noting that our capital city is now, whatever defects still remain, quoted in high (or hygienic) places as a model of sanitary conditions. At the Hygienic Congress at Vienna, Herr Pettenkofer, lecturing on hygienic education and the necessity of spreading hygienic principles among all classes of society, largely quoted English authorities, and in alluding to the English proverb, "Cleanliness is next to Godliness," remarked that the statistics of the mortality of London show how hygienic piety has been rewarded by Heaven. Here is comfort and encouragement indeed for apostles of hygiene, toiling in the narrow way that leadeth unto life.

#### LETTER FROM PARIS.

THE holiday period in Paris does not take effect, at all events, at the Champs de Mars, where the Exhibition works have proceeded vigorously during the last month. The glass roof of the "Galerie des Expositions Diverses" is just finished, and the great machine gallery is now being taken in hand. The footings for the skewbacks of the immense arch-shaped girders are being formed, and in a short time the huge curves of the wrought-iron principals will be rising into the air. On the other side the levelling of the surface of the Champs de Mars is proceeding, in preparation for the plantations and ornamental gardens which will extend up to the terraces of the Palace. M. Alphand, to whom Paris is indebted for the creation of its modern promenades, has undertaken the personal direction of this portion of the works. The Eiffel Tower proceeds, the four iron columns pursuing their parallel course upwards and growing visibly before the eye. Eight hundred tons of metal have already been placed in position. The whole tower will absorb about 6,600 tons, and at the rate at which the work is going, a height of 75 metres will probably be reached by the end of the year.

In connexion with the Exhibition, it may be mentioned that two architects, M. Lahgée and M. Gilbert, are to submit to the Municipal Council, which has appointed a special committee to deal with it, plans for an "Hôtel International" intended for the delegations of working men who are expected to come to Paris during the year 1889.

We spoke in our last of a grand panorama

which M. Alfred Stevens and M. Gervex were preparing in view of the Exhibition. As a pendant to this, M. Castellani, who has made a speciality of this kind of exhibition, has undertaken the production of an extremely complicated panorama, which he entitles "Tout Paris," and which will certainly be one of the curiosities of 1889. It was to M. Castellani that we were indebted for the curious panorama of the "Monde Anté-diluvien," established in the Jardin d'Acclimatation, and which has fallen a prey to fire. There is also an interesting restoration of the Bastille in process of construction near the Champ de Mars, in the Avenue Laboulaye, which will include not only the too-celebrated fortress, but also the street and the Porte St. Antoine, and the other contiguous streets, with a faithful reproduction of the houses, shops, and signs of the period. This resurrection of a defunct corner of Paris is being made from authentic documents, and in a most realistic manner.

For some time public opinion has been excited by acts of vandalism of the same kind as that of which Carpeaux' famous group of "La Danse" was a victim some fifteen years ago. If it is the fact that political and religious feeling is the cause of the injuries done to statues in some cases, such as the breakages at Lunéville and the hostile manifestations made against the statue of Voltaire recently erected in the Jura, one cannot protest too much against acts which give evidence of a spirit quite at variance with civilisation. But there is a kind of financial vandalism which is quite as annoying in its results, and which has succeeded in spoiling the new St. Lazare railway station. Considering the building at the angle of the Rue de Rome, and seeing the pickaxe employed in the demolition of the long pile of houses bordering the Rue St. Lazare, one hoped, according to the designs of M. Lisch, to see extending along the street a fine monumental façade worthy of the importance of the structure and of the situation. And what has happened? The wealthy company of the "Chemins de Fer de l'Ouest," for whom apparently the æsthetic side of things has no interest, while leaving M. Lisch to build his façade, has decided to raise in front of it, along the border of the street, an immense Terminus Hotel 100 metres long and 20 metres high, which will completely mask the station, and present nothing to the eye but an immense square block of stone. The idea of a terminus hotel is a very good one in itself, of course, but it should have been placed at the side, not in the front as it is, to destroy the view of a fine architectural work. It is much to be hoped that the State or Municipal Authorities will interfere, in any future case of the same kind, to prevent such a piece of architectural spoliation of Paris for a mere question of £. s. d.

It is now fifty years that we have been repairing and restoring the Sainte Chapelle, and scaffolding have masked its beauties for half a century. The limited resources at the command of the Commission des Monuments Historiques chiefly account for this unfortunate delay of the work, the completion of which even now seems still a long way off. We may record, however, a vote of 50,000 francs towards it, which will enable M. Boeswillwald to complete the upper portion before long, when it is to be hoped the Government will see its way to further pecuniary sacrifices.

M. Deck, whose appointment as Director of the establishment at Sèvres we announced recently, has taken a step which has given great satisfaction to all the artists and artisans at work there. Under M. Deck's predecessor they were under a rule of military precision during the whole time they were in the establishment, which they could only enter or leave at regulation hours. This annoying discipline has been abolished by the new Director. "Piecework" is re-established, and the painters and modellers attached to the establishment enjoy from henceforth the liberty they have long demanded, and which is in fact almost necessary to the carrying on of artistic work; and under M. Deck's rule we may expect to see Sèvres a genuine *atelier*, and not a mere "fabrique."

The question of the housing of the Opéra Comique Company is now settled, and in a few days its members will be installed in the Théâtre des Nations, the house which saw the first representation of Gounod's "Faust." As an epilogue to the melancholy tragedy, they are occupied at the Hôtel de Ville about the monu-

ment to those who perished, which is to be erected at Père La Chaise, over the burial space given gratuitously by the Municipality. In the same well-known cemetery there is also to be inaugurated a funeral chapel which M. Aldrephe, the architect, has been commissioned to construct over the tomb of M. Thiers, the former President of the Republic.

This monument, on which M. Chapu and M. Mercié have worked, rises by the side of the cemetery chapel, at the summit of the hill situated opposite the principal entrance of the necropolis. It is of rectangular form, built in Renaissance style; the façade 9 metres in length, and the height 14 metres. In the centre of the principal façade is an arcade, closed by a bronze gate, opening between two Corinthian columns on granite pedestals, and which carry a complete entablature and attic. In the centre of the attic a tablet of green marble bears the following inscription in gold letters: PATRIAM DILEXIT; VERITATEM COLUIT. In the interior four large arches sustain a domical cupola, with a central window, which gives a dim light at once to the chapel and the crypt under it, which is surrounded by a stone balustrade. Access is given to the crypt by a staircase of thirty steps. The cupola is decorated with figures symbolical of Science, Literature, Eloquence, and History, sculptured by M. Mercié on the surfaces of the four pendentives. At the back of the chapel is placed a fine group by the same sculptor, representing "Thiers répondant à l'appel d'immortalité." This short account will in itself give some idea of the importance of this funeral monument, which, from an artistic point of view, is undoubtedly the most remarkable thing in Père La Chaise.

Besides the new Hôtel du Mont de Piété, at the angle of the Rue de Rennes and the Rue du Regard, and which is to be opened in January next, there are several important buildings in prospect. There is, first, a new hospital to be erected in the 19th Arrondissement, and the construction of a new Mairie in the 18th Arrondissement, in place of the wretched little houses hitherto devoted to the municipal service of one of the largest districts of Paris. This latter will undoubtedly be the subject of a public competition.

The Municipal Council for its part has decided, as we have already mentioned, on the erection of a School of Typography, to be called the "École du Livre," which is to be built in the 13th Arrondissement, on ground situated at the angle of the Boulevard d'Italie and the Rue de Gentilly. M. C. Lucas, whose name is well known to our readers, has been commissioned to prepare plans for this great establishment, the construction of which will offer, on account of the slope of the ground, considerable difficulties. When the plans are completed and approved by the Prefect of the Seine, they will be submitted to the Municipal Council, which has already created many professional schools in Paris, such as the "École d'Ébénisterie," the "École de Serrurerie" and "de Mécanique," the excellent results of which can now be appreciated. It is also announced that the State proposes to create a Museum of Oriental Art in which all the Oriental work now in the Louvre will be collected, along with that in the Palaces of Compiegne and Fontainebleau. This new museum is, however, still only an ideal project, and considering the limited resources of the Ministry of Public Instruction, it is not easy to predict whether or when it can be realised.

It may be of some interest to English readers to give the programme of the course of Instruction in Architecture which has been laid down for M. de Baudot, for his new chair at the Trocadéro, the proper locality for which would be the École des Beaux-Arts.

The course, which fills what has hitherto been a serious gap in the official instruction programme, will include three parts:—

1st part. Exposition of methods of construction, employment of materials, building apparatus (*appareil*), construction and planning of buildings, vaulting, carpentry, removal of rain-water, design of buildings in reference to their purposes, their artistic expression, their decoration, their proportions; drawing and design of mouldings; sculpture in its relation to architecture.

2nd part. Restoration of buildings. Explanations of the restorations undertaken under the auspices of the Commission des Monuments Historiques since its foundation; works required in underpinning; shoring; modes and



systems of scaffolding; general conduct of building operations.

3rd part. Study of the relations between the Middle Ages and the Renaissance; comparison of buildings of these two periods with each other and with the monuments of earlier epochs.

This course has received the complete approbation of the Commission des Monuments Historiques. It will be supplemented by photographs and drawings, and visits to buildings in progress. M. de Baudot proposes also, by way of giving a practical turn to this new experiment, to organise competitions, the winners of which will have the opportunity of doing work for the Commission and on diocesan buildings.

The "envois" of the students at the Villa Medicea, according to the new regulation of the Académie des Beaux-Arts, will be exhibited for eight days during the latter half of the month of October. In the section of architecture M. Esquie, a four years' pupil, has sent a restoration of the villa of Hadrian at Tivoli; M. Redon (third year), a drawing of the actual state, and a restoration of, the Temple of Concorde; M. d'Espouy (second year), a considerable number of water colours, among which are some interesting studies of interior decoration, as well as some details of the Campo Santo at Pisa; and M. André (first year) has sent drawings of the Tomb of Cecilia Metella and of fragments found in the Forum of Trajan. In the commencement of October will be exhibited the forty-five designs sent in for the Troyon Competition. The premium is 1,200 francs, and the successful work becomes the property of the State. The Académie des Beaux Arts has awarded the Jean Leclaire prize of 1,000 francs to MM. Conin and Marcel Berger, pupils of M. Gaudet.

Among other artistic news we may mention the intended transformation of the Arènes de Lutèce into a public square; the discovery at Beaumont-sur-Oise, near Paris, of a Gallo-Roman cemetery; the opening of an Exhibition of Ancient and Modern Engravings in the Galerie Georges Petit, to remain open till the end of November; and lastly, the Commission for two Busts in Marble for the Opera House, that of Flicien David by M. Steiner, and that of Tagliani by Mme. Laure Coutan.

The death is announced of an architect of talent who was little known to the younger generation of the present day, but who had a legitimate reputation at the commencement of the reign of Louis Philippe.—Daniel Bamsé, who has died at the age of 81. He was much occupied for the Monuments Historiques, and to him we owe the restoration of the Palais de Justice of Beauvais, as well as of many curious churches, such as that of Saint Vulfran at Abbeville, Notre Dame de Noyon, the Church of St. Biquier, that of Senlis, &c. He was also a very learned writer, who has left numerous works, among which we may mention a general history of architecture, a dictionary of terms used in architecture (in four languages), a history of "Monuments, Anciens et Modernes," a monograph of the Cathedral of Notre Dame de Noyon, &c., &c. He was, in every acceptation of the word, a good man and a conscientious artist and lover of his art.

P.S.—The departure of the Ministre des Travaux Publics for England is announced, accompanied by the Directeur des Chemins-de-Fer. They are to visit successively Liverpool, Glasgow, and Edinburgh, and the London Docks and the Metropolitan Railway. The moving cause of the expedition is understood to be the question of the Paris Metropolitan Railway, which must come before the Legislature again during the ensuing Session.

**Heavy Lightning**—Lord Grimthorpe, a propos of lightning conductors, with his customary courtesy, writes to the *Times* of his opponent's (also a correspondent to the leading journal) desire to "display his own smartness," and speaks of that opponent's opinions as "mere nonsense, due to his ignorance." He concludes, "If he wants the last word, he is welcome to it." Lord Grimthorpe's last word (if really the last) is preferable.—*Punch*.

**Removal**.—Mr. Henry Bassett, parquet-floor manufacturer, has removed from 18, Wells-street, Oxford-street, to new and more commodious premises, 89, Charlotte-street, Fitzroy-square, W.

#### FURTHER NOTES ON THE SANITARY EXHIBITION AT BOLTON.\*

We conclude our notes of the exhibition now being held at Bolton under the auspices of the Sanitary Institute of Great Britain.

Messrs. Casebourne & Co., of the Cement Works, West Hartlepool, exhibit (Stall 6) specimens of cement and concrete in their various applications, and one of Fajja's patent cement-testing machines. The next Stall (7) is that of the Bolton Paint Company, Limited, who have on exhibition some pigments of good colour, together with dryers, varnishes, brushes, and painters' tools generally. The Asbestos Fireproof Paint Company (Stall 8) exhibit the applications of their material; and some floral panels, stated to be executed with it, seem to show that it is capable of being used in any colour, so that in skilful and artistic hands the best results may be obtained. The Buttermere Green Slate Company, of Keewick (Stall 9), show a piece of roof covered with their slates, which are admirable in texture and colour. At the next Stall (No. 10) the Ball Hill Fire Clay Company, Darwen, exhibit some very good white and coloured enamelled bricks.

Hardie's furnace for burning town refuse is shown in model and by drawings on Stall 13. To describe it in detail would take up more space than we can here devote to it, but the inventor claims that by its use the materials to be burnt are dried in a close chamber, the noxious vapours and gases generated being drawn through the furnace and there consumed, thus avoiding all nuisance. Mr. Hardie's invention is well worth examination at the present time, when increasing difficulties are felt in the disposal of the refuse of large towns in a manner at once economical and inoffensive. We do not pledge ourselves, without further examination, and without learning the results of practical trials, that Mr. Hardie has solved the problem, but he has, at any rate, contributed some suggestions towards its solution.

At Stall 14 is exhibited a model of a double ash-closet, submitted by the Scavenging and Sewage Committee of the Borough of Bolton as a suitable apparatus for use in Lancashire towns where there is no water-carriage system of sewerage, or where water-carriage is only in partial operation. The model represents what appears to be a very simple and effective apparatus. At the next stand, Messrs. James Duckett & Son, of Burnley, exhibit what they call their patent "self-acting water-closet," which is entirely flushed with waste-water. It is only applicable to situations on the ground floor or in the basement, and when it is located on the ground-floor, the "pan," which is oval on plan and vertical in section, is two or three times as deep as the ordinary hopper, in order, while keeping the normal height of seat above the ground-level, to get the trap at a sufficient depth to be flushed by the waste water from slop-sink and yard. No arrangements are made for flushing the sides of the deep vertical oval "pan" which we have described, but it could probably be cleaned by other means when necessary. In the arrangement which would be most often found practicable, the inventor leads the sink-pipe through the house-wall and discharges it over a grid which covers the tilting-box or chamber, which is in stoneware. Inside this tilting-box is the tilting-tank, a scoop-shaped vessel, also of stoneware, nicely poised on brass or gun-metal trunnions so as to tilt and discharge its contents when full, and to immediately return to its position for re-filling. The liquid discharged by the tilting-vessel passes along a trapped stoneware drain-pipe laid at a fall beneath the yard, and so enters the trap at the bottom of the closet "pan" before described, and flushes it. The surface-water from the yard, as well as the rain-water from the roof, is made to pass through the grid and tilting-tank, and so all available waste-water is made use of for flushing the closet: but there seems to be no provision for catching grease and solid matters coming from the sink, the presence of which might create in time a stoppage in the trap under the w.c. A useful little detail connected with this appliance consists in the brass bolts and nuts which, while effectually preventing the removal of the grid by children, readily permit of its removal when it is necessary to examine the tilting chamber or tank. Other closets of this type, though differing in details, are shown by

other exhibitors, but it is hardly necessary to describe them.

Various forms of dry closet are shown, including the British Sanitary Company's earth closet, Morrell's cinder-sifting closet apparatus and cinder-sifting dustbin, Nicholl's antiseptic sanitary closets, and Monie's earth-closets, all of which have been frequently described and are well known to our readers.

At Stall 20 the International Water and Sewage Purification Company (Limited) exhibit a section of their magnetic spongy carbon filter as used at the Acton Sewage Works, recently referred to at some length in our columns.

Close by (Stall 80), Mr. J. W. Lovibond, of Salisbury, exhibits a very ingenious instrument which he calls the "Tintometer," which is used not only to determine the colour of water, but is capable of use in a variety of industries,—brewing, dyeing, and bleaching among others. The water of the Croal shows very badly under the test of this instrument. Those of the Irwell and Thames are not shown.

In the annex to the Drill Hall there are only one or two exhibits of any interest to our readers. The most notable of these are the "Control Air-propeller," shown by the Control Air Propeller Company, and a very well devised inlet for warm and moist air,—a necessary condition for work in cotton-mills.

While speaking of ventilators we may mention that the Æolus Water Spray Company have, as usual, a very good display of their varied and efficient appliances for warming and ventilating.

Messrs. C. Kite & Co., of Chalcot-street, exhibit their admirable under-roof ventilators and their excellent silent automatic counterpoise ventilator, of the merits of which we have spoken on previous occasions. The latter apparatus is noiseless in action and extremely sensitive, and is now being adopted for the inlets to drain-ventilating pipes, in order effectually to prevent unpleasant consequences (where such inlets are near to windows) in the event of a reversal of the direction of the current of air in the pipe.

Messrs. J. Wright & Co., of Westminster-chambers, exhibit their now almost indispensable fireproof fixing-blocks, of which the latest application is their use as floor joists,—the "fixing-blocks" when so applied taking the form of continuous lengths of the material of which they are made embedded in or keyed into the concrete, the floor-boards being nailed direct to the continuous fixing-blocks thus provided. A specimen piece of floor so constructed is shown by the exhibitors.

Mr. C. H. Sidebotham (Stall 22) exhibits some useful sanitary fittings, but the pedestal closet in stoneware, to be flushed by waste water by a tipping arrangement, does not appear to be by any means perfect. A novelty, shown by this exhibitor, is Wright & Sutcliffe's "Hair-dressers' Complete Hot-Water Apparatus," which contains in the centre a hot-water boiler, with receptacles for hot-water and soap and brush-holders for three customers at a time. The hot-water receptacles are fitted with wastes, and altogether the apparatus is exceedingly compact and convenient.

Mr. R. Guerdon and Messrs. James Vause & Son are large exhibitors, but the articles and appliances they exhibit are, for the most part, those of other makers, and are very well known.

We have now touched upon most of the principal typical exhibits in the departments in which our readers are most fully interested. But Class IV., "Personal Hygiene, Foods, and Disinfectants," is an exceptionally large and interesting one.

We gave a list of the awards in our last. The exhibition will, as then stated, remain open until the evening of Saturday, October 15.

**Changes at the Local Government Board.**—We have reason to believe that, in fulfilment of a recent Treasury minute of reorganisation, some considerable changes will soon be effected in the engineering and medical staffs of the Local Government Board.—*Sanitary Record*.

**Stables at Folkington Manor.**—In our notice of this mansion, which we illustrated in our last, it should have been stated that the fittings of the stables were supplied by Musgrave & Co. (Limited), of New Bond-street and Belfast. They embody all the latest improvements in such fittings.

\* See *Builder*, p. 423, ante.



The above clauses provide ample means for recovery of the cost of construction of such works as bring the supply into the houses or to stand-posts, whether such supply is obtained by a Rural Sanitary Authority direct or by agreement with a neighbouring Authority or water company. Nothing in these sections, however, provides for cases in which the geological formation or altitude of houses to be supplied prevents the supply of water by means of pipes, either to stand-pipes or into houses. Section 3 of the Public Health (Water) Act, 1878 (framed upon the evidence given before Mr. Alexander Browne's Committee), was intended to deal with cases in which the supply can only be obtained by draw-wells or hand-pumps; but this section has, it appears to me, not been used to the extent which might have been expected, on account of the opposition generally found in rural districts, based on the objection on the part of a ratepayer well supplied with water in one part of a parish to pay for the sinking of wells or fixing of pumps for the benefit of others, perhaps several miles distant. It is true that the framers of the Act in question foresaw this difficulty, and apparently intended that Sub-section 5 should meet it. Sub-section 5 is as follows:—

"Where the owners of two or more houses have failed to comply with the requirements of the notices served on them under this section, and the Authority might under this Act execute the necessary works for providing a water supply for each house, the Authority may, if it appears to them desirable, and no greater expense would be incurred thereby, execute works for the joint supply of water to those houses, and apportion the expenses as they deem just."

In Section 3 power is given to cause works to be executed (wells to be made) at a cost not exceeding 8l. 13s. 4d., or, in certain cases, 13l. for each house. If water were in all cases sufficiently near the surface to enable a separate well for each house to be sunk for this sum, there would be no difficulty in recovering it by means of a rate of 2d. or 3d. per week on the property benefited. But it is precisely in such districts that a sufficiency of wells (though not necessarily pure) already exists.

It is for cases in which the wells have to be 60 ft., 100 ft., or more in depth, that the power of charging the cost on the property benefited rather than on the whole parish is desirable. At first sight nothing would appear easier than to deal with the matter as follows under Sub-section 5.

Suppose there are ten houses sufficiently near together to use one well, and that such well be made and provided with a pump, or windlass with bucket, chain, &c., at a total cost of 130l. If each house-owner paid 13l., or 3d. per week (Section 3), a water-supply for these ten houses would be provided at the cost of those benefiting from it, without increase of rates, or those receiving no advantage from it, and dwelling perhaps miles from it. For reasons which I do not propose to discuss, Sub-section 5 is not so read, the result being that works are seldom carried out under this section,—a thing much to be regretted, as I believe that much of the opposition which retards, and in some cases prevents entirely, the adoption of some form of public water supply, would be withdrawn if it were possible to work under this section. I do not venture to suggest any special alteration or modification in the wording of this section, but I have drawn attention to the matter, as I believe it to be one with which the future of village water-supply is closely connected.

**A Perpetual Calendar.** We have received from Messrs. Gordon & Gotch, the publishers, a "Perpetual Dial Calendar," consisting of two cards, turning on the centre, one over the other, and so arranged as to give the day of the week for any date from the year 1753 to the year 2005. It is ingenious, though the only practical advantage of such a thing is when it is required to find the day of the week for a date either far back or far in advance of the existing year, which it is some times necessary to do.

**University College Architectural Lectures.** "Education, Cultivation, and Examination" is the comprehensive title selected by Professor Roger Smith for the opening lecture of his courses at University College, to be delivered at half-past seven on Wednesday next, the 5th of October. The subject will, of course, be treated mainly as it bears upon the study of architecture. The classes will begin the following week.

#### ARCHITECTURAL ASSOCIATION VISITS.

THE last vacation visit of the Architectural Association was made on Saturday, the 24th inst., to a house in Cadogan-place, built from the designs of Messrs. George and Peto. The exterior is a picturesque treatment of Flemish character, built with red brick and buff terra cotta. The entrance lobby is arranged with a mezzanine boudoir, which is approached by a separate staircase from the hall and opens out into the drawing-room with an arched, forming a kind of gallery. The drawing-room has a very rich plaster ceiling; the staircase is framed of oak, wrought all over with carving; the dining-room is panelled with oak, the upper panels being covered with carving; the billiard-room, over the dining-room, has an open timber roof of oak with a lantern light, a charmingly sunny effect being given by covering the lantern with silver and bronze lacquer; the boys' room, off the billiard-room, is to be panelled throughout. The whole of the house is arranged with a double system of electric and gas lighting, the electricity being generated under the stable by a dynamo and eight-horse-power gas engine. The stables, which are in the rear of the house, and are fitted for eight horses, can be reached by a passage from the dining-room, a very ingenious piece of planning. The entire house is full of the most piquant and picturesque features, and is certainly the most interesting and complete specimen of a modern town house that the Association has visited. The interest felt was evidenced by the large number of members who attended the visit.

#### Illustrations.

#### DECORATIVE PAINTINGS FOR THE CHURCH OF ST. GREGORY, SUDBURY.

THE designs published in this number are to be painted as wall decorations in this church; they are designed by Mr. Aveling Green, and are to be executed in spirit fresco. The figures are life-size. The following brief notes on the history of the church and neighbourhood, for which we are indebted to Mr. Green, may be of interest:—

The town of Sud- or South Bury was the principal borough of South-east Anglia as far back as A.D. 797, when "The Anglo-Saxon Chronicle" mentions the death of Bishop Alfrin at Sudbury. About the year 970 Atheric founded a hospital, giving a moiety of Northoe to St. Edmund's Bury and the other to St. Gregory's, Sudbury. Not long after this the Lady Ethelica, widow of Bethnoth, Duke of East Anglia, bequeathed the land at Wealdings, Felder (Waldingfield) to St. Gregory's Church, Suthyngensis (Sudbury), as her sister had desired on her death-bed. This Count Be(r)thnoth most bravely resisted the Danish invaders, and was killed in battle at Maldon, in Essex, and buried at Ely Abbey. His widow also helped to found the Abbey at Ely, and gave a fine piece of tapestry on which she had worked her husband's exploits. In Domesday Survey St. Gregory's is said to possess fifty acres of land and fifty of meadow. The Manor of Sudbury, with many others was conferred by William I. on Richard de Clare, afterwards Earl of Gloucester and Hereford. His first charters were granted by this powerful family. In the reign of King John, Amicia, Countess of Clare, gave this church and its property to the Prioress of Eaton, which grant was ratified by Henry II.

Coming down to the later half of the fourteenth century we are probably contemporary with the present building, for it was purchased from the Nuns of Eaton by Simon de Sudbury, afterwards Lord High Chancellor of England and Archbishop of Canterbury, and finally beheaded by the rabble of Wat Tyler's rebellion in 1381.

The present church is mostly in the Early Perpendicular style, and has a very fine tower with a peal of eight bells. It underwent large alterations in pre-Reformation times. The chancel arch is of an earlier date than the piers which support it, and has been spread open to suit its present position. Simon raised the roof of the nave and built the clerestory. The north arcade belongs to A.D. 1350, and the south may be as late as 1530. The fine chancel, with its lofty Perpendicular windows, is 62 ft. long by 21 ft. wide. Its size and length and noble altar may be due to the fact that Simon

of Sudbury established close by the church a College of Secular Priests on the ground where his father's house stood, now occupied by the Union House. The twenty oaken "Misereere" stalls still retain their original position. The church contains a remarkably fine font-cover of rich tracery and tabernacle work, over 12 ft. high, richly painted. This church had fallen into very serious decay, and thirty years ago was closed as being dangerous, but it has been gradually restored to something like its pristine glory under the guidance of Mr. Butterfield, freely and generously given. The area of the church is mainly seated with chairs and every seat is free.

#### "PROPOSED CHURCH OF ST. MICHAEL."

This church was designed to be built of stone throughout, and upon ground sloping, so that the eastern chapel would be on a lower level than the rest of the church. Steps from the chancel aisles would lead to a passage under the higher level of the chancel, and so in to the chapel, which would also have an external door.

The drawing from which it is taken was exhibited at the last Royal Academy Exhibition. The author does not give us any information in regard to the locality of the building, and we therefore publish it as an Academy exhibit, with the title under which it was accepted at the Academy.

#### ALL SAINTS CHURCH, SOUTHBEND-ON-SEA.

The church, of which a view is given in this number, is built of red brick both inside and out. The roofs are covered with Broseley tiles of a purple tint. The accommodation, when complete, will be for 468. The church is seated with chairs. All the roofs inside are boarded on the face of rafters, and ribs planted on the face of boarding, and spaced out into different panels for future decoration. This is done on account of the gun-firing in the neighbourhood, which would bring down the plaster from the roofs. The architect is Mr. James Brooks.

#### THE MONUMENT TO THE LATE MR. WHICHCORD.

We give this week a view of this monument in Kensal Green Cemetery, referred to in our last issue, which has been designed by Mr. H. R. Robson, to the memory of the late Mr. WhicHCord, Fellow and Past-President of the Royal Institute of British Architects.

#### FOUR SOMERSETSHIRE TOWERS.

The four towers shown here are reduced from measured drawings by Mr. J. Gerhardt Tiarke. They are good examples of the architectural characteristics of this class of towers.

#### NORTH PORCH, HARFLEUR.

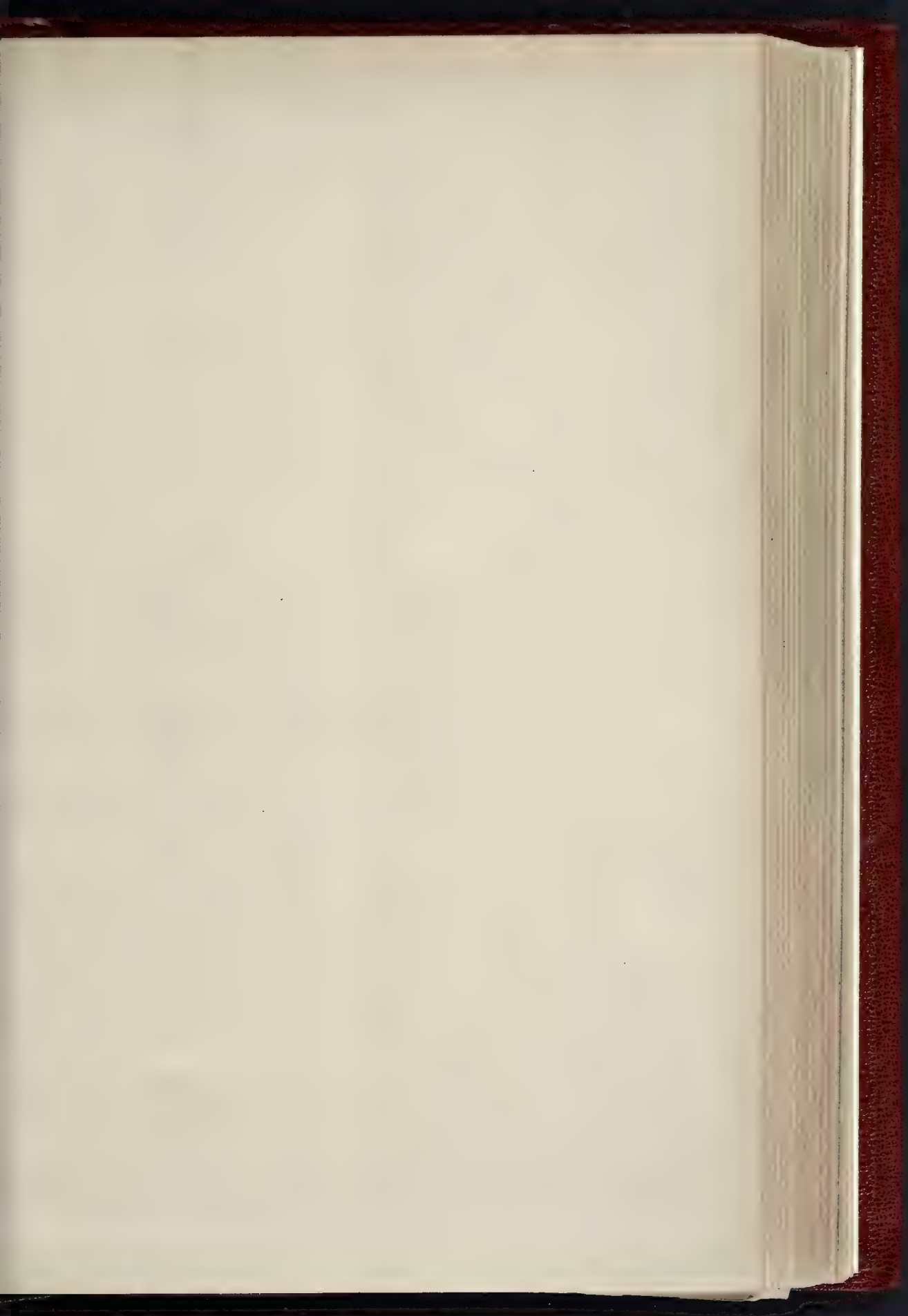
THE town of Harfleur, as every one knows, is situated a few miles from Havre, and was formerly the chief port at the mouth of the Seine, but, owing to the silting up of the channel, it has been left high and dry, and Havre has taken its place. The town was taken in 1415 by Henry V., after a forty days' siege, and the tradition is that Henry vowed to erect a church in memory of his triumph.

The north aisle of the church, with its fine porch, of which we give a sketch, and the tower, were probably erected in pursuance of this resolve. The body of the church has suffered so much from repairs and decay, that its interest has been nearly obliterated. There are some good timbered houses round about, and the whole place is delightfully picturesque.

F. W.

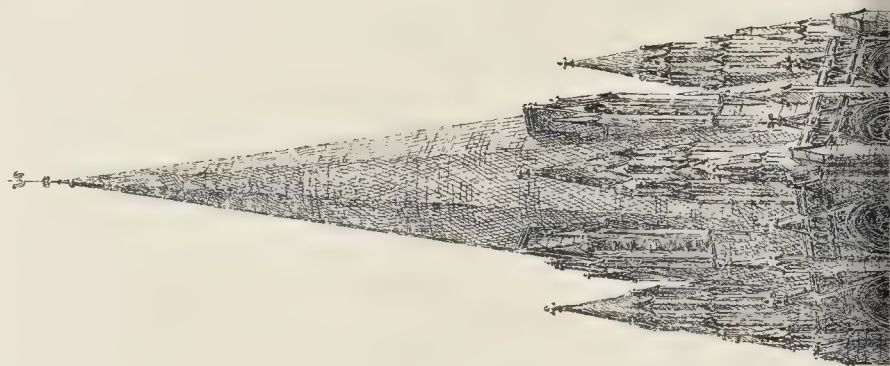
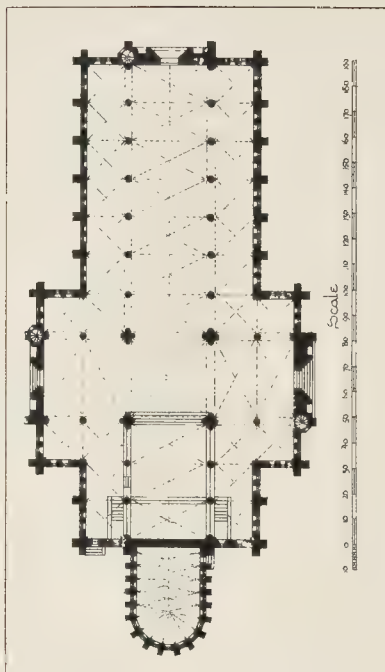
**Surveyorship, Tiverton.**—On Wednesday, the 21st ult., Mr. John Siddalls, Surveyor and Inspector to the Brownhills Local Board, was elected by the Tiverton Town Council to the office of Borough Surveyor, at a salary of 225l. per annum.

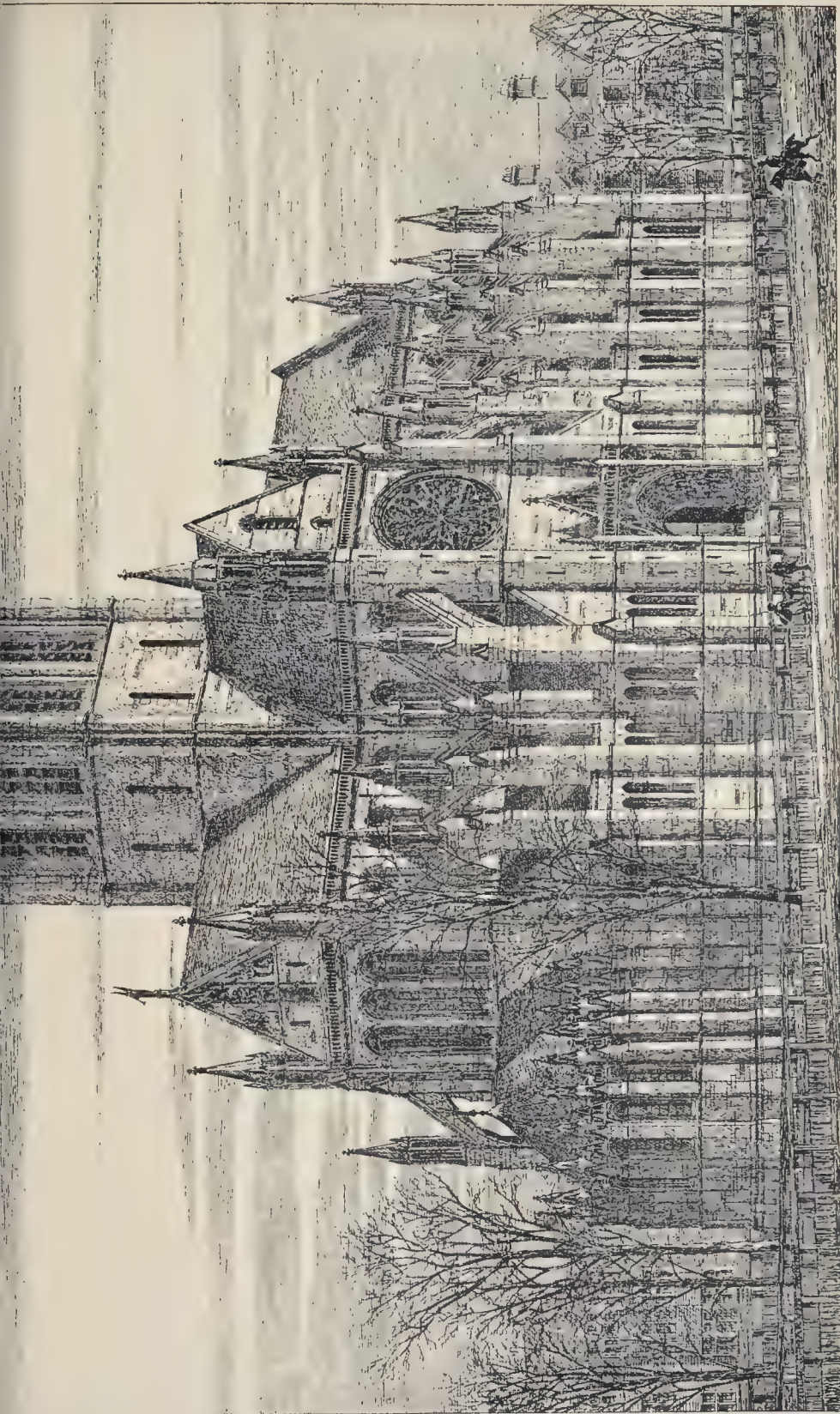
**Balusters and Newels.**—Messrs. Carter & Aynsley send us a volume of designs of balusters and newels kept, we presume, in stock. They do not show anything new or original, but may be useful to select from when it is not deemed necessary to go to the expense of making such things from special designs.





THE BUILDER, OCTOBER 1, 1887.



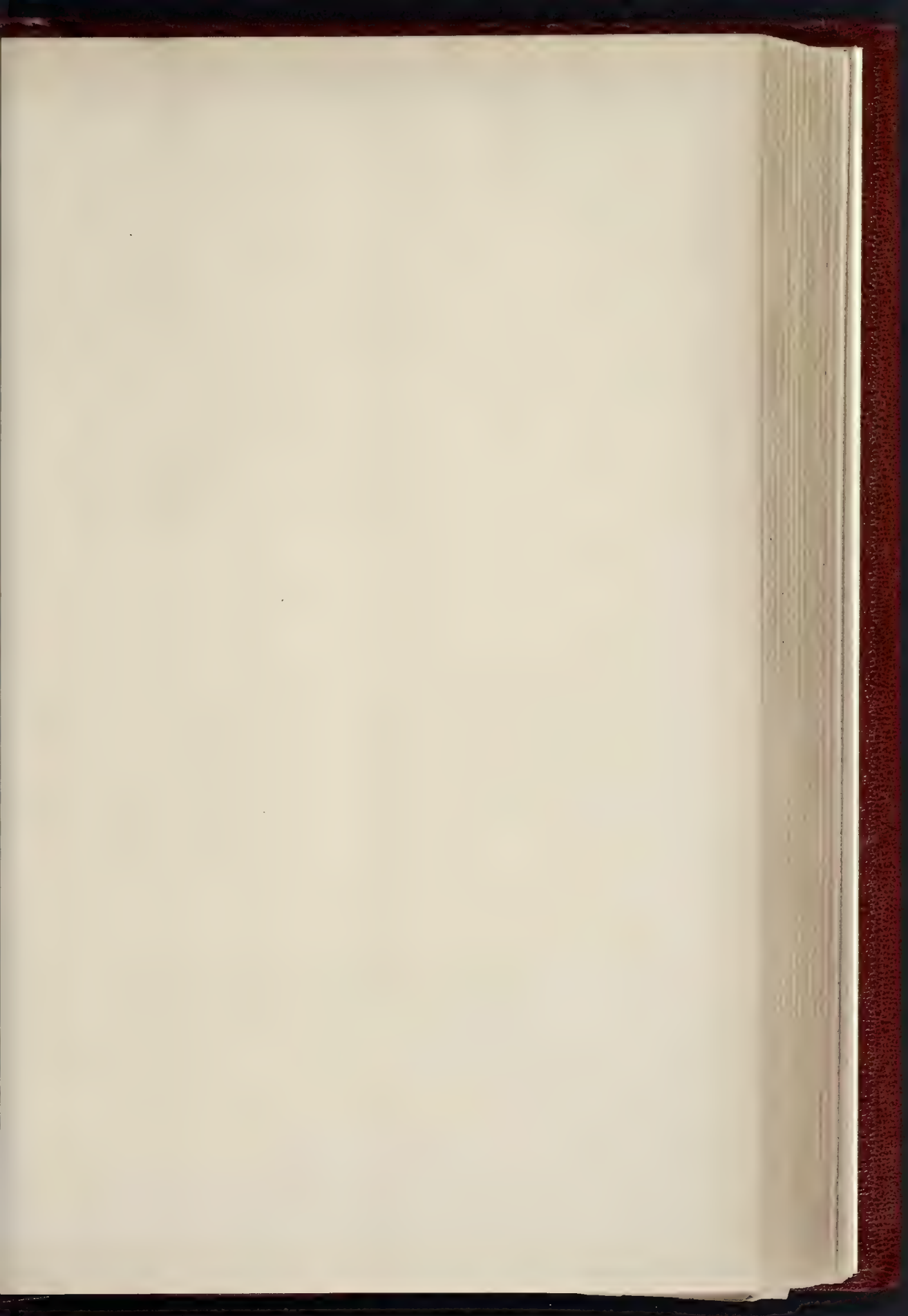


CHURCH OF ST. MICHAEL.—MR. P. J. MARVIN, ARCHITECT.

PLATE 1. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.



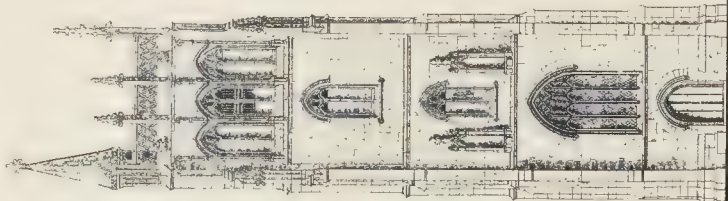






THE BUILDER, OCTOBER 1, 1887.

Church of St. James,  
Worcester.



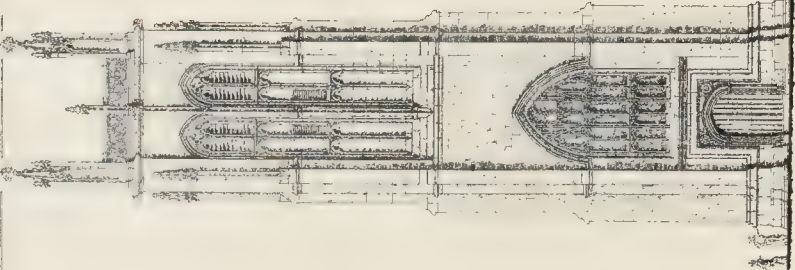
West Elevation of Tower.

Designed by G. A. Paget, Architect, Worcester.  
and executed by Messrs. G. A. Paget & Co., Worcester.  
1887.  
Scale of feet.

Half ground plan



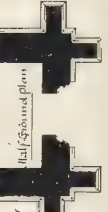
Church of St. James, Worcester.



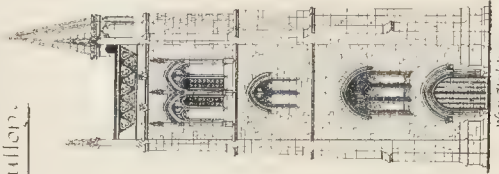
West Elevation of Tower.

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1887.  
Scale of feet.

Half ground plan



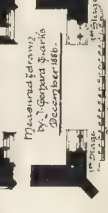
Church of St. Mary,  
Hull.



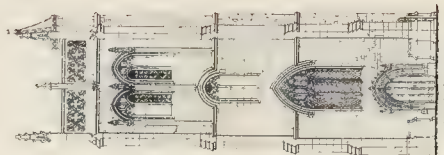
West Elevation.

Designed by G. A. Paget, Architect, Hull.  
and executed by Messrs. G. A. Paget & Co., Hull.  
1887.  
Scale of feet.

Half ground plan



Church of St. Augustine,  
Leeds.



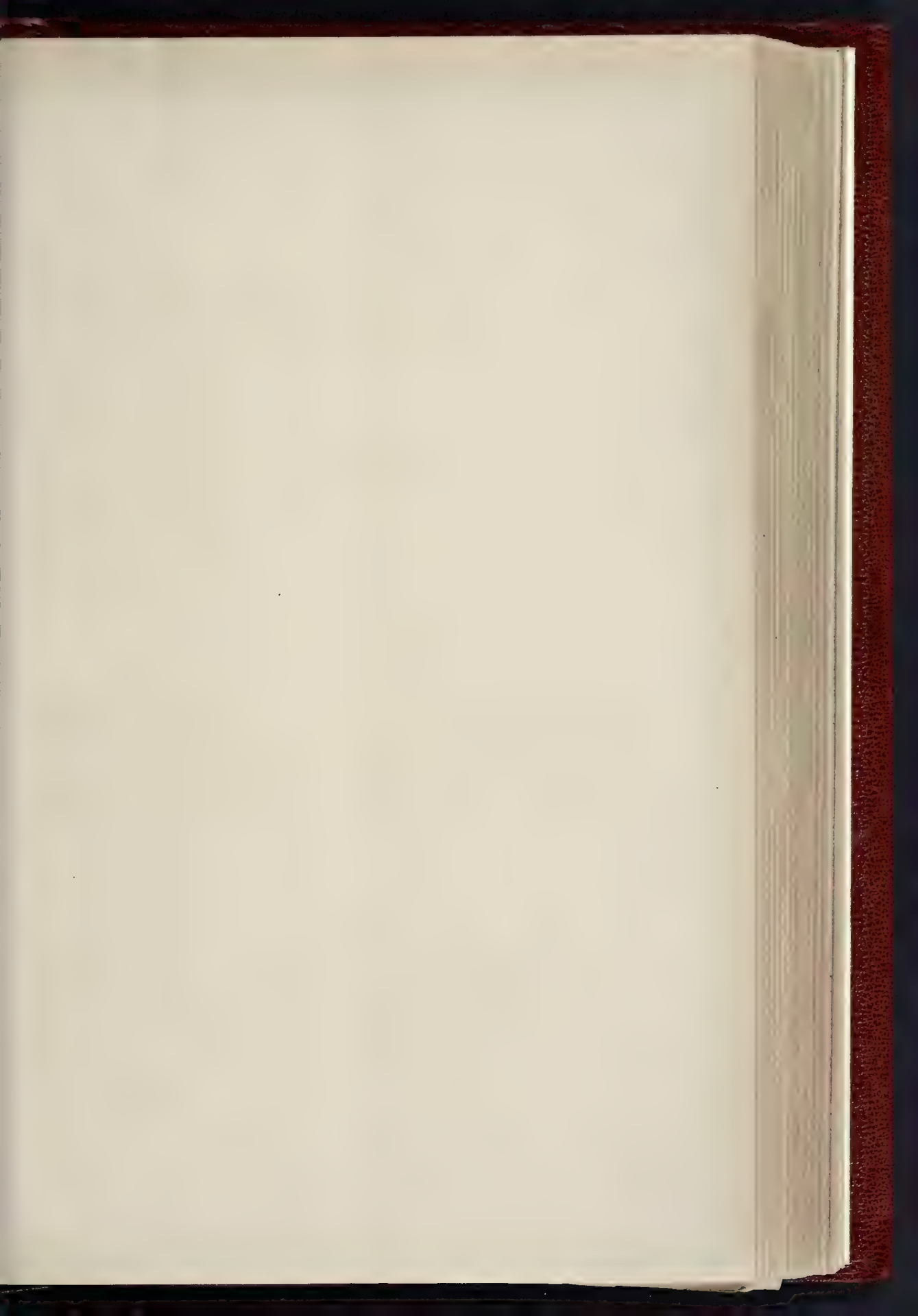
West Elevation.

Designed by G. A. Paget, Architect, Leeds.  
and executed by Messrs. G. A. Paget & Co., Leeds.  
1887.  
Scale of feet.

Half ground plan

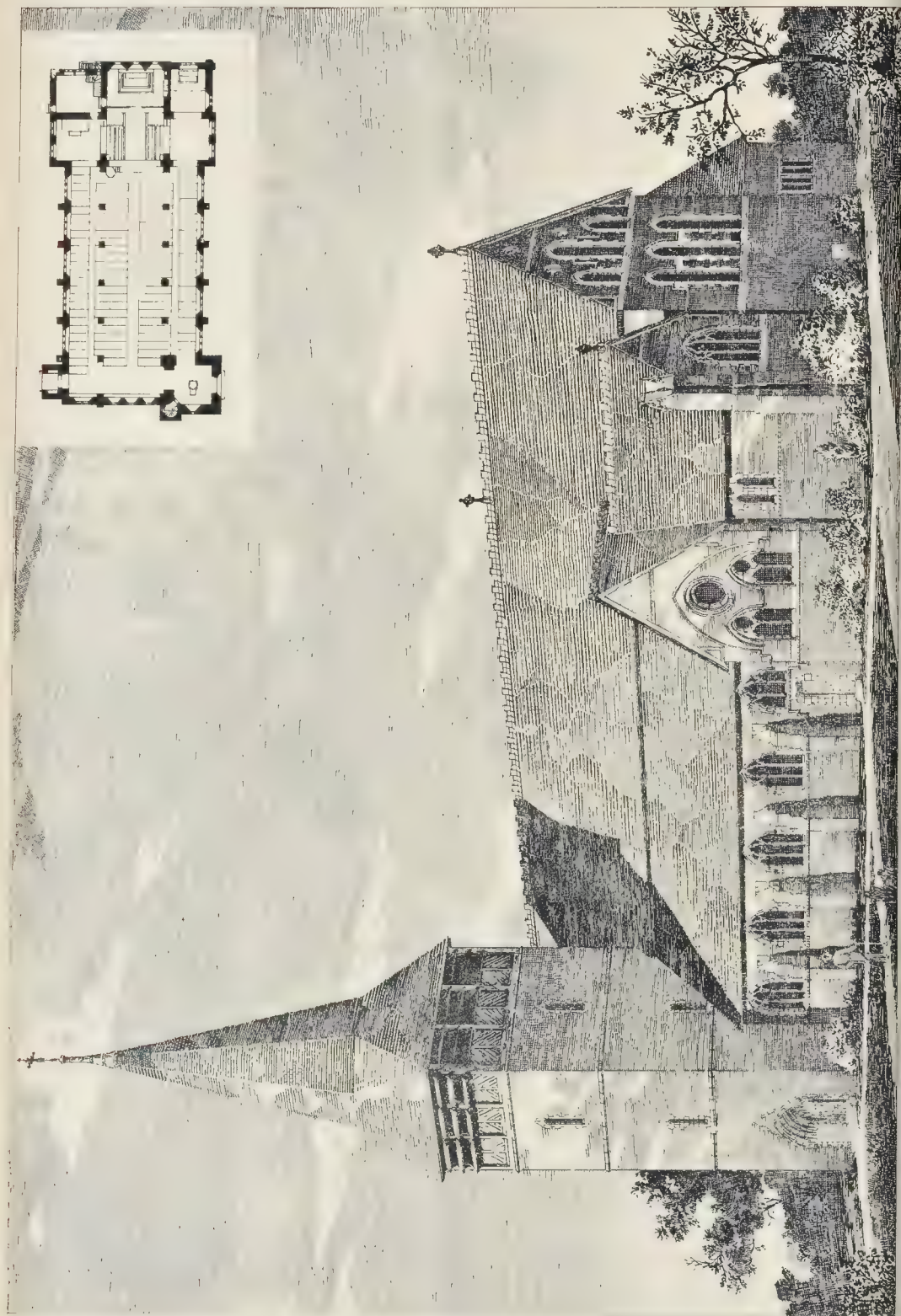


# Illustrations





THE BUILDING, OCTOBER 1, 1887



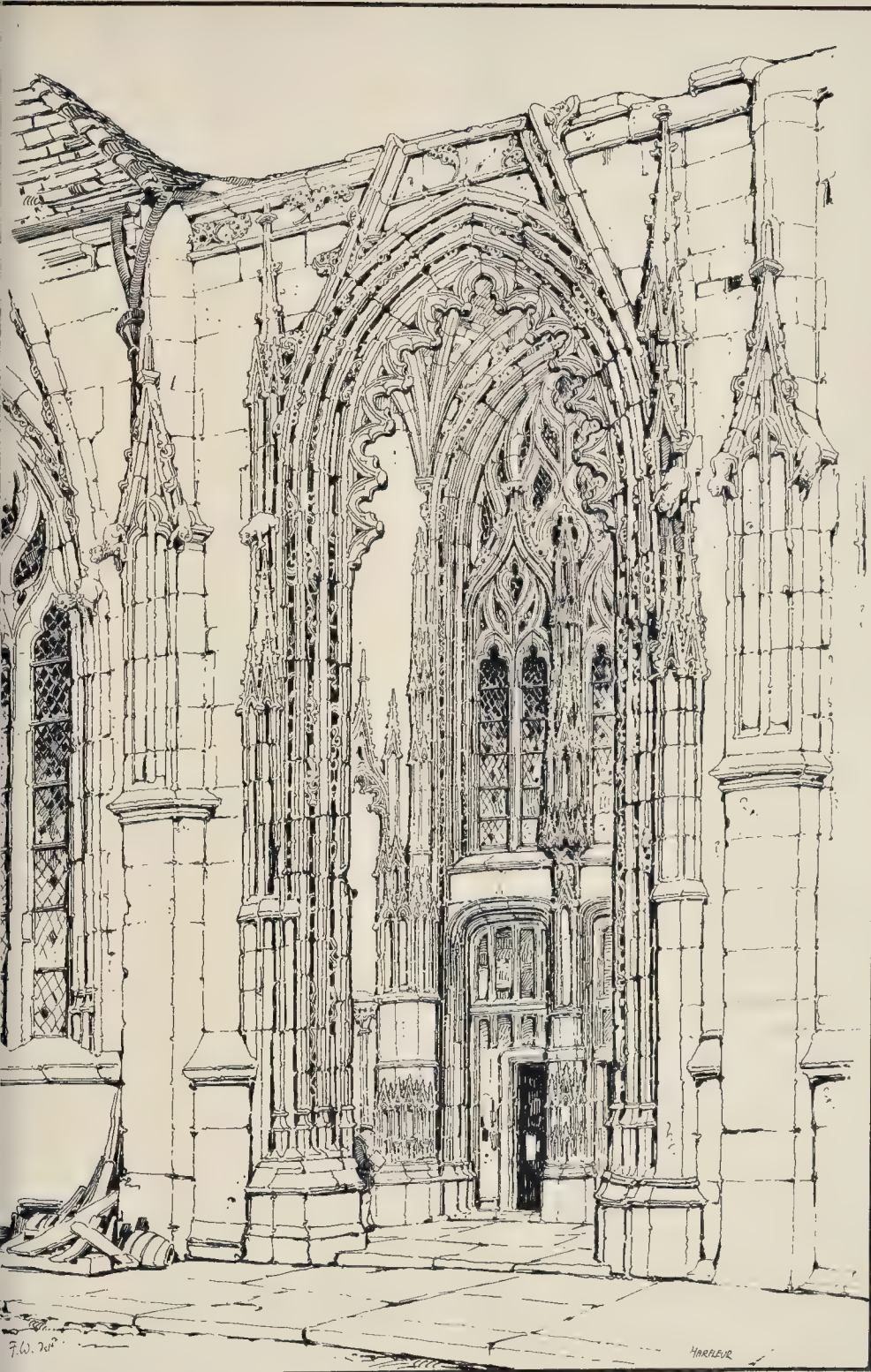


PHOTOGRAPH BY SPRAGUE & CO. 25 NASSAU LANE, LONDON, E.C. 4.

MONUMENT TO THE LATE J. WHICHCORD P.R.I.B.A.—DESIGNED BY MR. E. R. ROBSON, F.R.I.B.A.



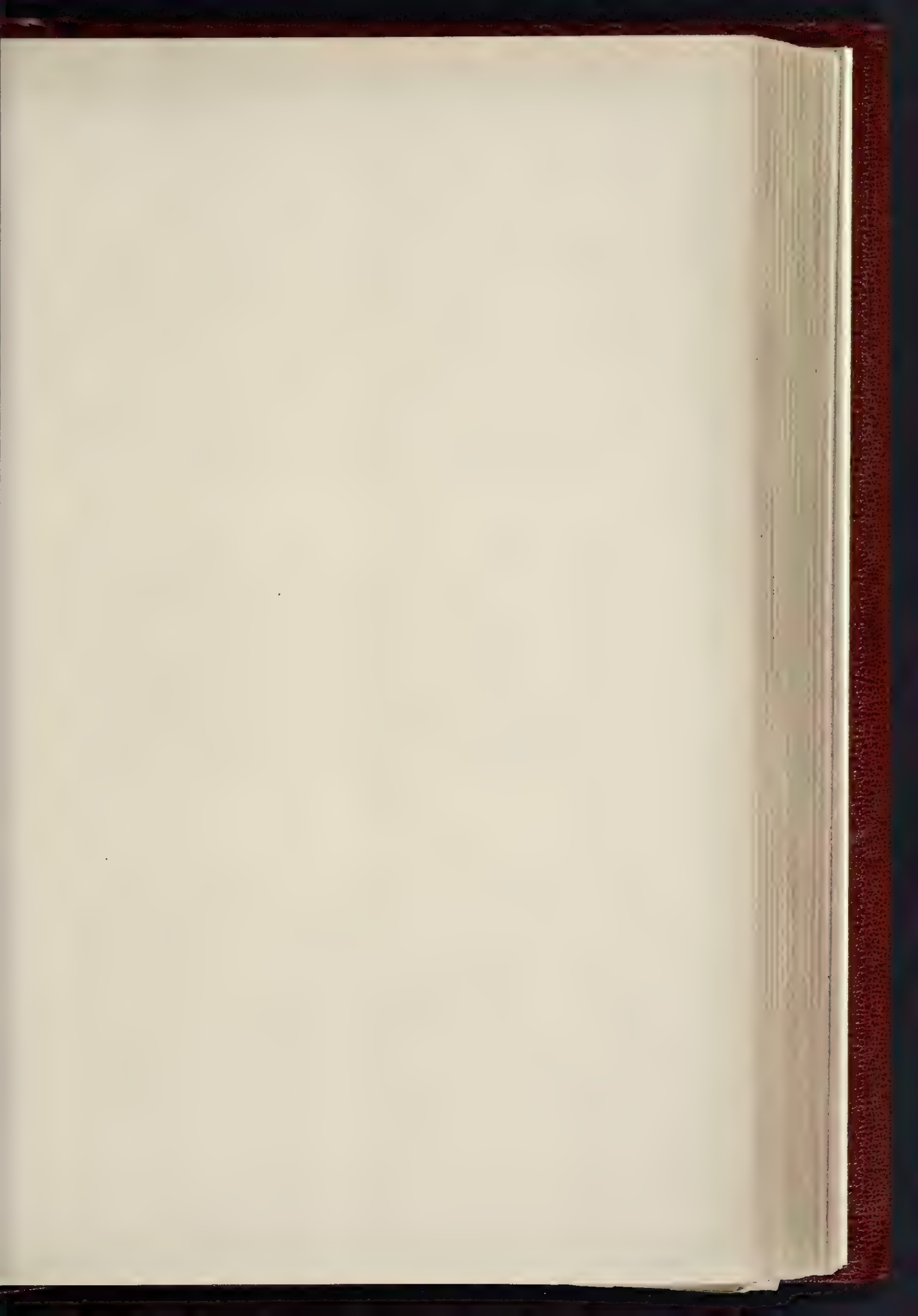




NORTH PORCH OF CHURCH AT HARFLEUR

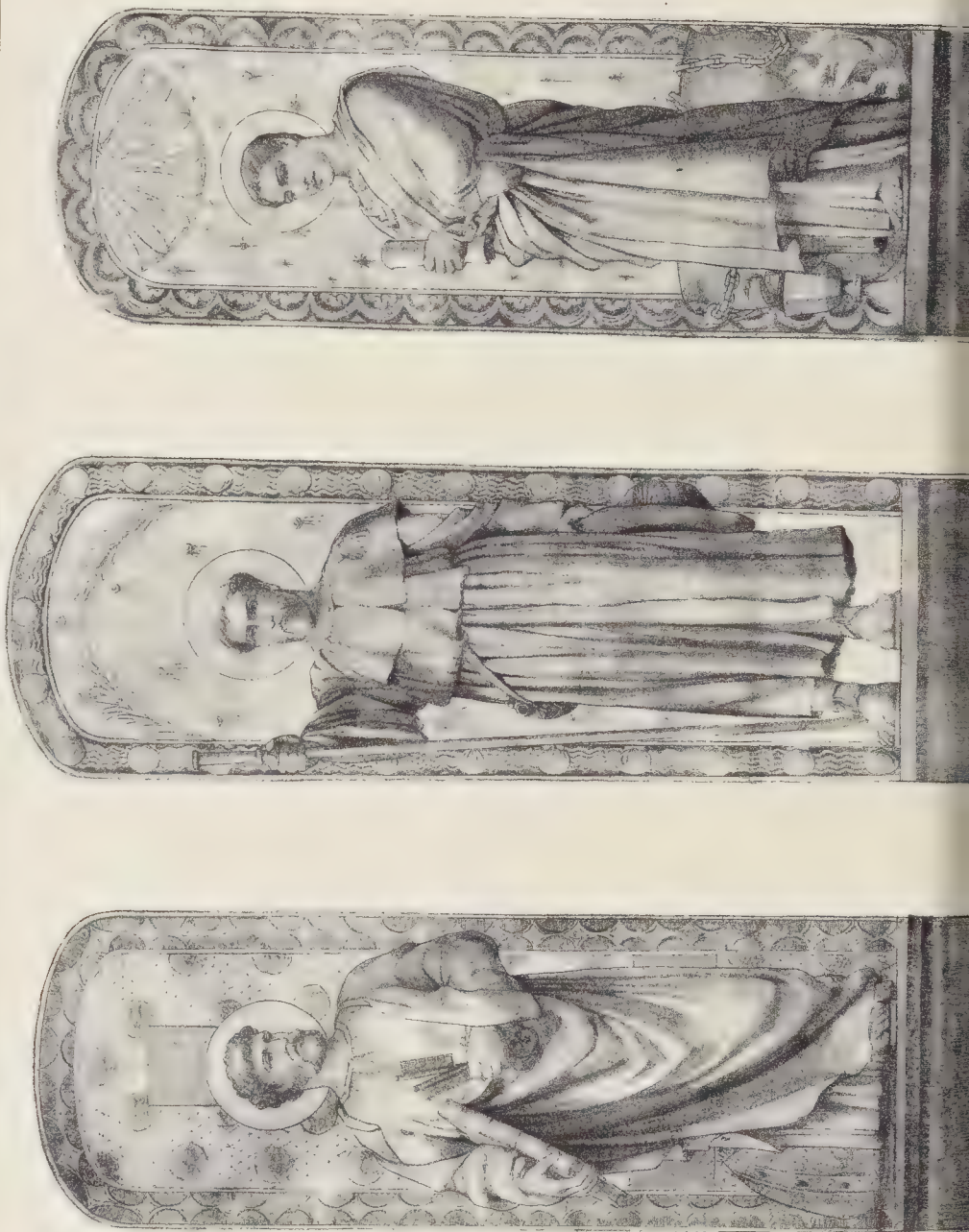








THE BUILDER, OCTOBER 1, 1887.





ST. JOHN BAPTIST.



ELIJAH.

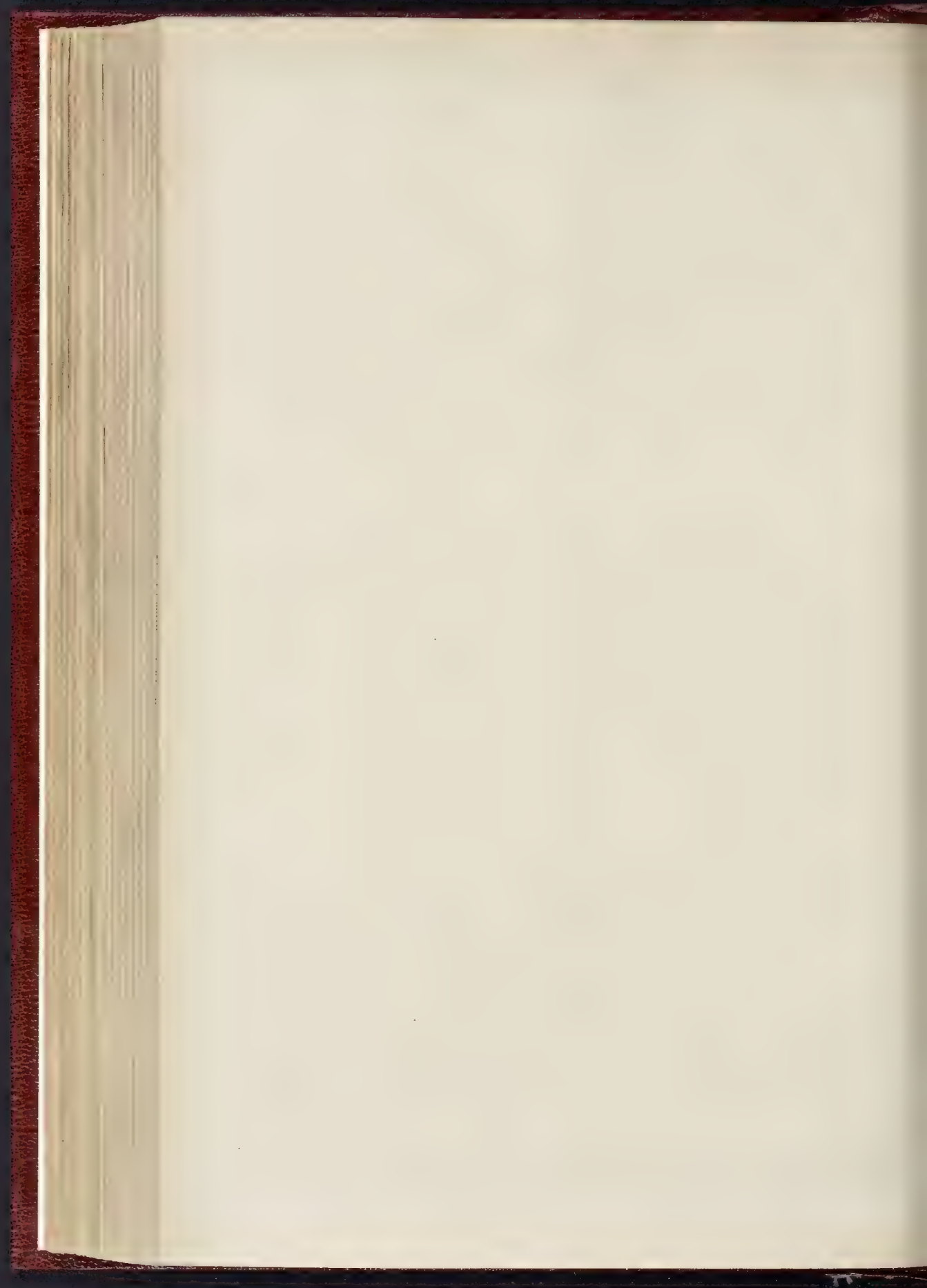


MOSES.

THE PHOTO. FRANKLIN & W. J. HART, N. Y. LANE. ANSON ST., N. Y. C.

FRESCOES AT THE CHURCH OF ST. GREGORY, SUDBURY, SUFFOLK.—DESIGNED BY MR. AVELING GREEN





# THE "SANITARY REGISTRATION OF BUILDINGS BILL, 1887."\*

As the Sanitary Registration of Buildings Bill, 1887, has received a good deal of attention in some quarters, while its importance as affecting householders seems to have been lost sight of by those most interested in its provisions, a few remarks on what is proposed to be effected by the Bill may not be inopportune. The object of this Bill is stated to be the compulsory registration of the sanitary condition of all buildings used for certain specified purposes, and the voluntary registration of any other buildings.

A very strong feeling exists, it is thought, that the general sanitary condition of buildings is not what it should be, and as there is at present no means, short of having the building inspected by a professional man at some expense, which enables an intending occupier to know anything of the sanitary condition of the house he proposes to rent; and as, in the case of hotels, asylums, and other buildings of this description, even this protection is not afforded, for it is obviously impossible for every visitor to an hotel, every father who sends his son to school or college, to have the sanitary condition of such buildings examined; it is, therefore, thought that if the owners and occupiers of such buildings could be obliged or encouraged to have their properties inspected, and these inspections registered, such an arrangement would give confidence to the public, and would be of general advantage, both to the users of the buildings and to the owners and occupiers; and it is hoped that when these advantages become apparent, owners of houses not included in the list of those which must be registered compulsorily, would see that it is to their advantage to have their properties registered, and would voluntarily take the same course.

Should it be found possible to draft a Bill which would effect this change in the liability of owners, and oblige them to be able to show the satisfactory sanitary condition of their property at any time, and to do this in a simple and efficacious manner without throwing any undue burden on any person or class of persons, it seems pretty clear that a public benefit would be the result. But whether the Bill lately before Parliament would have the desired effect, or would in itself be a public benefit, may be doubted; and the writer is of opinion that the objections to it, as at present drafted, are many and serious, and it is with them that he now proposes to deal briefly.

The Bill provides that hotels, schools, colleges, hospitals, asylums, and lodging-houses shall be put in a satisfactory sanitary condition and registered; but if it be necessary that these buildings should be certified by a licentiate in sanitary practice, it is equally, if not more, necessary and important that boarding-houses, restaurants, bakeries, butcheries, dairies, and places of whatsoever description where food is collected, stored, or manufactured, and whence it is distributed, should come under the same category. The first-named places are all more or less subject to publicity in cases of illness or epidemic, but how much evil may result from faulty sanitation in the latter, who can say? To trace any illness arising from bad drainage in the buildings named in the Bill is comparatively easy, in those indicated by the writer exceedingly difficult; yet these latter are entirely omitted from the provisions of the Bill.

The Bill is one of registration only; and although the Local Government Board is specified as the authority under which the Bill should be put in force, if it be enacted, no power is given to that body beyond the registration of the acts of the Licentiates in Sanitary Practice, who, so long as they act up to certain very vaguely defined requirements specified in Clause 10, have a free hand and are answerable to nobody, and do not draw their power to act from any authority save that of the Bill itself, and their own ability to obtain a certificate or licence. This seems to be rather an invidious position for a Board entrusted with the supervision of sanitary matters, and as registering machinery only is required, the writer suggests that such machinery already exists in the

persons of the Registrar-General and his Registrars of births, deaths, and marriages; and that this machinery might be used with less friction and to more advantage than that indicated in the Bill.

It is left an open question in the Bill as to who shall bear the expense of the alterations rendered necessary by its provisions, and it may be inferred that, as the occupier would be the person who would have to pay the penalty if the work were not done, and as he would be more easily reached than any other person, he would be made to bear this cost. This does not seem to be just, as, if there be an obligation on the part of somebody, as is certainly implied by the existence of this Bill, that buildings should be in a sanitary condition, such obligation must surely rest with the owner of the building in question; it is, therefore, suggested that it should be a provision of this or any similar Bill, that the occupier should have power to recover from the owner in the same or a similar manner as is provided in Clause 97 of the Metropolitan Building Act.

In like manner no provision is made for the localising of the charges which would be incurred in enforcing the provisions of the Act, in printing and forwarding notices, in registering Licentiates and buildings, and in carrying out the necessary examinations; it is, therefore, suggested that fees should be charged for each of these acts, with the exception of printing and sending notices, and that any expense incurred beyond the amount provided by the fees should be supplied by the department of the Registrar-General, and should be under his control.

In the Bill before us, it is provided that (1) Members of the Royal Institute of British Architects, Members of the Institution of Civil Engineers, and Members of the Royal Institute of Architects of Ireland, who are registered in accordance with this Act as qualified in sanitary practice; (2) Architects and Civil Engineers who have been in practice three years at the passing of this Act, and who shall before the 1st day of January, 1890, prove to the satisfaction of the Local Government Board that their practice as architects or civil engineers has been a *bona-fide* one, and has included the designing and carrying out of constructive works; (3) Sanitary associations incorporated by licence of the Board of Trade; (4) Medical practitioners registered as qualified in sanitary science; (5) Persons who are medical officers of health at the passing of this Act; (6) Such other persons as the Local Government Board may consider qualified, shall receive licences in sanitary practice, and that these licences shall be given free of cost to those who come under Sections 1, 4, and 5 of this clause.

What is intended by the words, "who are registered in accordance with this Act as qualified in sanitary practice," and "registered as qualified in sanitary science," is not very clear. If it be intended that Clause 9 is to refer to those after whose designation this limitation is placed, it refers to the members of the three leading institutions, who must be examined by examiners, themselves unlicensed and unregistered, appointed by the respective institutions, before they can receive licences to practise; while architects and engineers who do not belong to any institution have merely to satisfy the Local Government Board of the *bona fides* of their practice and experience. Sanitary associations and medical officers of health are under no limitations at all, and any other persons whom the Local Government Board may consider qualified will receive licences to practise. If this be the true reading of Clauses Nos. 7, 8, and 9, it is so manifestly absurd that it does not require further comment, especially as medical practitioners are required to be qualified in sanitary science, not in sanitary practice,—a very different thing,—and no provision is made by examination or otherwise for their registration as having this qualification.

If the interpretation given above be the true one, then the order of precedence stands as follows:—1. Sanitary associations; 2. Medical officers of health; 3. Such persons as the Local Government Board may consider qualified; 4. Architects and engineers not members of one of the institutions named; 5. Members of the institutions; 6. Medical practitioners.

The highest place in the list is taken by sanitary associations, who, as corporations, have no knowledge whatever of sanitary matters; who do not deal with these things themselves, but

through their subordinates and officials; who are practically exempt from the penal clauses which are introduced for the punishment of those who contravene the provisions of the Bill; and who are, as corporations, simply collections of business men who, by joining forces, are able to employ qualified experts to do the necessary work; and who, again as corporations, are able to advertise themselves, which the qualified expert, who does the work, is by professional etiquette prevented from doing. The claim of any corporation to receive a licence in sanitary practice is so utterly absurd that the writer does not think it necessary to carry the argument further, and presumes that he has failed to attach their true meaning to these clauses.

If, however, it be intended that all the persons mentioned should receive licences, the position is not much better; there are other professional members of the institutions named fully as well entitled to practise in sanitary science as their brethren who have attained to full membership, and they cannot do this as corporate members of these institutions, but must get their licences under Section 2, as other architects and engineers. Sanitary associations still retain an equal position with professional men; medical practitioners may be qualified in sanitary science, but are not, unless in a few isolated cases, in sanitary practice, and are therefore not qualified to inspect and superintend work, which, perhaps, more than any other requires practical knowledge to ensure its excellence. Medical officers of health labour under the same disabilities as medical practitioners, and are besides hampered by their official position, and the other persons should not exist as other persons; if they wish to practise they can do so as professional men, or not at all.

To follow these arguments to their conclusion, it is considered that only corporate professional members of the institutions named, to which may be added the Institution of Civil Engineers of Ireland, who have reached the age of twenty-seven years, should receive licences on application; that architects and engineers who come under Section 2 should satisfy the examiners in the same manner as it is here provided that they shall satisfy the Local Government Board; that all other persons shall be required, to pass an examination before they can receive their licences; and that the words "corporations" and "associations" should be entirely removed from the Bill.

If such vague and meagre minimum requirements as those contained in Clause 10 be considered to be a sufficient protection to the public,—and this can only be the case if it be thought that the understanding on this subject is so thorough and general that there can be no difference of opinion,—why introduce any such clause at all? If, on the other hand, this thorough and general consensus of opinion does not exist, it is absolutely necessary that the specification should be as full and ample as it possibly can be on broad lines; and this can be no hardship to anybody, for if the consensus of opinion be general, the specification will be followed naturally and without effort; if the consensus of opinion be not general, or if there be any sanitarians who are ignorant of modern requirements, it is the more necessary that there should be a complete and binding specification, to which reference can be made and from which no divergence can be permitted.

In Clause 14 it is provided that after the lapse of five years a building shall be considered uncertified; also that any alteration to any building which affects the sanitary arrangements of such building shall render the certificate null and void; but no provision is made for enforcing the publication of such alterations, which might easily be carried out without their coming to the knowledge of the Sanitary Registration Authority, or of any person interested in preserving the satisfactory sanitary condition of any building. It is suggested that the builder or any person who carries out such alterations should be bound to inform the Sanitary Registration Authority of such alterations being made, under penalty as for misdemeanour in case of non-compliance with these requirements. As the enactment of such a Bill as that under consideration would be likely to give rise to much advertising of ability and readiness to certify for the condition of buildings by those who are not prevented by professional etiquette from taking this course to make themselves known, it is proposed that a clause should be introduced rendering it penal,

\* On the "Sanitary Registration of Buildings Bill, 1887." From a paper by Mr. Reginald E. Middleton, M.Inst.C.E., M.Inst.M.E., Vice-President of the Civil and Mechanical Engineers' Society. Read at the Congress of the Sanitary Institute of Great Britain at Bolton.



by loss of licence or otherwise, for any licensee to advertise, or allow to be advertised, his ability and willingness to grant certificates, otherwise than as is provided for in the Bill, that is to say, by the published list of licensees; also, as abuses might arise from licensees who were owners or part-owners or otherwise pecuniarily interested in buildings certifying for their own property, it is thought that provision should be made against this danger, by enacting that no licensee shall grant a certificate for any house or building of which he is the owner or part-owner or in which he has any pecuniary interest other than as an adviser in its construction.

It is not thought advisable that any penalty should be recoverable before a justice of the peace unless he be sitting in court.

The writer trusts that these few remarks may be sufficient to stimulate discussion, and that thereby valuable information may be obtained which may result in a Bill being drafted and eventually enacted, which shall be satisfactory to all persons interested.

#### A NEW CEMENT-GRINDING MILL.

ONE of the most important of building materials in the present day is Portland cement, and its extensive use in the many purposes for which it is employed renders every means of improvement in its quality and in the cost of production a matter of widespread interest to the building trades. In former days the cement was far less carefully burnt than is now the universal practice; and in those days it was sold as it was ground and came from the mills. Now, on the other hand, the practice of sieving has got firm hold amongst the manufacturers, and the tendency to finer and finer sieving increases. The milling thus becomes a serious part of the commercial production, and many firms have made considerable expenditure on trials of new machinery, but hitherto with little practical results. Amongst those who have tried to keep themselves in the van of progress are Messrs. Booth, of Borsdal, on the river Medway, which, with the neighbouring Thames, may be looked upon as the birthplace of the Portland cement industry, which has attained to immense dimensions, although the origin itself is within the memory of this generation.

This firm has recently put up one of the composite edge-runner mills of Messrs. Dutrulle & Co., and on Monday, the 19th ult., a large party of cement-makers and factory-managers were present at a crucial trial of the apparatus, which was made by Messrs. Taylor & Neate, at their engineering works at Rochester.

The idea of the new mill is a very simple one: so much so, indeed, that (as is the case with so many good practical inventions) the moment it is seen one wonders that it has never been put into practice before. It may be briefly said to be two pairs of edge-runners working in the same pan. But it is rather more than this, for one couple is composed of two runners of unequal diameters, each running on its own bed, whilst the other pair are runners of equal diameters running on one bed common to both. These beds are in the form of rings or steps. The smallest and lightest runner, on the upper and inner circle, takes the broken-up clinker as the feed falls in. From this step the first cranshings are swept by a trailing rake, or scraper, on to the second step, where the materials get crushed down again by the second-sized runner. From this, again, the crushed material is raked off in like manner on to the outer ring, where the two largest edge-runners pulverise it to an almost impalpable powder. The elevators take the final ground materials up to circular sieves, with very fine meshes; and the residue, after sifting, is returned to the mill. No doubt a good deal of the success attained is due to the hard and roughly crystalline structure of the steel used for the facings of the runners, and which wears to an almost granitic surface. But it is clear also that this composite mill is doing the work of three ordinary mills at once, without the time, labour, and expense which would be incurred in transferring the loads under treatment for considerable distances from one ordinary mill to another. Or we may say that the stuff must be kept for at least three times the length of period in a common mortar-mill to grind it down to the same degree of fineness. In fact, more than three times the period would be required, because in the common mortar-mill there would always be a thicker load in the

pan, the intermingled dust in which would keep the surfaces of the edge-runner and the bed apart, and so diminish the speed and capacity of reduction by the mill-stones. In the new mill the full value of the first two runners is got upon the first and second break-downs; and finally only small materials in a thin layer come under the action of the finishing rollers, which are, in this way, able to crush down very rapidly, through the nearness of their surfaces with that of the mill-bed. The Borsdal machine is closely housed in a wooden casing, and the whole occupies a very compact space indeed.

In the trials the speed of feeding was very fast; but not too much so for excellent results to be obtained, as was thoroughly demonstrated by the sievings themselves. It is clear, however, that by a little experience the feed can be absolutely adjusted to the exact degree of milling to which the materials should be subjected; and with such care in the setting of the speed of feed, perfect uniformity would be attained in the cement produced. The feed is made direct into a hopper leading to the mill. Of the mill itself, the bed is permanently fixed, and both couples of runners revolve round a central vertical shaft, which can be driven either at top or at bottom by crown-wheels and pinions. The indicator-diagrams were taken at the trial by Mr. Neate; and the weighing and sifting was supervised by Mr. Hollick, of Greenwich, one of the visitors present, and well experienced in the manufacture of cement. The results of the engine-power were:—Mean speed of the horizontal two-cylinder engine, 67·4 revolutions per minute; average gross power of right cylinder, 35·5 indicated horse power, of left cylinder, 33·3; total, 68·8 indicated horse power. The power exerted by right cylinder in overcoming friction of the engine and shafting was 11·93; of the left cylinder, 10·87; in all, 22·8 indicated horse-power. The net power, therefore, absorbed by the mill in grinding the materials was, as obtained by deducting friction horse-power from gross horse-power, 46 indicated horse-power for the half-hour run.

The results of the weighing and sifting tests, as weighed by Mr. Hollick, were 39·25 cwt.; the temperature of the cement by centrifugal thermometer, 37·5 degrees; by Fahrenheit thermometer, 99·5 degrees; the weight per bushel, 117 lb. The residue from the cement on sifting through a 150 by 150 mesh sieve, 40 per cent.; through a 80 by 80 mesh sieve, 24 per cent.; and through a 50 by 50 sieve, 12·5 per cent. The net power absorbed per ton of cement ground per hour will be 11·72 actual horse-power.

There were present amongst the visitors and experts Mr. Johnson, of Northfleet; Mr. Courtney, of Sittingbourne; Mr. Hall, of Rugby; Mr. Weigner, Mr. Forby, Mr. Craske, and many others, as well as the patentee, Mr. Dutrulle, and a favourable opinion was expressed without exception by all the practical men.

#### THE WALLS OF CHESTER.

SIR,—In reply to Messrs. Roach Smith and Loftus Brock, in your last number [p. 441], I will reply as briefly as possible, considering the amount of ground to be travelled over.

Mr. Smith, whose letters are always worthy of study and consideration, says it is not the question what the Archaeological Institute thought in 1886, but what they think now. Just so. I have been in communication with many of the members, and they by all means hold the same opinion they did in 1886. Mr. Smith names the impartial verdict of Sir James Picton and Mr. Loftus Brock. The former of these gentlemen, in his last letter on the subject (*Liverpool Courier*, Sept. 17th), says that he will pronounce "no opinion as to the date or the builders" of the walls, but waits further investigations. As Mr. Brock was the only other speaker at Chester, it follows that his *ipse dixit* was by some, perhaps, tacitly acquiesced in (though very few actual members of the Association were present, the bulk being Liverpool visitors), whilst the anti-Roman party were, as I have said elsewhere, by agreement silent.

As to the Jacobean theory, I have never said a word about it one way or the other; but as to the writers on the non-Roman side, they are, at least, as numerous as those on the other. More will be, however, forthcoming immediately.

Mr. Smith quotes a number of examples in

France, &c., of walls built up with the fragments of Roman monuments, but there has been in the cases of many of these towns much discussion, and much doubt as to the age of the walls so built. With regard to the two London instances (Tower-hill and Camomile-street), Mr. J. E. Price, who, on behalf of the Corporation, superintended the excavation of the latter, says in his published report that both may be of the thirteenth century. With the exception of the mortar, they are both similar to Chester.

That the sculpture which Mr. Smith says is a Romano-British girl holding a mirror is not so is the verdict of 90 out of every 100 persons who have seen it. Nearly every one recognises it as a male, most as an ecclesiastic, and many see the remains of a nimbus round the head, with a vessel holding the consecrated wafer in the hands. It may, no doubt, be perfectly true that Mr. Smith has engraved in the "Collectanea Antiqua" the figure of a girl holding a mirror found at Bordeaux, but it is not like the stone named.

Mr. Smith refers again to the *castra* at Richborough, &c. He said at first that these *castra* had no mortar in their foundations, and consequently that they resembled the wall newly laid bare at Chester. I pointed out that they were solidly cemented from summit to base, whereas at Chester there was no mortar whatever, nor had there been, and I asked him if he ever knew of the wall of a Roman *castrum* (not other buildings or aqueducts, &c.) in which there was no mortar used from base to summit? He has not yet answered the question, but says that at Richborough, &c., there are small stones with tiles, and at Chester the stones are large. It is not a question of the size of the stones, or the presence or absence of tiles. Did he ever see the wall of a Roman *castrum* built without mortar? He alludes to the Roman wall, &c., saying I had not considered its large stones. Why the great wall is a solid mass of concrete; the size of the stones is a secondary question. Dr. Bruce, the historian of the wall, has distinctly said that "he did not believe that the Romans ever built a wall without the use of mortar." Mr. Smith will surely accept testimony like this from such a quarter. And with this may be put Mr. Smith's own words on the Chester walls ("Collect. Antiq.," vol. vi., p. 43), "A question naturally arises, not why the prevailing features of Roman mural masonry should be so uniform and so marked, but why that at Chester should form an exception to the general rule." The excavations just made, and those made three or four years since, have answered the question by showing that the wall is not Roman. Mr. Brock, following suit to Mr. Smith's words as above, said in his address at Chester that the Romans had introduced "novelties" into Roman architecture when building this north wall at that place. Has Mr. Brock, any more than Mr. Smith, seen a similar wall in a Roman *castrum*? Has he ever seen in the wall of such a *castrum* a cornice projecting some 18 in. on the exterior, as if purposely to assist an escalade? Or if the Romans had introduced such a feature, would it have been preserved all through the Middle Ages and the Parliamentary war, when it would have been more than ever of advantage to besiegers? Mr. Brock's remarks as to Sir J. Picton I have anticipated in the *Academy* of last week, and replied to in what I have said above on Mr. Smith's letter.

But if this wall be Roman, what will Mr. Brock say to the portion west of the North Gate? In 1883, the inner face of this fell down, and when the necessary repairs were made it was resolved to cut a new passage (or gate) through it. In doing so, it was found that the wall (proper) was, beneath the pavement, nearly hollow; some little distance lower, between the external and internal faces, there was the lower part of an internal older wall, formed of rudely shaped stones, some 6 in. square, with a quantity of poor mortar, and a "filling in" like the rubble walls of old churches, but percolating water had removed this to the depth of 6 ft., and had thus been the means of bringing down the present interior face. Competent judges decided that this wall was probably Edwardian, but that it could not be earlier than late Norman. The decayed wall was supported to half its height on the outer face by a much newer and sloping one, acting as a buttress, from 4 ft. to 6 ft. wide at the base, and sloping

\* I leave out of the question the town-walls in France, Belgium, &c., which Mr. Smith names as built up of monuments, as the origin of these is disputed.



to a point, which had never been bonded to first named. Mr. Shrubsole passed his arm the space between them. This buttressing wall was composed of fragments of Roman stones, friezes, split columns, bases, and betones, one of the latter, with an inscription in good preservation, being removed from with close joints and no mortar, much sunbling the wall lately laid bare near the onix Tower. Was this low, sloping, and tressing wall of earlier date than the wall ch it supported? The mouldings were all ned to the inside. Some of the fragments now in the Museum, and I have engraved m, as well as the inscribed tombstone, in "Roman Cheshire." Here is an almost counterpart of the wall lately laid bare, will Mr. Brock assert that the buttressing I was Roman, whilst the main one was beyond question of Medieval date? A little beyond one of the towers of the wall (Pemberton's flour) there is an inscription which tells us it in 1708 "diversa viue branches in these ls were rebuilt and other decays therein re repaired, two thousand yards of the pavet were new flagged or paved, and the whole aired, regulated, and adorned at the expen one thousand pounds or upwards." The vness of the buttressing wall, it being com- paratively little worn, suggests at once that it is a part of the reparations named as being oted in 1708, for the breach made by the plimentarians was certainly not left open that date, whilst as to the adornments I take cornices to the east of the north gate to be one them. The wall here was found some three four years since to be exactly like what Sir Picton has described it a few yards distant, double, with an interval between. This was ounced to be Medieval work of uncertain age." But it was so from the rock surface, and the stones surmounted by the cornice, ough Roman, have been removed from else- ere. And if so many Roman stones were ound about Chester, as King in his "Vale yal," and even Dr. Stukely in his "Iter reale" inform us, there is little difficulty in understanding that the "buttressing" wall I ve spoken of, and the cornice and stones at the North Gate, were among the repairs noticed taking place in the reign of Anne. I have elt upon all these at greater length in my "Roman Cheshire." I will not dispute Mr. Brock's measurements, &c., but I have not at sent time to go into them. The stone uring the "ecclesiastical" figure was, I mit, found in the "unmortared" part, near e base of the wall, and near its centre. I e Mr. Brock will gather from this and my er letter that I believe the newly-excavated ion of the north wall to have been constructed t present state (or mostly so) immediately er the siege, the North Gate cornice and walls e the "buttressing" wall during the repairs ne's reign, whilst as to the Roodey stones o not recognise them, either above ground or e 15 ft. beneath ground (where they are ular), as a wall in any sense. They are e side the Roman area, at the corner of a e creek, where the clay bank would be ticularly liable, from the tide of the estuary d the water of the creek, to be gradually shed away, and they have been placed there prevent it. Perhaps also they may have eed as the abutment of a bridge which sed the creek, and of which the base of the e responding abutment, with possibly inter- ing piers, may yet be found beneath the ck on which the present walls are built. n old maps, the creek was still a large one Elizabeth's time.

W. THOMPSON WATKIN.

Liverpool, Sept. 26, 1887.

S.—If I were "at all hazards" to advocate Roman theory, I could find in the removal the northern wall of the castrum to its sent line from that of Abbey-court, and sequent enclosure of an extra-mural cemo- y ("Roman Cheshire," pp. 87-8), a reason the presence of Roman tombstones in the then wall. But that wall is not of Roman k, and at the time the cemetery was inclosed stones would not be so desecrated.

## "SHONE'S EJECTORS IN THE RECENT RAINSTORMS."

SIR,—I have read the letter of your correspondent who styles himself "Miscalled Uncivil Engineer," which appears in your last issue [p. 442], in reply to Mr. John Phillips's letter which appeared in your issue of the 17th inst.

Mr. Phillips's primary object in writing to you was, as I believe, to prove the adequacy of the new works. (1) from his own point of view as the engineer who originally suggested them; (2) from the point of view of the Select Committee of the House of Commons which elected to act upon his suggestions.

You will agree with me, Sir, that to judge fairly of the success or non-success of the works at the Houses of Parliament, and of the relative worthlessness of the statements of your correspondent, your readers ought to know what I undertook to do at the Houses of Parliament. Because, if I can prove that I have done what I undertook to do for the Government, I fail to see why, except on one hypothesis, your correspondent or anybody else should deny to Mr. Phillips and myself the gratification we think we are justly entitled to enjoy, in explaining to the sanitary world, through you, that notwithstanding the prophecies of a certain clique of engineers to the contrary, the works carried out are, in reality, a great success.

Those of your readers who are really desirous to understand in principle and in detail the nature and character of the important works carried out at the Houses of Parliament, I would respectfully refer to the illustrated "enlarged edition" of a work which I have just published through Messrs. E. & F. N. Spon, descriptive of them.

For my present purpose it is sufficient to say that the maximum quantity of sewage and rainfall in combination, which I stated to the First Commissioner of Her Majesty's Works and Public Buildings, that the four Atkinson gas-engine air-compressors, and the three pneumatic sewage-ejectors, working together, would receive and discharge into the Metropolitan sewer, when that sewer was surcharged with storm-water to the greatest extent ever known or recorded, was 1,200 gallons per minute. Now, the question is this,—Did the gas-engine air-compressors and the pneumatic ejectors discharge this quantity, as Mr. Phillips would have you believe they did, and considerably more, on the 17th ult., when there was a rainfall at the rate of 0.59 in. per hour, or at the rate of 14.16 in. in the twenty-four hours?

I believe they did, because the surface area drained into the ejectors is ten acres, more or less, and this consists for the most part of roofed and paved surfaces over which the rainfall would, and does pass extraordinarily rapidly. Of course, if the rain passed from this area to the ejectors as quickly as it fell, the quantity with the sewage would be equal to 2,250 gallons per minute.

Now, whatever the rate was at which that rain reached the ejectors,—and I know from experience it must have been nearly as rapidly as it fell,—the ejectors dealt with the whole of it, with the exception of about 2,000 gallons, as stated by Mr. Phillips. This quantity overflowed, as it was designed to overflow, into what remains of the big old sewer, which is retained specially for the temporary storage of such heavy downpours as I am describing. Not a drop got into the basements.

The Meteorological Office at Westminster gives the rainfall as being 0.59 in. only, whilst Mr. Symonds records it as being 1.42 in. in Camden-square, N.W. The data thus obtained furnish incontrovertible proofs that the plant put down at the Houses of Parliament is able to deal with much more than 1,200 gallons per minute, the quantity which I stated would be the maximum quantity it would deal with.

In this connexion I desire to state that Sir Robert Rawlinson, in his evidence before the Select Committee of the House of Commons appointed to inquire into this subject, gave it as his opinion, that if pumps, when duplicated, were provided to deal with a maximum quantity of 400 gallons per minute, they would be more than sufficient to deal with the rainfalls stated by the officials of Her Majesty's Office of Works, &c., to be the rainfalls that give trouble, &c.

It is manifest, therefore, that, as I provided power to deal with three times this quantity per minute, and more, the works carried out must be deemed to be adequate for all reasonable rainfall emergencies; and, if so, is it not sheer nonsense for your correspondent to write about "the incapacity of the Shone installation to deal with the rainfall"? What rainfall? I ask. Three inches per hour, as stated by your correspondent?

Is there any engineer, in his senses, who would provide pumping power to deal with 3 in. of rainfall per hour, or 11,344 gallons (off the ten acres) every minute, in or out of England?

Your correspondent persists in stating that the inlet and delivery pipes of the Houses of Parliament ejectors are 5 in. in diameter. I ought to know,—and I again assure your correspondent, for the last time, that they are 6 in. in diameter; and as he admitted at the meeting of the Society of Engineers that the installation, as existing at the Houses of Parliament, would deal with 1,000 gallons per minute; and as the capacity of pipes to receive and discharge sewage varies as the square root of the fifth power of their diameters, it follows that

the installation after all, according to your correspondent's own calculation, will deal with 1,577 gallons per minute. ISAAC SHONE.

SIR,—From your correspondent's letter at p. 442 in last week's *Builder*, he evidently thinks that I was present at the meeting he refers to. I beg to say I was not, and know nothing of the assertions he indulged in at that meeting.

For some years past certain engineers have opposed the adoption of Mr. Shone's ejectors, not by fair criticism, but by distorted statements. It is charitable to suppose that some have done this because they are unacquainted with the true principles and capabilities of the ejectors, and therefore are unable to distinguish right from wrong in regard to them.

Your correspondent has mistaken the 6-in. receiving and discharging pipes of the ejectors for 5-in. pipes. On this false datum he has soared away into the regions of imagination, and it would be unprofitable labour to follow him in his wanderings. The ejectors are now largely in demand, and the more their merits are known and understood, the more they will be employed.

In my former letter, at p. 411 in the *Builder* of the 17th Sept., I described a few undeniable facts in regard to what the ejectors successfully accomplished during a most trying ordeal on the 17th August. It is very likely that during the two minutes when the 2,000 gallons of water overflowed into the subway reservoir, twice the registered rainfall in Westminster came down, namely  $2 + .59 = 2.59$  in. per hour, for at Battersea and at Camden Town more than 1½ in. per hour was registered during the same rain-storm. With the probable rainfall of 1.18 in. per hour, the basements of the Houses of Parliament were not flooded, nor would they have been had 2 in. per hour fallen for a short time, as the subway reservoir would have contained the surplus water which the ejectors could not then have discharged without the head of water therein reaching the basement levels.

Whoever has a desire to know what the performance of the ejectors was on the day referred to,—which was far beyond what they were designed to perform,—would do well to refer to my previous letter.

JOHN PHILLIPS, C.E.

## REFUSE DESTRUCTORS AND CREMATOIRS.

SIR,—My attention has been drawn to a report of the paper read by Mr. Jones, of Ealing, before the Association of Municipal and Sanitary Engineers at West Brunswick. [See *Builder*, p. 360, ante.]

I consider Mr. Jones's criticisms on all destructors but one most unfair, and I take it that his paper, as a whole, is more in the form of an advertising lecture than a *résumé* of what has been accomplished by "refuse destructors and their results up to the present time."

I do not intend to wade through the whole of what I term an egotistical production of a self-styled "Author," but rather to refer to the remarks on the system named the "Beehive," which I have patented.

Mr. Jones says, "In the valuable digest prepared by Mr. Clavey, of Burton-upon-Trent, for his Board in 1886, under the head of Burnley, where the 'Beehive' was born, in answer to the query as to whether 'the destructor gives satisfaction,' the reply is, 'It gives every satisfaction'; but on turning to Leicester, where it was in the hands of one of our most experienced officers, I find the reply to the same question as follows, 'That the 'Beehive' does not give satisfaction.'"

Now, Mr. Jones throws a doubt on the accuracy of the reply from Burnley, but I can inform him that the answer above quoted is perfectly correct, and was returned by me, and I defy Mr. Jones or any other person who has visited Burnley and inspected the "Beehive" to give any evidence to the contrary.

He also refers to Richmond and Bradford, but has not been sufficiently explicit in his details to show the reason why the "Beehive" has failed at these places; and I consider this a want of fairness on his part. Nor can I understand how Mr. Jones should be of the opinion, through his visit to Burnley, that the destructor was not a success; though I can now account for its non-success at Richmond, when it has to be judged by a critic who had an interest in another similar invention.

How is it Mr. Jones has not told us more about his own cremator and its working at Blackburn?

In looking over the columns of the *Blackburn Standard* of February 5th, 1887, I find these remarks applied to the so-called "Cremator":—"Since the last Council meeting I have examined the Cremator, and found it doing little or no work at all. The nuisance was as bad that week as it was before."

This is a quotation from one of the Councillors of that town, and I presume it applies to this celebrated Cremator as patented by Mr. Jones, who went to Blackburn to inspect it after its erection in December last, and approved of its working.

In conclusion, I consider that if Mr. Jones wishes to criticise inventions, he should go into all the facts of the case, and not pick out matters detrimental to one and of value to others.

JOHN E. STAFFORD.



## SETTING OUT CURVES

CALCULATION OF OFFSETS.  $R$  = RADIUS, AND  $L$  = LENGTH OF THE TANGENT LINE MEASURED FROM THE BEGINNING OR THE END OF THE CURVE TO THE POINT WHERE THE OFFSET IS TAKEN. THEN THE LENGTH OF THE OFFSET IS  $R - \sqrt{R^2 - L^2}$ .

FIGURE 1

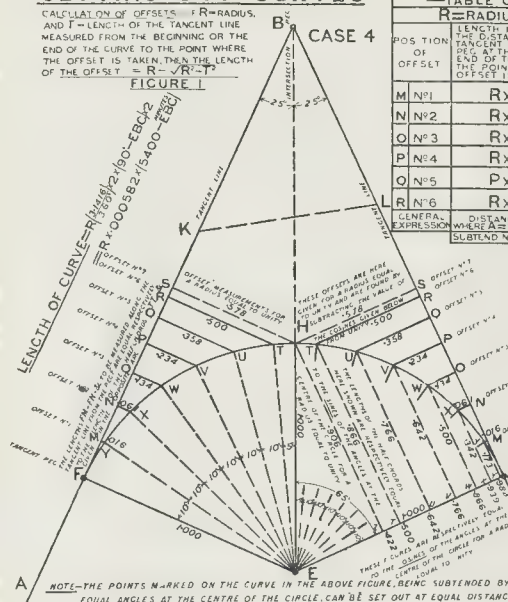


TABLE OF OFFSETS FOR CURVES		
R = RADIUS OF THE CURVE IN CHAINS		
POSITION OF OFFSET	LENGTH IN CHAINS GIVING LENGTH OF OFFSET IN FEET	LENGTH OF OFFSET IN FEET
M N°1	Rx17.36	Rx1.60
N N°2	Rx34.20	Rx6.10
O N°3	Rx50.00	Rx13.40
P N°4	Rx64.28	Rx23.40
Q N°5	Px76.60	Rx35.80
L R N°6	Rx86.60	Rx50.00

GENERAL EXPRESSION WHERE  $A$  IS THE ANGLE AT THE CENTRE OF THE CIRCLE. DISTANCE =  $R \sin A$ . OFFSET =  $R(1 - \cos A)$ . SUBTEND NC THE ARC SET OUT — SEE FIGURE 1.

FIGURE 2 RADIUS = R

LENGTH OF CHORD HC =

$$EJ = \sqrt{R^2 - L^2} \text{ AND } JF = R - EJ$$

$$KL = \sqrt{R^2 - JK^2} - EJ$$

$$MN = \sqrt{R^2 - JM^2} - EJ$$

$$EO^2 = EC^2 - OC^2$$

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NOTE.—TABLES FOR SETTING OUT CURVES BY THE METHOD OF OFFSETS. PUBLISHED BY THE BUILDER, CONTAINING THE OFFSETS FOR CURVES OF 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 120, 140, 160, 180, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000, 1200, 1400, 1600, 1800, 2000, 2500, 3000, 3500, 4000, 4500, 5000, 6000, 7000, 8000, 9000, 10000, 12000, 14000, 16000, 18000, 20000, 25000, 30000, 35000, 40000, 45000, 50000, 60000, 70000, 80000, 90000, 100000, 120000, 140000, 160000, 180000, 200000, 250000, 300000, 350000, 400000, 450000, 500000, 600000, 700000, 800000, 900000, 1000000, 1200000, 1400000, 1600000, 1800000, 2000000, 2500000, 3000000, 3500000, 4000000, 4500000, 5000000, 6000000, 7000000, 8000000, 9000000, 10000000, 12000000, 14000000, 16000000, 18000000, 20000000, 25000000, 30000000, 35000000, 40000000, 45000000, 50000000, 60000000, 70000000, 80000000, 90000000, 100000000, 120000000, 140000000, 160000000, 180000000, 200000000, 250000000, 300000000, 350000000, 400000000, 450000000, 500000000, 600000000, 700000000, 800000000, 900000000, 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ts F and G be joined by a chord line F G curve might also be set out by offsets squared from the chord, as shown in Case 4. The middle point of F is found by measuring the length of the chord H G and bisecting it. distance J M or J K to the points M or K which offsets are required is next measured, the square of the distance is subtracted from the square of the radius. The square root the result is then determined, and from it is subtracted the square root of the radius squared as half the chord squared. This is expressed in the formulae given upon the diagram.

the point of intersection of the tangents is inaccessible the application of the rule for finding the distances B K and K L (1) becomes necessary when Case 3 or Case 4 (1) be adopted. Where obstructions occur in the line of the curve itself, the application of the method shown in Case 4, fig. 2 is often desirable.

In fig. 1 the true measurements for setting a curve are given, the distances along the tangent line from the beginning or end of the curve being respectively equal to the half radius, or the sines of the angles at the centre of the circle for a radius equal in length to a tangent unit; while the length of the offsets at angles to the tangent lines are found by subtracting from a unit of measurement the sine of the cosines of the angles at the centre of the same circle. If, as shown in fig. 1, the angles taken at the centre of the circle be equal, that is, if the angles taken be extended by equal chords, the points marked on the curve will be at equal distances apart. If = the distance in links measured along the tangent line by the chain the offset to be secured by a tape or rod will amount to  $\sqrt{R^2 - T^2}$  expressed in links. Tables are published in a form suitable for carrying in the pocket which give the length of various offsets stated distances for different radii.

## RECENT PATENTS.

### ABSTRACTS OF SPECIFICATIONS.

11,766, Apparatus for Inducing Draught in chimneys. T. Carter and W. B. Tully.

According to this invention, compressed air is forced through jets inside the chimney or into the flue to induce a current of air for draught or ventilation.

13,436, Improvements in Spirit Levels. J. Harrington.

This invention consists of a slide, made of brass or horn for protecting the glasses of spirit levels, which is fixed underneath the face-plate immediately over the spirit-glass. The slide is sometimes used for protecting the glass only; or it may, if desired, made the whole length of the level, in which case it is used and figured as a scale.

13,555, Ventilation of Buildings. J. Horrocks. The idea of this invention is to pump fresh air into pipes of any length by means of a steam or other engine fixed at one end. Means are taken to infect and deodorise the air as it passes through the pipes. The system is to be worked in sections, the air being turned in at one end and the foul air forced out by the fresh pure air and escapes into the atmosphere by means of a tall stack or such appliance. It is thought possible to bring to the City of London country air for the better ventilation of dwellings.

13,698, Door Furniture. J. Brownrigg.

By this invention a small bush with a flange is secured to the door. The rose is then fixed against the bush with the face, but with the bush protruding. A screw spindle is pushed through the door, and an outer loose rose is secured along the spindle against the fixed rose. The face of this loose rose is tightly sunk to receive a thin washer and the shoulder of the loose knob. When these are screwed tightly up all works smoothly, and the door is simple and durable.

16,105, Outlet Ventilators. J. Craig.

The bottom part of the ventilator is formed of an long funnel, the top of which is divided into two equal parts, one part on each side, tapered in an angular direction, which forms the cone. A funnel is fixed on the inside of the ventilator divided into two or more compartments, according to size of the ventilator. An intercepting channel is inserted into the bottom funnel in a position to catch anything that may descend from the top funnel and discharge the same at the open outlets at each end.

19,817, Material for Covering Walls on Floors. By this invention it is claimed that paper of a more than usually suitable to receive embossed patterns is made of wood pulp and straw pulp in

varied proportions, as different degrees of hardness or resiliency are required. The pulp mixture is made into strong paper, in the usual way, and this paper, before it has dried and set, is embossed by pressing rollers or pressing blocks. When dried the pattern or protuberances retain their form. Felt or fabric may be cemented on or between layers of the paper.

10,250, Wood Screws. C. D. Rogers.

According to this patent, the diameter of the core or bottom of the screw (at the commencement of the screw thread nearest the head) is made to gradually increase up to its intersection with the head, thereby forming a conical shank. The thread is of the coarse gimlet kind most useful for wood screws.

### NEW APPLICATIONS FOR PATENTS.

Sept. 16.—12,570, W. Foster, Connecting Pipes to Water-closet Basins, &c.

Sept. 17.—12,603, W. Baird, Fastenings for Doors of Theatres, Halls, &c.—12,614, J. Hird and J. Ford, Casement Windows and Doors.—12,618, P. Ayton, Combined Door Springs and Pneumatic Checks.—12,632, J. Lyman, Paint.—12,638, A. Rammage, Flooring or Decking for Bridge Work and Building Construction.—12,640, F. Barnett, Self-lowering Metallic or other Fireproof Material Shutters for Prosceniums of Theatres.

Sept. 19.—12,654, H. Lomas, Fasteners for Windows and Doors.—12,691, L. Chinnery, Window Sash Silencer.—12,695, C. Groombridge, Automatically Closing Gates and Doors.—12,710, D. Grove, Portable Buildings.

Sept. 20.—12,765, M. Samuel, Plastic Compound for the Production of Moulded and Decorated Tiles, Slabs, &c.—12,768, W. Lake, Sash Lock and Fastener.—12,775, W. Mandern, Rod or White Faced Stock Bricks.

Sept. 21.—12,817, M. Clarke, Fireproof Curtains for Theatres, Music Halls, &c.—12,821, S. Pitt, Weather Guard for Doors, Windows, &c.

Sept. 22.—12,857, H. Waddington, Ventilator.—12,864, J. Lyman, Roofing Material.—12,872, M. Blanchard, Bricks for Wells, &c.

### PROVISIONAL SPECIFICATIONS ACCEPTED.

9,939, P. Born, Cooling the Air in Rooms, &c.—10,426, T. Moore, Lifters and Fasteners for Skylights, Window Sashes, &c.—10,642, G. Redfern, Preventing the Leakage of Water around Chimney or other Pipes passing through the Roofs of Buildings.—11,039, J. Kenyon and Others, Preventing Passage of Wind, Rain, or Dust beneath Doors.—11,109, J. Carrett, Chimney Top.—11,686, J. Tomkys, Attaching Door-knobs to Spindles.—10,284, J. Wilson, Walls, Buildings, Floors, Chimneys, &c.—10,436, J. Wilson, Walls, Buildings, Floors, &c.—11,283, W. Ball, Roofing Tiles, &c.—11,509, H. Warrington and W. Howlett, Bricks and other Blocks for Building Purposes.

### COMPLETE SPECIFICATIONS ACCEPTED.

#### Open to Opposition for Two Months.

13,452, J. Hunt, Fitting, Ornamenting, and Decorating Shops, &c.—14,491, R. Henry, Sash Fasteners.—14,899, E. Smith, Regulating the Supply of Water to Closets, &c.—15,038, J. Gregson, Rain-water, Soil, and Stove Pipes, and Fixing same.—15,546, A. Henderson, Syphon Trap Closet Pans.—16,708, M. Syer, Syphon Cisterns for Flushing Closets, &c.—8,965, R. Gamble, Burglar Alarm Detector for Windows, &c.—11,297, H. Lake, Door Latches.—11,339, E. Finch, Syphon Flushing Cisterns.—14,223, J. Tall, Concrete Wall Construction.—14,442, A. Henderson, Fixing Door-knobs to Spindles.—15,184, G. Sterlin, Fanlights, Windows, Ventilators, &c.—15,312, G. Ewing, Flushing Apparatus for Water-closets, &c.—15,628, H. Walker and R. Carey, Hydraulic Lifts.

### RECENT SALES OF PROPERTY.

#### ESTATE EXCHANGE REPORT.

##### SEPTEMBER 9.

By DRIVER & CO. (at Exeter). South Devon, near Totnes, Washbourne Barton Farm, containing 202a. 0r. 36p., freehold .....£10,000

##### SEPTEMBER 21.

By JOSEPH BAKER & SON. Pinner, Middlesex—Down's Farm, containing 64a. 2r. 36p., freehold, 34 years' lease, 7,300  
Battersea—36, 37, and 39, Falcon-road, 92 years, ground-rent 21l. 15s. 1,775  
Horne Hill—67, Shakespeare-road, 79 years, ground-rent 5l. 450

##### By C. A. RICHARDS.

Holborn—2, Castle-court, freehold..... 385

##### By R. & S. SMITH.

Lisson-grove, Grosvenor-street—Improved ground-rents of 100l. 8s. per annum, 34 years' lease..... 1,010

##### By ELLIS, MORRIS, STUBBS, & CO.

Clerkenwell—16, Lloyd-square, 34 years' ground-rent 10l. .... 450

##### By ELLIS, MORRIS, STUBBS, & CO.

Maidenhead, Ray Park—The residence, "Sawford Lodge," 77 years, ground-rent 10l. .... 1,430

##### SEPTEMBER 22.

By FARMER-BROOKS, ELLIS, CLARK, & CO. Plymouth—The Promenade Hotel ..... 12,000

##### By DONALD TAYLOR.

Pimlico—7, Churton-place, 42 years, ground-rent 8l. 480  
Stockwell—45, Aytoun-road, 60 years, ground-rent 9l. .... 200

##### By NEWSON & HARDING.

Kensington—32 and 33, Edwarde-square, 22 years, ground-rent 4l. 10s. .... 980

Islington—24, Wellington-street, 44 years, ground-rent 8l. .... 2,400  
King's-cross—17 to 22, North-avenue, 47 years, ground-rent 21l. .... 580  
Barnsbury—20, Offord-road, 63 years, ground-rent 1l. .... 490

### SEPTEMBER 23.

#### By BAKER & SONS.

Sussex, Shifnold—Freehold farm buildings, and 254a. 3r. 36p. .... 4,640  
Brondebury, Salisbury-road—The residence called "The Oaks," 91 years, ground-rent 12l. 18s. .... 1,090  
Spitalfields, Lamb-street—Freehold ground-rent of 20l. per annum, reversion in 64 years ..... 870  
High Holborn—A profit rental of 250l., increasing in four years to 300l. per annum, 42 years, ground-rent 80l. .... 4,270

### MEETINGS.

#### MONDAY, OCTOBER 3.

Society of Engineers.—Mr. R. J. Hutton on "Stability of Factory Chimneys," 7.30 p.m.  
Clerks of Works' Association (Carpenters' Hall).—General quarterly meeting, 8 p.m.

#### TUESDAY, OCTOBER 4.

Parkes Museum (Lectures for Sanitary Inspectors).—Dr. Louis Parkes on "Water Supply, Drinking Water, Pollution of Water," 8 p.m.

#### WEDNESDAY, OCTOBER 5.

University College.—Professor Roger Smith's Opening Lecture in Architecture, 7.30 p.m.  
Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting, 8.30 p.m.  
Liverpool Engineering Society.—Mr. F. Hudson on "The Coal Shipping Appliances of the Port of Liverpool,"

#### FRIDAY, OCTOBER 7.

Architectural Association.—Conversation at the Westminster Town-hall, 8 p.m.  
Parkes Museum (Lectures for Sanitary Inspectors).—Professor H. Robinson on "Drainage Construction," 8 p.m.

### Miscellaneous.

**The Palcosmeter Engineering Company** are about to bring out a new and simple automatic pumping-machine for lifting sewage or other liquids from one level to another. The machine is likely to be of much service in town sewerage works where difficulties of level have to be encountered. The machine is worked, at a very small expenditure, by the pressure of water obtained from the street water-main. It is automatic in action. The presence of sewage is necessary to set it working, but when the flow of sewage ceases the pump comes to a standstill. We have this week seen one of these machines in action at the Company's Works, Nine Elms, Vauxhall. At the same time, we had an opportunity of noting the great adaptability to almost all conceivable conditions of contractors' work, of this Company's now well-known pumping appliance, the Palcosmeter, which requires no staging, but can be slung or suspended down a shaft, or in any other situation, the steam-pipe being led down to it. Their deep-well pumping engine, "The Deane," is direct acting, and is admirably adapted for raising water from contracted shafts, artesian wells, &c. Another speciality of the Company is the "Thames Filter," the filtering medium being sponge, which is cleaned by simple mechanism. A large installation of these filters has been fixed at the works of the London Hydraulic Power Company, where about 10,000 gallons of water per hour of Thames water are filtered by them to a defined standard of purity, thus saving the heavy cost of a supply from one of the water companies. Filters for swimming-baths and other purposes are also made by the Company.

**A New Gas Boiler for Conservatories.**—Mr. G. Shrewsbury, of Newgate-street, has lately brought out a new gas boiler for conservatories, which he calls the "Reliance." Now that the sharp frosty nights are approaching this boiler, it appears to us, will be found well worth examination. It is claimed for it that it may be placed in perfect safety inside the conservatory, as there is an equal pressure of air on the inlet and outlet pipes. The outer case of the boiler is made air-tight, and all the air for the supply of the burner is drawn down the inlet pipe from outside the conservatory and is led into the bottom of the air-tight outer case of the boiler. The pipe for the escape of the products of combustion is led out of the top of the case, thus keeping up a syphonic action in the pipes and case, maintaining the pure air in the conservatory. This boiler was patented as recently as July last, but was previously carefully tested throughout the whole of last winter by the patentee in his own conservatory, and found to answer well, we are informed, under all conditions and changes of weather.



**Sale of Building Land at Cromer.**—On Monday last a large and important sale of building sites, the second during the present season, took place at Cromer, where a considerable impetus is at the present time being given to building, not only within the area of the old seaside town itself, but also in the neighbourhood immediately around. The property submitted to competition on Monday comprised the second portion of the Suffield Park Estate, belonging to Lord Suffield. It consisted of 142 lots, divided into sites of various sizes, for the erection of different classes of houses, the frontages ranging from 15 ft. to 40 ft., with corresponding depths, three of the plots, which were exceptionally large, having frontages of 50 ft., 93 ft., 130 ft., and 155 ft. The property offered is situated in a charming valley, with the Lighthouse Hills and the rugged and majestic cliffs immediately to the north-east commanding a picturesque view of the German Ocean, with the shore nearly 100 ft. below the lofty cliffs, the scenery inland to the south-east and south-west being equally picturesque. Messrs. Baker & Sons conducted the sale, in conjunction with Messrs. Spelman, land agents, of Norwich and Yarmouth. Mr. Baker, in introducing the property, enlarged upon the natural beauties and attractions of Cromer, which, he observed, was fast becoming the most favorite watering-place on the north-east coast. On the sale proceeding every lot was rapidly purchased, the smaller lots, having 15 ft. frontages, averaging about 12l. each; those having 20 ft. frontages 15l. each; those with 25 ft. frontages from 31l. to 32l. each; and those having 30 ft. frontages from 40l. to 45l. each. An hotel plot having a frontage of 57 ft., and a return frontage of 90 ft., realised 100l., and the three large plots above referred to were sold for 135l., 140l., and 145l. each. The entire proceeds of the sale amounted to about 3,800l.

**Economic Geology.**—A series of thirty lectures on this subject is to be commenced by Mr. G. F. Harris, F.G.S., at the Birkbeck Institute, on Wednesday evenings, commencing October 5. The lectures are intended especially to give practical as well as theoretical geological information to architects, civil and mining engineers, builders, &c., and deals, among other subjects, with the selection of stone for building purposes, experiments in testing durability of stone, crushing weight, absorption of water, chemical and microscopical analysis, weathering, &c.; the distribution and shape of the water-bearing and non-water-bearing strata in England and Wales; water-supply from lakes and rivers; reservoirs, analyses of water, rainfall, filtering; canal and railway cuttings and embankments, landscapes, faults, and drainage; concrete, cement, lime-kilns, mortar, &c.

**Lightning Conductor Tests.**—Amid some disputes about lightning conductors recently by people who do not all know what they are talking about, the following from a letter signed "J. A. Fleming" in a recent number of the *Times* is a suggestion worth keeping in mind:—"Not only is it necessary to have a properly fitted conductor or system of conductors to every valuable building, but it is above all things necessary to have a periodical electrical test applied to the conductor in order to ascertain if the earth plate is making 'good earth.' The proper manner of doing this is to run a second isolated cable parallel to the conductor and making contact with it near the top. This testing cable should have a separate earth plate. A simple electrical test, applied easily, will then enable an observer to state whether that conductor is an efficient lightning protector, or only an additional source of danger."

**A New Italian Canal.**—Two members of the Italian Parliament, Signori Fazzari and Morandini, have presented to their Government a plan for a new canal, navigable for large vessels, through the province of Catanzaro, whereby ships bound from the Tyrrhenian into the Ionian Sea will save the detour around Sicily, or the passage through the Straits of Messina. The canal would be thirty-five miles in length, and will follow the course of the rivers Amato and Corcuro, and by regulating the waters of these two rivers it is estimated that 80,000 hectares of land will be reclaimed, an area sufficient to cover the interest on the capital required for the construction of the canal. The new waterway, the promoters maintain, would be of great value to vessels trading in the Levant and Black Sea.

**Engineering, &c., at University College, London.** We notice from the prospectus of University College, London, Engineering Department, that the work of this College commences for the Session on the 5th of October. The instruction in Surveying and the lectures in the various branches of Civil Engineering are given by Prof. L. F. Vernon-Harcourt. The general lectures on Engineering and Machine Design, as well as the work in the engineering laboratory, are in the hands of Professor Alex. W. Kennedy. In this laboratory, the arrangements of which formed a principal subject of the paper on "The Use and Equipment of Engineering Laboratories," read by Professor Kennedy before the Institution of Civil Engineers last winter, students go through for themselves during the session a systematically-arranged course of experimental work in connexion with elasticity and the strength of materials, the efficiency and economy of steam boilers and engines, the appliances for which have been considerably extended during the last few months. Electrical Technology is under the care of Professor Fleming, by whom (with Professor Carey Foster) a dynamo installation has lately been fitted up for the purpose of practical experimentation in "applied electricity." Economic Geology is treated as a special subject in a short course of lectures by Professor T. G. Bonney, and Chemistry as applied to Engineering and Architecture by Professor Charles Graham. In addition to these matters directly connected with engineering, the College provides ample instruction in all the sciences on which engineering is based, mathematics, mechanics, physics, chemistry, geology, &c., and very special attention is given to graphic methods of calculation as applied to scientific and technical problems in the lectures and drawing class of Professor Karl Pearson.

**The Sanitary Condition of Large Cities.** Dr. Jacques Bertillon, chief of the Paris Bureau of Statistics, publishes in the *Revue d'Hygiène* a comparative statement of the sanitary condition of the chief European and American cities during 1886. The author gives the proportion of deaths per 100,000 of the living population for certain preventable diseases. The proportion of deaths caused by typhoid fever was as follows for French cities:—Beaune, 205; Toulouse, 118; Marseilles, 108; Nancy, 65; Bordeaux, 60; Paris, 46; Lyons, 40. These are high figures as compared with those for certain cities of other European countries. The proportion per 100,000 was, in Liverpool, 34; Manchester, 33; Brussels, 29; Dresden, 18; London, 17; Amsterdam, 16; Berlin, 16; Edinburgh, 15; Copenhagen, 13; Leipzig, 11; Vienna, 11. A few large cities, however, suffered more severely from this disease. At Saragossa the proportion was 128; St. Petersburg, 113; Milan, 71; Philadelphia, 65; Baltimore, 46. The great outbreaks of smallpox during the past year are shown by the following figures, giving the number of deaths per 100,000 of the population, viz.:—Marseilles, 573; Buda-Pest, 358; Saragossa, 221; Rome, 128; Rheims, 110; Zürich, 106; Milan, 64. Some of the figures for scarlet fever were:—Hanover, 285; Buda-Pest, 127; St. Petersburg, 93; Glasgow, 68; Leeds, 57; Brooklyn, 51; Liverpool, 47; München, 34; Leipzig, 28; Berlin, 21; Paris, 18; London, 17; Vienna, 16; Lyons, 13; Amsterdam, 6; Marseilles, 5; Rome, 5. For diphtheria some of the figures were:—Grenada, 491; Nürnberg, 240; Brooklyn, 170; Dresden, 169; Marseilles, 163; Berlin, 128; Buda-Pest, 128; Hamburg, 123; Philadelphia, 113; Leipzig, 110; München, 86; Amsterdam, 74; Paris, 73; St. Petersburg, 63; Rome, 52; Lyons, 38; London, 33; Edinburgh, 32; Glasgow, 29; Liverpool, 21. The above diseases appearing generally in epidemic form, an otherwise healthy city may show a large death-rate for any particular year. It is otherwise with such diseases as consumption, for instance, of which Dr. Bertillon gives statistics which do not vary much from year to year. The highest proportion occurred at Buda-Pest, where 708 died of the disease in 100,000 inhabitants. Then follow Vienna, with 664 deaths; Nürnberg, 482; Paris, 470; Marseilles, 448; Lyons, 444; München, 390; Dresden, 387; Berlin, 334; Brussels, 315; Leipzig, 315; Rome, 212. Of American cities, New Orleans had the highest death-rate, 382; Brooklyn following, with 313; and Philadelphia, with 296 deaths per 100,000. With the exception of Belfast, where the pro-

portion was 472, the large cities of the United Kingdom show very favourably compared with Continental cities, Glasgow having but 278; London, 202; and Edinburgh, but 193 deaths from consumption out of 100,000 inhabitants. The figures given above, taking into account changes which have been mostly for the better, prove that the greatest mortality from consumption exists in large Austrian cities, the smallest in English cities. The death-rate from scarlet fever was highest in Germany from diphtheria in Spain and Germany from small-pox in France and Austria, from typhoid fever in France and Spain. It is satisfactory to find that the death-rates from all the causes mentioned in English cities are amongst the lowest.

**Schools, Formby, Lancashire.**—The schools attached to St. Mary's R.C. Church, Formby, have recently been enlarged, and two additional class-rooms have been built in the same style as the existing buildings. Crosby light pink bricks have been used for the general walling, with Edwards's Ruabon red and blue bricks in strings, arches, buttresses, weatherings, &c. The interior is plastered throughout with a cemented dado. Roof principals are exposed, stained, and varnished. The work has been carried out by Mr. Edward Blackburn, builder, of King's-road, Bootle, from plans by and under the superintendence of the architect, Mr. Fred. H. Peate, of Liverpool.

#### PRICES CURRENT OF MATERIALS.

TIMBER.			
	£.	s.	d.
Greenheart, B.C. .... ton	4	0	0
Teak, B.I. .... do	8	0	10
Sequoia, U.S. .... foot cube	0	2	3
Ash, Canada .... do	3	0	4
Birch " " " " " " " "	2	0	8
Elm " " " " " " " "	3	10	0
Fir, Dantisc, &c. .... do	1	10	0
Oak " " " " " " " "	2	10	0
Canada, " " " " " " " "	3	0	0
Pine, Canada red " " " "	2	0	0
" " yellow " " " "	2	0	0
Lath, Dantisc " " " "	3	0	0
St. Petersburg " " " "	4	0	0
Wainscot, Riga " " " "	0	0	0
" Odessa, crown " " " "	2	10	0
Deal, Finland, 2nd and 1st, std. 100	7	0	0
" " 4th and 3rd " " " "	6	10	0
Riga " " " " " " " "	5	10	0
St. Petersburg, 1st yellow " " " "	8	0	13
" " 2nd " " " "	5	0	8
" " white " " " "	6	10	0
Swedish " " " " " " " "	8	0	14
White Sea " " " " " " " "	0	0	0
Canada, Pine, 1st " " " "	18	0	24
" " 2nd " " " "	10	0	15
" " 3rd, &c. " " " "	8	0	8
" Spruce, 1st " " " "	8	0	8
" " 2nd and 3rd " " " "	5	0	7
New Brunswick, &c. " " " "	5	0	6
Baltics, all kinds " " " "	4	0	10
Flooring Boards, 4", 1 in., prepared, first " " " "	0	8	0
Second " " " " " "	0	6	0
Other qualities " " " " " "	0	4	0
Cedar, Chile " " " " " "	0	3	0
Honduras, &c. " " " " " "	0	3	0
Australian " " " " " "	0	2	0
Mahogany, Cuba " " " " " "	0	4	0
St. Domingo, cargo average " " " "	0	5	0
Mexican " " " " " "	0	3	0
Tobacco " " " " " "	0	3	0
Honduras " " " " " "	0	3	0
Maple, Bird's-eye " " " " " "	0	0	7
Rose, Rio " " " " " "	8	0	11
Bahia " " " " " "	7	0	9
Dor, Turkey " " " " " "	0	5	12
Satin, St. Domingo " " " " " "	0	6	0
Porto Rico " " " " " "	0	6	10
Walnut, Italian " " " " " "	0	3	0
METALS.			
IRON—Bar, Welsh, in London..... ton	4	15	0
" " in Wales " " " "	4	2	6
" Staffordshire, London " " " "	5	10	0
COPPER—			
British, cake and ingot..... ton	43	10	0
Best selected " " " " " "	44	10	0
Sheet, strong..... do	60	0	0
Chill, refined " " " " " "	39	10	0
YELLOW METAL..... lb.	0	4	0
LEAD—			
Pig, Spanish..... ton	11	17	0
English, common brand..... do	12	6	0
Sheet, English..... do	13	2	0
SPECIAL—			
Silesian, special..... ton	15	10	0
Ordinary brands..... do	16	7	0
TIN—			
Straits..... ton	102	15	0
Australian..... do	103	0	0
English ingots..... do	108	0	0
OILS.			
Linedeed..... ton	19	15	0
Oceanout, Coochin..... do	31	0	0
Ceylon..... do	23	15	0
Palm, Lasc..... do	23	0	0
Refined, English pale..... do	24	15	0
" brown..... do	23	5	0
Cottonseed, refined..... do	21	10	0
Tallow and Oleine..... do	25	0	0
Lubricating, U.S..... do	5	0	0
" refined..... do	5	0	12
TURPENTINE—			
American, in casks..... cwt.	1	4	0
TAR—			
Stockholm..... barrel	0	14	0
Archangel..... do	0	9	0



COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Public Library	Borough of Middleton	Not stated	Not stated	ix.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Good-Paving Works	Westminster Bd. of Wks	G. R. W. Wheeler	October 5th	ii.
Construction of Roads, Sewers, &c.	Nat. Standard Land Co.	Official	October 10th	iv.
Construction of Urinals	West Ham Council	Lewis Angell	October 11th	ix.
Re Apparatus	Southgate Local Board	C. G. Lawson	do.	ix.
Broken Granite	do.	do.	do.	ix.
Saving Footways, &c.	Greenwich Bd. of Wks.	Official	October 12th	ix.
Mad-Making and Paving Works	Hammermith Vestry.	do.	do.	ix.
Bracket Pass, &c.	Hemp. Hempsted Town Improvement Com.	G. & W. R. Low	October 22nd	ix.
Public Memorial Clock, Hindley, near Wigan	Schl. Board for London	Official	Nov. 1st	ii.
H-p. Steam Boiler, for Heating Apparatus	do.	do.	Not stated	ix.
Building Residences, Calgan-place	do.	H. A. M. L. Seaman	do.	ii.
Construction of Scarborough Constitutional Club	do.	H. A. Cheers	do.	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Clark of Works	S. Shields, & Co., Bristol	Not stated	October 5th	xiv.
Surveyor and Engineer	Tottenham Local Board	40 l.	October 11th	xiv.

TENDERS.

ARNOLD (Notte).—For paving, kerbing, channelling and culverting in Wash-pond-lane, Arnold, for the Arnold Local Board of Health. Quantities by the engineer, Mr. Frank Jackson, 18, Low Pavement, Nottingham. Contract No. 1. £1,092 18 0. No. 2. £298 5 0. E. Haywood, Wootley. D. Barry, Nottingham. J. Hawley, Ilkeston. H. Vickers, Nottingham. J. Bradley, Lincoln. W. Gordon, Hurton Joyce. John Greaves, Front-street. Arnold. E. Morris, Arnold. J. Skerland, Nottingham. [Engineer's estimates, 601l. 15s. 6d. and 154l. 12s. 10d.] Accepted.

ASHFORD (Kent).—For the construction of earthenware pipe-sewers, precipitation works, effluent water-tanks, &c., for the Ashford Local Board. Messrs. Jones & Ballard, engineers.—A. W. J. Botterill. B. Nicholson. Neave & Co. J. Wood. H. Potter. G. H. Dennis & Son. D. F. Beale. Davis & Leamy. Howland Bros. G. Oarston. J. Trollope. W. Jackson. J. Piper & Son. Innes & Wood. A. W. J. Dennis. T. Reeves. G. E. Wallis (accepted). [A.—Extra for Doulton's Joints.

BANSTEAD.—For enlarging laundry at the Kensington and Chelsea Schools, Banstead, for the Managers of the Kensington and Chelsea School District. Messrs. A. & G. Karston, architects, 16, Leadenhall-street, E.C. Quantities not supplied. E. C. Quantities not supplied. Barton & Son. Woodhouse. Cogswell. Newton & Lido. Lye. Balch & Shopland. Turle. Potter. Wm. Taylor, Banstead (accepted).

BARNET.—For completing two residential villas on the Wyndown Estate, New Barnet, for Mr. T. B. Mee, Mr. Henry North, architect.—Exton & Burton, Birkbeck Works, Kingsland (accepted). [No competition.]

BATTERSEA.—For re-constructing a 3 ft. 6 in. by 2 ft. brick tower, and other works, in Newland, Battersea, for the Board of Works for the Wandsworth District. Mr. T. Pidditch, surveyor.—Hindle & Morrish. Cooke & Co. E. & W. Hes. J. King. Dickson. McKensie. Kellett. Marshall. Mars. Pizey. Harris. G. Neal. G. Kilgus. J. Meas. [Surveyor's estimate, 2,231l.]

BELLAGIO (Surrey).—For the erection of bungalows at Billericay, Bellagio, near East Grinstead, Surrey, for Mr. Arthur Burr. Mr. Walter J. Ebbetts, F.R.I.B.A., architect, Savoy House, 115, Strand, W.C.—Tenders submitted by Mr. Henry Baylis, builder, Highbury. No. 1 Bungalow. A. £195. B. £298\*.

BELLAGIO (Surrey).—For the erection of a bungalow at Fuzefeld Chase, Bellagio, near East Grinstead, Surrey, for Mr. J. H. Mackay. Mr. Walter J. Ebbetts, architect.—H. Baylis. £423 0 0.

BLACKHEATH.—For alterations and additions to the Three Tuns, Blackheath, for Mr. F. Walton. Mr. John Jas. Downes, architect, 163, Lewisham High-road.—Schellard. H. L. Holloway. Lorden & Sons (accepted).

CHELSEA.—For the erection of two studios at St. Leonard's Terrace, for Messrs. Cock & Elworthy (design No. 2). Mr. Walter J. Ebbetts, F.R.I.B.A., architect, Savoy House, 115, Strand, W.C.—H. Baylis (accepted).

CHESTER-LE-STREET (Durham).—For erecting block of offices and cottages, near The Hermitage, for Mr. Lindsay Wood. Mr. H. T. Girvan, architect, Durham. Quantities by Mr. G. D. Irwin, Sunderland.—Tremble & Co., Helton-le-Hole. Haswell & Waugh, Gateshead. Atkin & Co., South Shields. G. Graham & Son, Durham. Wm. Thompson, Chester-le-Street. G. H. Bell, Bishop Auckland. Jasper Kell, Birmingham. Geo. Douglas, Sunderland. Wm. Lodge, Flaworth. Thompson & Son, Chester-le-Street. W. G. Atkinson, Stockton-on-Tees. Robson & Son, Chester-le-Street. R. Sanderson, Birmingham. John Jopling, Chester-le-Street. Wm. Foster, Croxale. Thos. Akenhead, Stamfordham. Thos. Wood, Jarroon-Tyne. John G. Kilburn, South Shields. John Jennings, Chester-le-Street.

CLAPTON.—For additions and alterations, consisting of new assembly-room, studio, glass-rooms, lavatories, &c., at the Hix School for Girls, Marriestown, Clapton, for the Girls' Public Day School Company (Limited). Mr. J. Osborne Smith, architect, 34, Southampton-street, Strand. Quantities by Mr. F. H. A. Hardcastle.—J. J. Greenwood. W. Gregor. M. Manley. Wall Bros. J. Bentley. Exton & Burton. Barrett & Tower. Dove Bros. [Accepted. F. Woodward.]

DEPTFORD.—For alterations and additions to No. 50, New King-street, Deptford, for Mrs. Frank, Mr. John Jas. Downes, architect, 183, Lewisham High-road.—Martin. Blaker (accepted).

DEPTFORD.—For repairs and sanitary work to ten houses, Wotton-place, Mill-lane, Deptford, for Mrs. Longmotto. Mr. John Jas. Downes, architect.—Alwright. S. Best. Blaker (accepted).

DEPTFORD.—For alterations and repairs to a warehouse, Tanner's-hill, Deptford, for Messrs. J. F. A. Debridge. Mr. John Jas. Downes, architect.—H. L. Holloway.

EYE (Suffolk).—For new farm and other buildings at the Kerrier Thorndon Reformatory, Eye, Suffolk, for the Managing Committee. Mr. Frank Whitmore, architect, Chelmsford.—A. Dias, Colchester (accepted).

HASTINGS.—For restaurant and bar-fittings at the Palace Hotel. Mr. Arthur Wells, architect.—Smees & Co., Finsbury-pavement. Taylor Bros., Hastings. O. Hughes, St. Leonards. G. Vigor, Hastings. Sanders & Son, New Oxford-street. Sage & Co., Gray's Inn-road. J. Walker, Poplar. H. E. Crutenden, St. Leonards. T. Salter, St. Leonards (accepted). Sanders & Son, New Oxford-street\*.

KENSAL GREEN.—For the erection of two shops, Kensal Green, W., for Mr. J. Welford, Messrs. Raymond & Webb, architects, 16, Russell-road, W.—Martin Wells & Co. W. Oldrey & Co. F. T. Chinchin, Kensal Green\*.

KENSINGTON.—For additions, alterations, and sanitary works (exclusive of decoration), at 107, Holland-road, for Mr. James Caldwell. Mr. Edward Tidman, C.E., architect and surveyor, Connaught Mansions, Victoria-street, Westminster, S.W.—Giles Bennett. Harrison & Son. T. A. Owers. H. J. Hall & Co. (accepted).

LIVERPOOL.—For the erection of the Stanley Park Baptist Church, Walton-lane. Mr. Frederick H. Peate, architect, &c., 11, South Castle-street. Quantities supplied. Ed. Blackburn. Ed. Bostock. Thos. Tynon. Morrison & Sons. W. H. Clark. Richard Oates. Bell & Burnie. J. & G. Chappell. Thos. Bridge, jun., & Co. Brown & Blackburn. Thomas Urmon. Nicholson & Clarke. Geo. Woods & Sons. Hughes & Stirling\*. Not signed. Wm. Thornton & Sons. Wm. & J. Caird\*. Rathen & Campbell. Edmund Gabbitt. Thomas Spencer\*. [Accepted, with deductions. [Architect's competition estimate, design B (since which many alterations and additions have been made), 4,800l.] [All of Liverpool and district.]

LONDON.—For erecting the new City of London Court, Guildhall-yard and Basinghall-street. Mr. Andrew Murray, architect, Guildhall. Quantities by Messrs. E. L. Curtis & Sons, 119 and 120, London-wall, E.C., and Mr. Frederick Thomson, 5, Great James-street, W.C.—Stone. In Portland. Total. Lawrence. Conder. Grover. Colls. Budge. Patman & Fotheringham. Cubitt. Trollope. Chappell. Ashby & Horner. Holland & Hannen. Scrivener. Parry. Nightingale. Gentry. Mowlem. Morter (accepted).

LONDON.—For alterations and repairs at the Queen's Head, 403, Strand, for Mr. J. Sneyd, Mr. Edward Clark, architect, 432, West Strand. Quantities by the architect.—Wm. Smith. T. L. Green. Wilkinson Bros. A. Hood. Grover & Co. John Anley. Bishop Bros. & Marston.

LONDON.—For rebuilding the Britannia beer-house, Cambridge-road, E., for Miss M. A. Paxon. Mr. Edward Clark, architect, 432, West Strand. Quantities by the architect.—Wm. Smith. T. L. Green. John Anley. John Beale. Bishop Bros. & Marston. J. O. Richardson. A. Hood.

LONDON.—For repairs, &c., at No. 7, Sergeants' Inn, E.C., for Dr. B. W. T. Brooks, Mr. Edward Clark, architect, 432, West Strand.—S. Charlton. P. White. T. L. Green. Bishop Bros. & Marston (accepted).



*Particulars on Application. Chief Offices:—Fitzroy Works, EUSTON ROAD, LONDON, N.W.*



# The Builder.

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SATURDAY, OCTOBER 8, 1887.

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### Our National Maps.



It seems somewhat strange that the national maps of a kingdom such as ours, the mother of vast colonies, to whose inhabitants every foot of British soil is, or should be, dear and sacred, and who are destined

to be handed down to a remote posterity, not only our language, our customs, and our laws, but also our local histories and traditions, should be only now, at the close of the nineteenth century, nearing their completion, and that it is only now that the colonist is able to procure an authentic and explicit map of the parish where his forefathers lived and died, where he himself, perhaps, first saw the light, and the names of whose homesteads, woods, fields, streams, commons, and winding lanes have been handed down to his children as household words.

Turning from a perhaps somewhat poetical view to one of a practical nature, it seems still more strange that a business-like nation such as ours should have ignored to so late a period in its history the immense advantages to be obtained from a national survey of the kingdom, and that the War Office, the county, parish, city, town, and village authorities; the railway, canal, gas, water, mining, and other companies; fishery boards, land-owners, tenant farmers, parochial clergy, and others, to say nothing of antiquaries, students of history, geology, mineralogy, botany, &c., should only recently be able to obtain efficient and authentic maps of the parts of the kingdom in which they may be interested.

While the National Survey has been in hand generations have come and gone, and though its late commencement and its still more tardy execution are to be regretted, delay has allowed the use of recent discoveries of science, and the Ordnance Survey authorities have thus been enabled to present us with a finished work which, even in 1867, was rightly pronounced by competent French authorities to be "sans précédent et qui devrait servir de modèle à toutes les nations civilisées."

Our national maps, faithful and true pictures as they are of the land of our inheritance, with all its venerable histories and traditions, are yet far from being sufficiently known, appreciated, or understood, even by those whose training should naturally enable them to value the skilled execution displayed, or delight in the remarkable collection of geographical,

historical, topographical, and antiquarian detail that is laid before them.

In time, doubtless, those interested in the training of the young,—the men and women of the next generation,—will appreciate the parish sheets of the Ordnance Survey, which can now be procured at such trifling cost, and, mastering the details themselves, will learn with surprise what a valuable source of instruction the maps can be made; how great a love for home and country can, by their aid, be evoked; and what healthy interest in the study of history, botany, geology, &c., can be called into existence and steadily maintained.

Country walks, fishing excursions, visits to ancient objects, or historical sites can be, step by step, traced on the map; distances, areas of fields, woods, and commons, noted and compared; heights, inclinations of roads, falls of streams, can be observed; and memoranda made as to the haunts of the *fauna*, and as to the localities of different botanical and geological subjects. In short, in careful and appreciative hands, the parish sheets of the Ordnance Survey could be made to play a most important part in the education of the young, for, apart from the instruction to be derived from them in regard to archaeological and historical study, who can doubt the good effect of children being early trained to observe heights and distances, and to judge of areas, especially in the case of boys who are destined to follow many of the professions,—to become military commanders, engineers, architects, or surveyors?

Of the various classes of national maps issued by the Ordnance Survey Department, there are three of chief importance, viz., those on the respective scales of

$$\frac{1}{10560} \quad \frac{1}{2500} \quad \text{and} \quad \frac{1}{500}$$

or, in other words, on the scales of 6 in. to the mile, 25·344 in. to the mile, and 126·62 in. to the mile, which said scales are further designated as the county, parish, and town scales.

It is much to be regretted that instead of the county scale of 6 in. to the mile ( $\frac{1}{10560}$ ) the slightly larger scale of 6·336 in. was not used, and of which the equivalent is the fraction  $\frac{1}{10000}$ ; for then we should have had the parish scale an equi-multiple of the county scale, just as the town scale is of the parish,—an immense advantage, but one which engineers and surveyors can, perhaps, alone fully appreciate.

Unfortunately, the country was, in the early days of the Survey, too much wedded to the duodecimal subdivision of the lineal foot, and to the octave subdivision of the inch, for

Parliament to sanction such an innovation as a 6·336 scale; and so we were doomed to have in our county sheets 1 lineal inch representing 10,560 lineal inches on the ground, instead of the more readily handled, more easily subdivided, and more promptly reckoned number of 10,000 inches.

The credit of proposing the  $\frac{1}{2500}$  scale for the parish sheets is due to Capt. Dawson, R.E., who in 1837 strenuously urged its adoption.

In 1853 the question of the scale was still undecided, and the Treasury consulted the most eminent scientific societies and men of science in the kingdom on the subject, with the result that opinions were divided in favour of a scale of 24 in. to the mile and one of three chains to the inch, the latter being the scale on which the old, unofficial, and consequently very inaccurate, maps had been prepared for the use of the Tithe Commissioners.

If these two scales be, by the simple rule of proportion, converted into fractions, they will appear as

$$\frac{1}{2640} \quad \text{and} \quad \frac{1}{2376}$$

The supporters of the  $\frac{1}{2500}$  scale now seeing their chance, urged that their scale was a mean between the two proposed scales; that having been the scale sanctioned by Napoleon I. for the Cadastral Survey of France, it had been found admirably suitable; that it was easily divisible; and, finally, that one square inch on a map of this scale exactly represented one English acre, which last fact, considering the scale is of French origin, is somewhat curious.

It was thus the even now much-wondered-at and ignorantly-abused scale of 25·344 in. to a mile ( $\frac{1}{2500}$ ) came into use.

The town scale of  $\frac{1}{500}$  happily followed, and to this scale all towns of more than 4,000 inhabitants are laid down.

Our city and town authorities require to be furnished with a block plan, amongst others, of all new buildings proposed to be erected within their jurisdiction. At present there is no particular scale, except a minimum one, prescribed for such block plans, but with the splendid town maps now furnished by the Ordnance Survey Department, city and town authorities would do well to require all block plans sent in to them to be on a scale of 41·66 ft. to the inch ( $\frac{1}{500}$ ), so that such plans

could be at once transferred to their own maps, by which means the latter could be properly and effectively kept up to date.

Architects, in many cases, prepare their



drawings on a scale of 8 ft. to the inch, which is equivalent to  $\frac{1}{96}$ . If, however, a scale of

1 were used, their drawings would be on a scale exactly five times the size of the Ordnance town scale, and thus we should have our buildings, our towns, and our parishes all laid down in harmony with each other, to very great national advantage and economy. Not, however, until the decimal subdivision of the fact is generally adopted in place of the present tedious and troublesome duodecimal sub-division can such a change be looked for.

The system of the Ordnance scales having been discussed, it will be interesting to note how the kingdom has been divided and subdivided for the purpose of giving the public plans of convenient size, and suitable for ready reference; and the following explanation, though in reality the order is inverted, will, perhaps, suffice.

Parallel north and south lines being drawn at a distance from each other of six miles are crossed by parallel east and west lines at intervals of four miles, and the whole kingdom is thus broken up into rectangular sections, each containing twenty-four square miles. These sections, being laid down on a scale of 6 in. to the mile, give convenient sized maps of 3 ft. by 2 ft. The sections of which each county is composed are known as its county sheets, and are designated by Roman numerals. Small key county maps, on which all the parishes are delineated, are published, showing where these rectangular sections fall and the numbers of the same, and thus one is able to select at once the particular sheet or sheets required.

Again, each county sheet is subdivided into 16 equal rectangular sections, numbered consecutively from 1 to 16, and these sections being laid down on a scale of  $\frac{1}{2500}$  give us

what are known as parish sheets. For each parish a key map is also published, and by its aid all the parish sheets which go to form the complete map of the parish can be at once selected; and since the scale of  $\frac{1}{2500}$

is nearly four times the size of the 6 in.  $\left(\frac{1}{10560}\right)$  scale, each sixteenth portion of the latter, when redrawn to a scale four times as large, will give a map almost the same size as the parent map, which size, as we have seen above, is very convenient.

The quantity of ground shown in a parish sheet is the sixteenth part of twenty-four square miles; that is,  $1\frac{1}{2}$  square mile or 960 acres.

Where any town containing more than 4,000 inhabitants exists on the parish sheets, these sheets are subdivided into twenty-five equal rectangular sections, and each section being enlarged five times, i.e., to a scale of  $\frac{1}{500}$  attains the exact size of the parent sheet. These sections are numbered consecutively from 1 to 25. Each town is provided with a key map, similar to the parish key maps, and hence the town sheet or sheets are readily selected.

In purchasing Ordnance sheets through a local agent, or ordering the same from London, care must be taken to quote the correct number (Roman numerals) of the county sheet required. Should a parish sheet only be wanted, its proper number, which lies between 1 and 16, must be written after the Roman number of its parent county sheet; and should a town sheet be required its proper number, lying between 1 and 25, should be written after the number of its own parent parish sheet.

In order to comprehend the system on which the parish sheets are drawn recourse must be had to the "Book of Reference" published for every parish, which contains an index map of the parish, an explanation of all the terms and symbols used, and the area, to the thousandth part of an acre, of every field and enclosure.

The Ordnance Survey Department has taken a wise and advanced step in giving the areas

of all the enclosures in the kingdom in statute acres and decimals of acres only, thus finally abolishing "customary" land measurement, and tending to do away with the subdivision of English acres into roods and perches. Allusion has been already made to our tedious and troublesome subdivision of the lineal foot; the same objections stand good against our present subdivision of the acre, and equally, if not more so, against our cumbersome ton of 2,240 lb., with its subdivisions into hundredweights, quarters, and stones. The American and Canadian system of expressing all weights in pounds only, until the "short ton" of 2,000 lb. is arrived at, is much to be admired, and probably a change in our system of weights and measures in the direction shown would do more to further the collection of valuable agricultural statistics than generally could be believed.

It will be noticed that in addition to a scale of feet, the Ordnance maps are also furnished with a scale of chains and links. Gunter, the mathematician, more than two centuries ago, conferred a benefit on his country by the introduction of a chain of such a length that ten square chains, i.e., an area ten chains long by one chain broad, were equal to one statute acre. Gunter's chain, the length of which is 66 ft., is divided decimally into 100 links, and hence 100,000 square links represent one acre. Thus the acreage of any piece of land can be found by simply multiplying the mean breadth in links by the mean length, and dividing the product by 100,000, the answer being the acreage to a thousandth part of an acre.

For ready reference to Ordnance sheets a convenient method will be found to endorse on each of the four corners of the back of every sheet its proper numbers, and the sixteen subdivisions of each county sheet being rolled together will thus form one family or group, whose surname is, as it were, the Roman numeral of the county sheet. The different families of each county being then placed in numerical order, any particular sheet required can be at once selected. The town sheets, similarly endorsed, should also be rolled together. The small index or key maps of the county, parishes, and towns should be kept at hand, when a glance will suffice to show the number of any particular sheet that may be required.

In our national maps the hedges are delineated by a single line only, this line denoting the centre of the hedge, and to which the acreage of each field is calculated.

It has been objected that the actual acreages are not thus always shown, since, in practice, some hedges are included and some excluded in computing areas of fields; but the Ordnance Survey Department has nothing whatever to do with the boundaries of private property, and rests content with endeavouring to produce a perfect picture of the kingdom, such as would appear from a balloon exactly over every point of the same. This picture, in convenient sections, is on sale to the humblest farmer and to the smallest land-owner, as freely as it is to the wealthiest proprietor, and at a price astonishingly small.

France was long before us in the execution of her Cadastral Survey, but the maps of the same are not published, as ours are, for sale to the public, and thus that nation is deprived of almost all the immense benefits we enjoy. Without our national maps, giving, as they do, an accurate impartial plan of the whole of the kingdom on a fixed scale, with identical styles of drawing and with identical symbols, a proper system of land transfer and registration would be impossible, and on the final passing of the present Land Transfer Bill the importance of the national maps will become increasingly manifest. For the benefit of the public it may then seem desirable to permit the sales of local Ordnance sheets at the post-offices, and to exhibit in each post-office the index or key maps.

For those who wish to go more fully into the study of the subject, we may recommend the valuable work on "The Ordnance Survey of the United Kingdom,"\* by Lieut.-Colonel

White, R.E., published last autumn,—a book which should be read and studied by every lover of his country.

#### "LES ARTISTES CÉLÈBRES."

UNDER this general title there has been appearing for some time a series of short biographical and critical notices of eminent artists of all ages, by various authors, written in French, and published in Paris, but on which the name of a London publishing house also appears. They form very pretty octavo volumes, in a vellum cover of artistic design, and the contents bear out the fair promise of the exterior, at all events as far as the literary portion of the work is concerned. The main facts in the lives of the artists dealt with are given in a readable form; but a higher value is given to these biographical essays by the admirable spirit of critical analysis of the art and the artist which pervades them. The illustrations are not all that could be desired, the slight and rather crude engravings serving rather as memoranda than as illustrations of some of the more celebrated works referred to. On the other hand, a good many reproductions of facsimile sketches, hitherto unpublished, are scattered about the pages, and these, which can be adequately represented by an inexpensive process, are of real interest.

The volumes, so far as we have at present from time to time received them, deal with the genius and works of Pheidias, Donatello (we name them in chronological order), Ligier, Richier, Palissy, Callot, Rembrandt, Edelinck, Lamour, Reynolds (this is the last one which has appeared), Prud'hon, Delacroix, Decamps, Fortuny, and Regnault: the respective authors' names are given below.\*

In regard to the great Athenian sculptor, M. Collignon remarks with truth that it is more easy to relate the legendary than the real history of Pheidias (the French writers still retain the spelling "Phidias," which has been nearly abandoned in Germany and England), and the essay is, in fact, in the main a critical analysis of his known work, accompanied by illustrations mostly taken from the British Museum treasures, and which are better executed and more worthy of their subject than is the case in some of the other volumes of the series. The author makes no attempt at restoration of the pediment sculptures in the illustrations, but gives illustrations of some cognate groups, such as a "dispute of Athene and Poseidon" from a vase found at Kertch, and coins representing statues of Athene, which may give the general reader a better idea of the probable original and complete form of the central group of the west front, and of the colossal statue in the interior of the temple, than he could get from descriptions alone. The general question of the arrangement and signification of the groups is too large a subject to go into a notice of a work which is only one of a series; M. Collignon devotes a good deal of space to it, and concurs with Mr. Waldstein in regarding the figure in the library of St. Mark at Venice, and of which a cast has been placed among the Elgin marbles in our Museum, as probably one of the west front figures of the Parthenon; at all events, as certainly the work of Pheidias. M. Collignon

- \* Les Artistes Célèbres:—  
Donatello. Par Eugene Muntz, Conservateur de l'Ecole des Beaux-Arts. 1885.  
Henri Regnault. Par Roger Marx. 18-6.  
Decamps. Par Charles Clément. 1888.  
Fortuny. Par Charles Yriarte, Inspecteur des Beaux-Arts. 1886.  
Jean Lamour. Par Charles Courault, Conservateur du Musée historique lorrain, à Nancy. 1889.  
Jacques Callot. Par Marius Vachon. 18-6.  
Girard Edelinck. Par le Vicomte Henri Delaborde, Secrétaire Perpétuel de l'Académie des Beaux-Arts. 1886.  
Bernard Palissy. Par Philippe Burty, Inspecteur des Beaux-Arts. 1886.  
Rembrandt. Par Émile Michel. 1836.  
Phidias. Par Maxime Collignon, Professeur Supplémentaire à la Faculté des Lettres de Paris. 1888.  
Prud'hon. Par Pierre Gauthiez, Ancien Élève de l'École Normale Supérieure, Bibliothèque de l' Arsenal. 1889.  
Joshua Reynolds. Par Ernest Chesneau. 1887.  
Eugène Delacroix. Par Eugène Veron, Directeur de l'Art. 1887.  
Ligier Richier, Sculpteur lorrain du XVIe siècle. Par Charles Courault. 1887.  
Paris: J. Rouam. London: Gilbert Wood & Co.



uches on the question, what was the precise art which Pheidias himself had in the execution of these two great series of sculptures. Personal execution of the whole with his own hand was, of course, out of the question. The French critic seems to incline to the opinion that Pheidias himself modelled the whole in clay, giving the execution in marble to various sculptors in his atelier; that unity of conception and feeling, then difference in handiwork is the evidence given by the work preserved to us; and there is a certain distinction between the style of sculpture in the different figures, which is larger and bolder in some, and more minute and delicate in others. But in the main one's feeling is that since assistance must have been employed in producing the whole, the general unity of effect in the execution is marvellous, and is an indication of the extent to which Pheidias was able to impress his own style and feeling on his subordinates.

The life of Donatello, who may be called the Pheidias of the Early Renaissance, comes not suitably after that of the great Greek. To be sure, Donatello was an artist who lived in an incomplete or childlike period of art, while Pheidias represented a period of manhood; but Donatello's greatest work, the St. George, represents, as M. Müntz observes, a grand simplicity of pose "which would have enchanted the Greeks themselves," and which places the work intellectually in close relation with the finest Greek work in an æsthetic sense, while there is what may be termed a moral beauty about it of which the Greek mind had hardly a conception. In his numerous bas-reliefs, moreover, Donatello shows a close artistic relationship, though unknown to himself, with such work as the Parthenon frieze: there is the same low relief, the same severity of line, the same delicate perception of the conditions and capabilities of bas-relief, and we never see one of Donatello's works of this class without thinking of the Greeks, though here again we find a tenderness and holiness of sentiment to which Greek art presents no parallel, the feeling represented in such a word as "holy" having, indeed, as far as we have any evidence, no place or existence at all in Greek art and literature; some of the Greek grave reliefs, of which we said something recently, come nearest to it, though here the feeling is rather pensive than religious, in the post-Christian sense of the word.

Considerable interest attaches to the essays on Delacroix and Decamps, those two remarkable artists of the earlier part of the century, when French painting was in a more healthy and vigorous state than it can be said to be now. It is curious at the present moment to read that the works of Delacroix evoked the most violent hostility for a long time from critics and from the artists of the old school, on account of their revolutionary style and revolt from the classic models of the "École." The best-known works of Delacroix would be regarded by most critics now as quite within the most orthodox canons of art, but his biographer, M. Veron, evidently regards him as a somewhat erratic genius, since he draws a contrast between the character of his work and of his life, the violent and tragic character of his paintings and the calm and well-regulated conditions of his own existence. It appears, however, that Delacroix so far carried the enthusiasm of his artistic side into his life as to have been at all times a very effusive friend or admirer of the people he loved and the things he admired. His portrait, with what the French call a strongly-marked "meridional" character, accentuated by his tangled mass of dark hair, indicates this kind of nature. As far as his art was concerned, our own judgment would be that he was a remarkable instance of an artist essentially romantic in style and feeling, but working within the strict lines of artistic form and propriety, combining passion and emotion with a remarkable degree of artistic balance and self-control. His "Waterloo," of which a reduction from an etching is given, is an example of this. This is a work of great pathos; a dark hill-side, a wounded man, and two dead horses, that is all; it tells its tale with great effect, but there is no straining after

the dramatic in it, nothing stagey or overdone. Among the works from which illustrations are given, and which are not much known, is his series of illustrations of "Faust," of which the scene of the death of *Valentine* is illustrated, and also the broad and powerful pen-sketch made for a title-page to the set. Among the illustrations of sketches, the finest in the book is the "Education of Achilles," a most vigorous design, representing the young Achilles astride on the back of the centaur, who is galloping away from the spectator, and pointing with his hand at some mark at which Achilles aims his arrow, the figures of Achilles and the centaur both with a consentaneous impulse and bend in the same direction, which gives wonderful force to the composition. Delacroix was at war with the Académie set, or rather they were at war with him, for most of his life, though he received a tardy election at last. In connexion with the subject of the Academy elections, the author relates a story about another artist, M. Rude, who was invited by two members, X. and Y., to apply for admission to the Académie. He was balloted out, and heard from X. that Y. had voted against him. He charged Y. with this on meeting him, saying he had learned it from X. "Well," was the reply, "X. did not vote for you either, for you had not a single vote,"—an interesting illustration of the ways of Academies.

Delacroix was born in April, 1798; his brilliant compeer, Decamps, about five years later, as he said himself, "on the third day of the third month of the third year of the century." The volume devoted to Decamps is disappointing in the selection of the illustrations, in which rather disproportionate place is given to his earlier satirical and caricature work, very clever in itself, but not the kind of thing we connect with the name of Decamps. Of his more serious works the selection does not seem very judicious; at any rate, we have seen finer things of Decamps' than any of which illustrations are given here, except perhaps the "Christ in the Praetorium," the original of which we have not had the good fortune to see, and of which the engraving given is a very poor one, but which appears to be a remarkable Rembrandtish kind of work, an energetic contrast of expression between the calm face of Christ and the various vulgar and mocking figures around, brutal both in attitude and expression. It is a pity that a good illustration of "The Patrol at Smyrna" (one of Sir Richard Wallace's pictures) was not given; it is certainly one of his most characteristic works. The illustration of "Christ Crossing the Lake of Genesareth," which is a well-executed one, gives a good idea of his special power in landscape; as also the smaller engraving "Paysage en Syrie" with its square masses of white buildings in the foreground. M. Clément comments on the manner in which Decamps used architecture in combination with landscape and figures in his paintings.

"Ce mot d'architecture ne doit d'ailleurs pas être pris dans son sens ordinaire. L'architecture n'est pas là pour sa beauté, comme dans les vues de Canaletto, ou dans les paysages de Claude Lorrain; elle n'y est pas non plus pour servir de Théâtre à l'action, comme c'est le cas dans les peintures décoratives de l'école Vénitienne, et en particulier dans celles de Paul Véronèse. C'est la muraille, grande, nue, muette, projetant son ombre mystérieuse sur les portiques du tableau vivement et franchement éclairés. L'ombre portée, héritage des peintres Espagnols, pierre angulaire de la doctrine de Decamps, joue là tout son rôle. L'harmonie n'est pas détruite par les contrastes les plus violents; l'œil passe, presque sans transition et sans être blessé, de la lumière la plus ardente, la plus balayée, à des ombres intenses, transparentes, et profondes. Les figures se détachent dans les dédaillures par des tours de force de science et d'adresse. Ici le sujet importe peu à Decamps; une rue de village en Italie, une cour de ferme en France, un porche d'église avec une mendicante, quelques animaux sur la fumée, un intérieur de boutique à Smyrne ou à Beyrouth, tout lui sert à poursuivre cette lumière, ce protégé, dans ses infinies modifications."

It is true also, in another sense, that "the subject mattered little to Decamps," since he was one of those peculiarly artistic artists, so to speak, to whom a subject is merely an opportunity for artistic effect, not for any story, still

less for any moral. His fine head, of which a good portrait is given, expresses this completely; it is the head of the draughtsman, the man with an eye for effect in everything, but as far as possible from an artist with a theory or a mission. The military character in his physiognomy, visible in this portrait, is still more brought out in that capital group of the leading French artists of his period, half soldiers half painters, in Mr. Armistead's relief on the Albert Memorial.

Of another gifted artist, who was indeed, too unhappily for the country which has lost him, both painter and soldier, Henri Regnault, we have no space to say more than to direct the reader's attention to this sympathetic sketch of his life and works by M. Roger Marx. A good engraving is given of the bust of Regnault from the monument in the École des Beaux-Arts,—and what a head it is! The very ideal of intellectual manliness and vigour. A good many facsimiles of his studies are given; some admirable sketches of dogs, and a brilliant study for an illustration to De Musset's "Nana." Perhaps the force and originality of Regnault's genius are best shown in his "Judith and Holofernes," which is such a contrast in its terrible realism to the conventional Judith of respectable painters. His "General Prim" is an ardent young man's piece of bravado; of tremendous spirit, but still bravado; and his "Execution in a Moorish Palace" we always regretted; it is too brutal; and if the Prussians had not cut short his life he would possibly have lived to think so himself.

Among the less famous subjects of these essays, the sketch of the Lorraine sculptor, Ligier Richier, is of considerable interest, and the small outline engravings of his works show, in many cases, great though rather naïve originality. The very best, perhaps, though in a sense rather painful, are the figures of the penitent and impenitent thief, from the Church of St. Pierre at Bar-le-duc; these, by the way, we observe are only "attributed" to him. He was born somewhere about 1500. The thin volume on Jean Lamour, by M. Cournaud, gives a good many illustrations of his elegant Louis Quinze grilles, gates, and lanterns. M. Vachon gives some account of Callot, the master of grotesque, with a number of characteristic examples, including a facsimile of his large etching of the temptation of St. Antony (a subject after Callot's own heart), and another of the well-known print showing the Pont Neuf and the old tower of the Porte des Vesses, with a big basket let down from it like a gigantic spider at the end of his line. The life of Prud'hon, one of the cold and pretty classicists of the eighteenth century, has the merit of being better illustrated than some of the lives which would have been better worth good illustrations. Reynolds, described as "le plus célèbre, mais, à nos yeux du moins, non le plus illustre" of English painters, is treated of by M. Chesneau with a certain enthusiasm for many of his works; M. Chesneau, indeed, admits that his portraits taken *en masse* are a wonderful collection, but he accuses Reynolds of having almost always in his eye some ideal model, Murillo or some one else, rather than the sitter he had in reality before him. What the author means he illustrates rather well by instancing as an exception the "Lord Heathfield," where he thinks the artist was really carried away by patriotic admiration for the commander and for the occasion, and gave a truly unaffected and grand picture of a great commander, without affectation or pretence. Among the portraits of women he thinks Reynolds's *chef d'œuvre* is "Nelly O'Brien," but he does not say which Nelly O'Brien. He winds up:—"En un mot, l'exhale plus souvent des œuvres de Sir Joshua Reynolds une odeur d'atelier, d'huile, et de vernis, qu'un parfum de réalité." We can understand the grounds for this opinion, but we think it is pushed rather too far.\* The

\* As a set-off against this, it is related in the Life of Delacroix that on first coming to England and seeing the works of English painters, he was so struck with the style of Constable that he forthwith almost repainted the picture he was then at work on, the "Massacre de Scio," in an effort to emulate the vigour and freedom of the English artist's technique.



illustrations given from Reynolds's works are mostly very poor, and do no justice to the originals.

Taken generally, however, these are a very interesting and valuable set of monographs, written with true critical perception, and forming very pleasant and thoughtful essays in artistic biography.

#### NOTES.

**P**ROFESSOR MARSHALL, in a letter to the *Times* of Monday, proposes that, in order to lessen the danger to the audience from fire breaking out on the stage, the stage should be ventilated from the auditorium, and that a number of extractors should be placed over the roof of the stage portion of the building, openings below in this portion being kept closed, and thus a continual current should be drawn from the auditorium on to the stage. The whole object of this absurd and unpractical suggestion is to obviate the tendency of the fire to spread towards the auditorium, as an iron curtain, though useful, as Professor Marshall admits, may not be let down at once; that is, some one may be stupid or may not do his duty. And so, for no better reason than this, the actors are all to breathe the air the audience have already breathed, and to have direct ventilation cut off from them, and the whole movement of the air is to be set up in such a direction as to militate against the acoustic properties of the house! Did it never occur to Professor Marshall that it is more difficult to make yourself heard against a current of air than speaking with it? or did he never hear that the securing of a ventilation current from the stage side towards the house (not from the stage area itself, but from that direction) is a decided help to the acoustic qualities of a theatre? Really between the nonsense that people write to the daily papers and the nonsense that has been sent to us (but which we, at any rate, know better than to waste type on), it seems as if most people had gone out of their minds on the subject of theatres, and had forgotten that one object of a theatre is that people should hear and see a play in it. One person writes to us to know why all theatres are not built entirely of concrete and iron, and with an iron floor and bearers for the stage. Let him try it, and see how actors and audience will like it, and how many letters will appear in the *Times* abusing architects for building theatres in which actors cannot make themselves heard. One of the few sensible and practical letters we have seen on the subject is that of Madame Marie Roze in the *Times* of Wednesday, suggesting that the first thing to be thought of is improving the state of things behind the scenes; taking gaslights away from dangerous proximity to combustible materials, and making the attendants who have charge of lights and of hose criminally responsible if anything goes wrong through their neglect. Electric lighting (incandescent lights) behind the scenes is the most practical step towards safety from accidental conflagration of scenery, &c.; and the general adoption of that system on the stage at all events, if not in the auditorium, would render theatres a great deal safer.

**B**AD as the public health is just now in London with so much scarlet and enteric fever prevailing, it should be a subject of heartfelt congratulation that the cholera has so far given us the go-by, although it still hangs about Southern Italy and Malta in an unpleasant manner. There was a most interesting discussion at the recent Vienna Sanitary Congress on the subject of quarantine, the uselessness of which was generally conceded, while England was specially singled out as the country which has taken the lead in demonstrating its inutilty, by never imposing quarantine on people or things arriving from India, where most of the cholera has its source. The theory of contagion arising through water supply was disputed by Professor Gruber, while, on the other hand, Dr. Spatuzzi, of Naples, pointed out how that city had enjoyed

comparative immunity ever since the new waterworks had been finished. Professor Pettenkofer lectured on the influences which, in his opinion, locality and season had upon the disease. Of course, entire immunity on such a subject could not be expected, though it was satisfactory to hear from some of the greatest Continental authorities of the day, that we in England are considered to be on the right tack in sound and logical treatment.

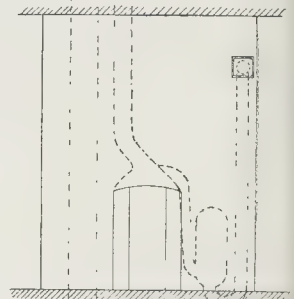
**T**HE Local Authorities of Croydon are carrying on a systematic house-to-house sanitary inspection, evidently with all the beneficial results upon public health which have attended similar steps in some of the suburban districts. A pleasing feature of these inspections is that the owning and occupying public, recognising more and more the importance of such work, are putting forth now a helping instead of a frustrating hand to the sanitary officials. A large proportion of inhabitants no sooner hear that such a step is to be undertaken than they invite the authorities to examine the sanitary condition of their houses, and in very few cases has the surveyor to issue the threatening legal notice to remedy the discovered defects. It appears from the annual health report of Croydon that nearly 5,000 houses, large and small, have been visited during the year, and with only one or two exceptions have the owners failed to comply with the simple note of the Surveyor, pointing out the sanitary defects and the necessary remedies. The work appears to have already perceptibly decreased the death-rate. The death-rate for the seven weeks ending September 10th last was 14.15 per thousand of the population, notwithstanding that at this period of the year the rate of infant mortality is high in consequence of the hot weather. The death-rate for the year was 14.52 per thousand, though the mean rate for the preceding ten years was 16.72. The death-rate of Croydon is, according to the Registrar General's return, about 2 lower than the rate this year in the ring of suburbs round London, 3.28 lower than the smaller towns and country districts of London, and 4.78 lower than England and Wales generally. It may be added that in Croydon 461 of the better class of houses were inspected during the year, and 63 had defects in sanitary arrangements, such as would allow the escape of sewer gas into the house. As many as 229 were inspected at the special request of the owners; of these 85 were free from defects, 79 had defects which permit of the escape of sewer gas; and the others had only minor defects. 3,884 small houses or cottages were inspected: 884 of these were in an insanitary condition, but chiefly owing to dirt,—4,460 re-inspections were made to secure the execution of the necessary remedial work. It seems that the drainage defects were almost exclusively found in the older houses, and that in new properties, as a rule, the approved sanitary arrangements have been carried out.

**T**HE small diagram appended shows the principle of a method of extract ventilation patented by Messrs. Young & Moss. The following is the inventors' description:—

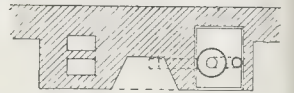
"A grating is placed near the ceiling line, from which a pipe descends in the brickwork of the chimney-breast to the floor level, and then enters a small chamber or cylinder, through a syphon (all the apparatus being placed out of sight behind the firegrate); a short pipe is taken from this chamber, and communicates with the chimney-flue, terminating just above the fireplace opening; the action of the draught (which is greatest at this point) on the end of this pipe, combined with the heating of the cylinder which is in contact with the fire, helps to draw rapidly off the vitiated air from the top of the room into the cylinder, and from thence into the chimney-flue. No reverse action is possible, the cylinder serving as an effectual trap and disconnector. In summer, in ordinary rooms the fireplace opening is better closed up, as by this means the draught up the flue is materially increased. Where the chimney-flues are defective a gas jet may be placed within the cylinder."

We have always upheld that vitiated air should be extracted from the upper part of a residential apartment, to which it naturally gravitates (or levitates), and not be coaxed down again; and this system has this recommendation; and

from personal inspection and testing we are satisfied that it does create a decided and pretty powerful extract draught even without the aid of the fire or of any other artificial heat near the upcast pipe. With the fire as a further assistance there would seem to be no possible doubt of its efficiency, unless the draught of the fire itself up the ordinary flue should act



Elevation



Plan

as a pull the reverse way of the system; this we have not tested, but we should think this result improbable. As to the function performed by the cylinder the inventors themselves do not seem quite clear, but they state as a fact that without the intervention of the cylinder it refuses to act, or is liable to do so, and that the result is the same if the upcast pipe is taken from the top instead of from the lower portion of the cylinder. The extract, of course, presupposes a corresponding area of inlet, but this is not dealt with as part of the patent. We inspected it under every disadvantage, with a temporary fixture and no artificial heat to stimulate the flow, and under those circumstances it is an efficient and pretty powerful extractor from the upper portion of the room, without any mechanical appliances.

**A** GOOD deal of excitement is being caused at Athens by the report of a discovery at Mantinea. The excavators there have come upon three large sculptured slabs, with a representation of the contest between Apollo and Marsyas. Marsyas appears with the Phrygian flute, his proper attribute; Apollo with the lyre. The two are surrounded by the Muses, who are present as judges. The great interest of the slabs consists in the possibility of their identification with the designs in the pedestal of a statue seen and described by Pausanias (book viii.) in his account of his visit to Mantinea. He says:—"And the Mantineans have a double temple divided down the middle by a wall. In one part there is a statue by Alcámenes of Æsculapius; the other is the shrine of Leto and her children. Praxiteles made the statues in the third generation after Alcámenes. On the basis of these there are *Muse and Marsyas playing on the flute*." If Praxiteles made the statues, did he not also carve the pedestal? The reliefs are described as of the utmost beauty of execution. They are to be taken to the Central Museum at Athens. True, Pausanias only saw one Muse; but then, perhaps, he only looked at one side of the pedestal.

**W**E have not had an opportunity as yet of making an inspection of the Roman remains at Tockington Court Farm, near Bristol, but, if we accept the detailed account published in the *Bristol Times and Mirror* of the 1st of this month, the discovery is one of no little importance and interest. It is



d to read that the first discovery of Roman remains on the farm, by a mason employed some alterations in the buildings, was in 84, and that, though the discovery was so appreciated that it was decided to cover the mosaic pavement discovered lest it could be injured by the frost (the discovery having been made in the winter), after it was done everything about it was forgotten till a few weeks ago Mr. Smith, the farmer tenant on this part of the estate, was reminded of it by coming on some other Roman remains whilst cutting a drain across his yard, and this led to a renewed investigation and to the finding of some large pieces of mosaic pavement, one of them, according to the Bristol Journal before referred to, of about 14 ft. by 10 ft., as well as another of 18 ft. square, and elsewhere a portion of 9 ft. long by 10 ft. wide. The place has evidently been the site of a large Roman villa, and as to the precise value of the remains, of course, we express no opinion without a special examination.

WE reviewed some time back (vol. lii., p. 491) at considerable length Drs. Furtwängler and Loeschke's last issue of *kykänische Thongefässe*, and expressed at the time our warm adherence to their view at the Mycenaean antiquities generally were of autochthonic (Achaean) origin. This view we retain unshaken, but it is only fair to note that it has been recently very ably controverted by Drs. Dümmler and Staudniczka. The German archaeologists have a way of running and also fighting in couples, which denotes rather the magnitude of their undertakings than any individual inadequacy. The point stoutly maintained by these two last combatants is that the Mycenaean antiquities are not autochthonic, not Achaean, but in the main foreign and of Carian origin. The arguments to and fro are too complex to be summarised, but the paper which embodies them could not remain unnoted here, and deserves to be carefully read. It appears in the *Mittheilungen des Archäologischen Instituts Athen*, xii., Nos. 1 and 2.

THE Carpathian vases noted (p. 83) in Dr. Furtwängler's work just cited have been presented by Mr. Paton to the British Museum. The *Classical Review* for October, a number which well maintains the high level of interest of the journal, gives a list of further acquisitions. In addition to the above vases, Mr. Paton gives the Assarlik antiquities discussed in the *Hellenic Journal* (viii. 64-82), and three other vases of the Mycenaean type. After these the most interesting acquisitions are a lekythos (oil-flask) from Tarentum of secular technique, white on black with details in buff; a large hydria in the so-called Chalcidian style, with frieze of warriors, horses, &c.; and a curious bronze plaque decorated in panels, each panel containing a pair of nude figures. This plaque is apparently a rough and probably late imitation of the sort of bronze work found at Olympia. The *Review* continues its full yet concise summaries of foreign Classical periodicals, literary and archaeological.

THE series of notes by "A Foreign Artist and Author in England," which are in progress in the pages of the *Art Journal*, accompanied by many excellent sketches, deal this month with Chester, coming, therefore, rather *apropos*, just when such a discussion on the Walls of Chester is being carried on; though the coincidence appears to be quite accidental. The author (M. Villars, a Frenchman, we presume) does not go into questions of archaeology, but deals with the artistic and picturesque aspects of the places he visits. The article this month includes a sketch on the Walls of Chester, and another on the Rows, both exceedingly faithful to the locality. Mr. Villars comments, with some excusable sharpness, on the fact that when inquiring in the city as to the existence of any art or archaeological museum, he was sent to the little worthless collections in two of the old turrets on the walls which are misnamed museums, and that no one gave him

any information of the existence of the recently-formed Museum and School of Art in Chester, of which he only heard from a friend a few days after his visit. M. Villars rather criticises, and we think with reason, the habit of erecting modern buildings in the Rows in direct imitation of the old half-timber houses; the intention he thinks is praiseworthy, and shows an appreciation of the picturesque element in the ancient structures, but he considers the contrast in tone and appearance between the old thing and the obviously modern imitation has a very unsatisfactory result. These articles in the *Art Journal* should be looked at by those who are interested in seeing how our towns and villages appear, both as regards architectural and human character (for there are plenty of capital figure sketches), in the eyes of an obviously clever and cultivated foreigner.

THE College Hall at Worcester, which has been lately restored under the care of Mr. Christian, was reopened on Monday last. Now serving for the purposes of the Cathedral, or King's, School, this fabric had been the Monastery refectory. Its upper portion dates from the fourteenth century, whilst the lower floor, with its undercroft, is two hundred years older. Henry VIII. gave to the Dean and Canons' charge a boys' school which would seem to have existed here concurrently with the original establishment of the see. According to Smith and Onslow's "History of the Diocese" (1883), this see dates from 680 A.D.,—Æthelred being then king of the Mercians,—when Bosel was consecrated first bishop. Bosel had for his church, in the old borderland of the Hwiccas, or Wiccians, that of St. Peter, founded by Saxulph, bishop of Lichfield. Wolstan, twenty-fifth bishop, rebuilt the church in 1030. Amongst its more celebrated bishops in early days were Oswald and Dunstan. The refectory stands against the southern side of the cloisters, and has lately been used for the Festivals of the Three Choirs. During the course of its restoration a staircase leading up to the roof and some blocked-up windows were discovered. The Ecclesiastical Commissioners meet the expense of the new works, which exceeds 5,000l.

THE *Art Journal* announces that its "Art Annual" for 1887 will be devoted to the life and work of J. L. E. Meissonier, "whose pictures fetch such fabulous prices." We are very glad they have chosen so good a subject, but why tag it with the statement about "fabulous prices"? That has certainly nothing to do with the artistic value of Meissonier's work, nor does that remarkable artist need any such *captandum* statement to draw attention to his works. The literary portion of the work is to be done by Mr. Lionel Robinson. The principal illustration will be a photograph of "La Rixe," one of the most popular and one of the cleverest of the artist's works, as a representation of vigorous action, though not one of those in which his peculiar genius is shown in its finest aspect.

THE *Indian Engineer* for September 3rd gives a description and plans and sections of the new swimming-bath in process of construction at Calcutta. The bath itself is 100 ft. by 35 ft., enclosed in an oblong building with an iron roof, with the necessary offices, waiting-rooms, &c., at the entrance end, and dressing boxes ranged along one side of the bath. The retaining walls of the bath are stepped from 2 ft. thick at the top to 4 ft. 6 in. at the bottom, and under the bath is a bed of concrete 2 ft. thick. The retaining walls, as far as we can gather from the description, are of brick, these and the bottom of the bath being lined with  $\frac{1}{2}$  in. Portland cement. The edges of the platform round the bath are to be faced with stone. The general design of the bath is by Mr. W. B. Gwyther, and the contract was taken by Messrs. Mackintosh, Burn, & Co., for 35,000 rupees. The exterior design is about as ugly and devoid of architectural feeling as anything well could be, but they are used to that in India, that paradise of engineer-architects: it would appear that

practically the work has been well carried out. The proposal to empty one fifth of the water every day, so that it should be completely changed once in five days, seems most inadequate: a swimming-bath should either have a current running through it, or should be completely emptied and refilled every day, at all events if it is in full use. Possibly considerations of water supply have affected this portion of the arrangements.

THE Government, we are informed, has sanctioned the definitive adoption of the iron process, invented and patented by Mr. Conder, M. Inst. C.E., at Chichester Barracks, and the War Department has taken over the supervision of the works, which have been conducted by Mr. Conder for the last fifteen months, under the order of the Secretary of State for War. This looks as if experience had proved it to be a practical success, and we congratulate Mr. Conder thereon.

MR. ALFRED GREIG, of Leeds, has designed a new form of traction engine for tramways, which is intended to dispense with the heavy wear and tear consequent upon the working parts of such engines being close to the road surface, and, therefore, always exposed to either dust or mud, which rapidly grinds away the working surfaces. In Mr. Greig's engine the cylinders and working parts are mounted, traction engine principle, on the top of the boiler, instead of underneath, as we find it in the tramway engines now in use. The engine is 11 ft. 6 in. long, 5 ft. 8 in. wide, and 9 ft. 6 in. high, and has a boiler of the locomotive type, burning ordinary gas coke, and working at a pressure of 180 lb. per square inch. There are two cylinders, each  $5\frac{1}{4}$  in. in diameter by 10-in. stroke, and the power is transmitted through spur gearing to the driving-wheels, as in ordinary steam traction engines. It is taken from a pinion on the crank shaft to an intermediate wheel, which gears into other wheels, one on each of the driving-axes, thus dispensing with coupling rods. The engine is carried on spring wheels, which save the wear and tear of sliding axle-boxes and improve the running. The exhaust steam is conducted to an air-condenser placed above the engine, and over the tubes of which cold air is drawn by means of a Blackman air-propeller, driven by a small auxiliary engine. This fan, which is placed in the roof over the boiler-flue, for there is no chimney-stack, also creates the necessary draught for maintaining steam. The engine is fitted with all the Board of Trade requirements, including an automatic steam brake, which shuts off steam directly the engine reaches a speed of nine miles an hour. The new engine, with which a very satisfactory trial run was made recently on the West Brighton and Shoreham Tramways, about the worst road in the kingdom for locomotive work, appears to be eminently suited for working tramways by steam efficiently and economically. It has been constructed by Messrs. Aveling & Porter, Rochester.

WE have received from the publishers of *Church Bells* an "Album of Notable Midland Churches," containing illustrations and descriptions of a good many churches, some of which are not very well known. The engravings are unfortunately poor in style, but they seem to aim at correctness, and with the descriptions the Album may be regarded as a useful memorandum of some churches that are worth keeping in mind.

WE regret very much to learn that Mr. Beresford Hope is dangerously ill, at his residence at Bedgebury, in Kent.

FROM the letters of the special correspondent of the *Times* at Bolton it appears that not only is the institution of the "picket" in full operation, but that tradesmen in the neighbourhood find it, or think it, necessary to write letters to the local papers to contradict any rumour that they have supplied provisions or other necessities for the imported workmen. It appears that numbers of non-society



workmen who would be glad of work are struggling in vain to break through the cordon of pickets to get to the work which is offered them, and those who do get in have to be provided with food and lodging, as they cannot safely go out again. There can be no two words about such a system. A man who refuses to work except under certain conditions may be right, or may be mistaken, he may even be unreasonable, but we cannot say more than that; but a man who endeavours forcibly to prevent fellow men in search of work from doing work which he himself will not do on the same terms is a selfish scoundrel, and that is the plain English of the matter.

#### THE TRAINING OF AN ARCHITECT.

On Wednesday evening Professor Roger Smith gave the introductory lecture to the architectural classes at University College, the subject being "Education, Cultivation, and Examination." After a general review of the subject, in the course of which he deprecated the frequent abuse of examination and the popular cramming system of the day, while expressing an opinion that the examinations for Association of the Institute of Architects were such as could not well be passed by mere cramming, the Professor continued:

Having now considered general education, cultivation, and examination, I propose to pass to these subjects as they specially affect ourselves as students of architecture; and in approaching this division of the subject, I desire emphatically to point out that every architect ought to be a cultivated as well as an educated man. I shall have to point out later on that not a few of the studies and pursuits which to men in other stations are simply aids to cultivation, form part of the architect's special professional training; but apart from that, if he be not a man of cultivation, he will not do his duty well, and he will not properly occupy the position which a member of so liberal and responsible a profession ought to hold in society. You may perhaps remember that I said early in this lecture that "the object of education is to equip the student for the part he has to play on the stage of the world." If I can sketch for you the part which the architect should be prepared to play you will more readily comprehend the training he requires. Let us examine "the architect's part." There are three directions in which knowledge, skill, and experience are expected of him,—(1) As to buildings and structure; (2) As to men and affairs; (3) As to drawing and art. And I propose to take these in their order.

I. An architect ought to be familiar with *buildings and structure*. He ought to know all sorts of buildings, their various purposes, and how those purposes are provided for,—all that makes them suitable or unsuitable for use, and for any emergencies for which they ought to be prepared. He ought to know structure also,—that is to say, all the materials of which buildings are usually made, their appearance, qualities, defects,—the marks of goodness or badness in them, and the modes in which they are wrought, the work they will have to do in the structure, and their fitness for it. He ought to understand the sites and surroundings of buildings,—drainage and sanitation, fittings and appliances, and should have mastered the scientific principles upon which such things as heating, ventilation, lightning conductors, and cooking apparatus should be arranged, as well as their practical details. He has to understand the decay and disruption of buildings, and the risks of decay and accident that beset them, and how to guard against such risks. Again, an architect ought to know something about the history of buildings, and the most important structures in the world. He ought to know the artistic principles upon which good buildings have been designed, and the forms, mouldings, enrichments, and features which have been to the great artists in architecture what the colours on his palette are to the painter. And he ought to know by personal knowledge and experience, by measuring and drawing out in some cases, and by sketching and noting in others, a considerable amount of good architecture and good ornament, some of which ought to be from other countries than our own. And with some of this architecture

he ought to be familiarly, nay, intimately, acquainted. Further, he requires to be at home upon buildings in course of construction, to foresee what is likely to be successful or otherwise, whether in arrangement, construction, or design; and to be able to correct defects and prevent mistakes, alike of design and of construction, before it is too late.

If, again, the architect is required to know *men and affairs* as well as building, You will come to find, as you advance in life, that in every professional calling, as, indeed, in every important position in life, a knowledge of men is the most valuable of all acquisitions. Even the solitary student, or the lonely landscape-painter, works for others, and if he succeeds it is either because his mind is so in harmony with the thoughts of his time that he involuntarily produces what others delight in, or else because his powers of calculation and observation enable him to take the measure, so to speak, of the men of his generation, and cleverly to produce (possibly without sympathy) some work sufficiently in harmony with the time to please them. Far more is it the case with ourselves whose work is from first to last done in contact with our fellow creatures, that a knowledge of what men like and think and do is essential to success. The inception of any architectural undertaking grows out of the desire of other people to erect a building. The material carrying of it out is done by other hands than the architect's under the control of another hand, often fuller of the desire to make money than to make a building; and the whole undertaking is beset by difficulties, emergencies, and varied transactions, in which the architect has to unravel one tangled skein after another with different people. In short, from that early stage in his career, when an architect has to establish his position, make a connexion, and inspire confidence sufficient to induce persons to put their work into his hands, to the close of the transaction, when the last instalment of his own fees is paid him, he has need of tact, resource, a command of temper, presence of mind, good common sense, the ability to write a clear letter, and, in short, the qualities, natural and acquired, which enable a man to get on well with his fellow-men. All this must be combined with a knowledge of affairs. All this intercourse with other people rises out of matters that have relation to the buildings, or the site for them, or the materials of them, or the uses they are to be put to, the laws affecting them, or the customs, or the prejudices, or conflicting interests of the folk who have to deal with them. Now, in every one of these things the architect or chief builder, if he is to be chief, must be sufficiently posted up to take the lead. He must be familiar with such of the forms of transacting business, correspondence, accounts, vouchers, &c., as are used in building affairs, and such laws, customs, rights, as are incidents of or affect his work, and, in addition, with an infinite number of things that bear on it only indirectly. Estimates, accounts, the value of the things that are used in making buildings, the value of buildings themselves, and of the land they stand on. Road-making, repairs, light and air, the statute and common law as affecting buildings and property,—on all these affairs he is expected to be able to give advice,—and sound advice. He ought to know something about every use that a building can be put to, and though so much is almost unattainable, yet he ought to be constantly approaching to such a state of unusual knowledge of what goes on under all roofs the longer he lives.

III. *Drawing and Art*.—We build our buildings on paper to an extent never hitherto practised, but rendered apparently necessary by the modern contract system; but more than this, we study with the pencil when we examine existing work. The pencil aids to develop and fix our ideas when we are designing; with the pencil we make our intentions clear to our clients, and at a later period to the surveyors who prepare the estimate, and the artisans who carry out the work. Drawing, then, is a most essential,—the most essential of acquisitions for an architect. The best draughtsman may possibly never make an architect, though I do not think such a result need often occur; but no architect can hope to succeed at the present time who does not draw well, and is not familiar with all that ought to be and habitually is done in drawing out architectural designs, plans, and details, from first to last. Familiarity with plans is not a substitute for

familiarity with building, but it is an admirable introduction to buildings, and the best possible aid to the mastering of them. The draughtsmanship that is necessary will extend beyond familiarity with plan-drawing. A good draughtsman must have so far mastered the use of the instruments as to be able to think through his bow pencil or his straight-edge, and he must be able to draw all the ornament in his buildings, including representations of the human figure, that his drawings shall be serviceable guides to the workmen. He ought to have mastered perspective, and to be at home to some extent in colour. Finally, in the use of these means he should have the feeling and inspiration of the artist, and he should have sympathy with and a knowledge of other walks of art as well as his own. Art which I have named last, on the principle on which the most famous performer is placed at the foot of a play-bill ("*and Adelina Patti*," for example) is that which determines the level at which our architect shall work. If he can be the artist in feeling and training, and in what he designs, his work may be noble architecture, and certainly will be good. Being an artist, be it remembered, relates to everything that develops a sense of beauty in form, line, and colour, and in all the allied parts as well as in our own. I need hardly point out that this considerable range of knowledge and experience will take years to acquire,—in fact, it is the work of a lifetime; but what we are concerned with is that approach to it which justifies a beginning. This ideal portrait is not often, however,—even if time enough be taken,—carried out symmetrically and completely. Opportunity enables a man to accumulate experience, knowledge, and skill in one direction. The lack of opportunity, or of will, or taste, cramps him in another; and so it comes to pass that most men are better in one walk of this profession than in another,—fortunate if they are able to find that class of work for which they are most fit. In passing I ought to point out that more than one of the matters that figured in our enumeration of the cultivated man's acquisitions or methods are almost essential to the architect. This is especially the case with his drawing and his cultivation of the fine arts. He almost alone of all professional men should, as a matter of course, include foreign travel as a part of his training. He also, in common with all professional men, should cultivate his mind and powers by Bacon's method of reading, writing, and social intercourse. In short, he should be a cultivated man. I now turn to the standard which has been set up by the Royal Institute of British Architects as marking what they consider should be the attainments of a young architect before he is admitted as an Associate of that body. This standard we find set forth in the programme of the examination and in the specimen examination papers published, and though my statement is in less detail than the series of subjects of examination, you will find that those subjects group themselves under my broader headings perfectly well. My first heading is "Buildings." To the subjects which I embraced under this head the programme allots 400 out of the total of 700 marks, divided as under:—History of architecture, 100; mouldings, features, and ornaments, 100; sanitary science, strength of materials, and shoring, 100; materials and construction, 100. You see that the largest demands, even when a deduction, which I shall come to directly, has been allowed, are made under this head. This is partly on account of the fundamental importance of a knowledge of buildings, and partly because fair opportunities for acquiring that knowledge are open to you in your student days. My second head was "Men and Affairs." This comprises two heads in the examination programme, between which 100 marks are allotted. They are:—Specifications and estimating, 75; professional practice, 25. The first of these two subjects most students can easily acquire, and skill in it can be readily tested by examinations; but much of the knowledge comprised under the head of professional practice cannot be acquired till later in life, so but few marks are allotted to the subject; moreover, the skill, tact, self-possession, and judgment needed for the transaction of business are not matters in which a candidate can be directly examined; though, as far as they come out in his *ex vivo* examination, they will be sure to have a share in examining the result. My third head, "Drawing and Art," is directly



represented by one heading only, Plan, Section, and Elevation, to which 200 marks are allotted. Of course a proportion which the programme does not disclose of the marks allotted to the first group of subjects will be given to the sketches with which the answers are to be illustrated, and, as far as they go, these marks will increase the proportion devoted to drawing and art at the expense of those devoted to knowledge of buildings; but it is not likely that this could ever take place to so great an extent as to equalise the two. This examination grows, as you know, out of the voluntary examination, which acted as a pioneer to prepare the way. I had the honour of having some share in preparing the preliminaries of that examination, and am, alas! the only survivor of the five who acted as examiners and moderators on the first occasion, the others being Scott, Digby Wyatt, Aschpietel, and John Papworth. Some of those who organised and subsequently recast the scheme still remain,—among them, I am happy to say, my immediate predecessor in this class, Professor Hayter Lewis, to whose initiation as honorary secretary to the Institute, more than to the action of any other person, we owe it that to-day we have an entrance examination for Associates of the Institute. The advantages which it was considered that students would obtain were, first, that the programme would make it clear what directions in the opinion of persons qualified to judge an architect's studies and his preparation for the serious work of his profession ought to take; and, secondly, that the examination itself would establish a standard of attainment which it is not unreasonable to expect that every student with the usual means of study at command shall reach before he looks upon himself as qualified to practise. The Institute by adopting this examination as the door through which every Associate must enter, had in one sense doubled the value of it, for it had added a double stimulus to work. Passing has always been a distinction; but now failure to pass entails a very serious professional disability. Of all things I should deprecate,—and I think in this I should speak the feelings of the examiners and council generally,—I should deprecate this examination being looked upon, or coming at any future day to be looked upon, as an arbitrary test. It is intended to be, and I think is so worked by the Board who undertake it, as really to be a test of qualification. That is to say, a man is not held fit to be admitted to the Institute because he has passed the examinations, but because he has fitted himself to perform the duties of an architect, and the examiners will direct their questions so as to satisfy themselves of this fact only. Whenever, or if ever, the examination fails to keep up its character in this respect, if it admits what are called catch-questions, and sinks to the level, for example, of the Civil Service examinations, where a man is passed as a consequence of his having temporarily worked up certain subjects, it will fail of its real object. Consider, then, that your duty really is to prepare yourselves for practice, and that this examination is an incident in such preparation. And do not consider that you are to prepare yourselves for examination, and that if you can worry through you are sure to be right as far as fitness for your professional life goes. If we have now arrived at some clear understanding of what you require to prepare you for practice, the only questions which it remains for me to deal with are first, the broad question of how generally you are to obtain it, and the narrower one of how much of it you can get here from me? I am not going to delay you in order at any length to examine any scheme of architectural education not at present in actual force, and within reach. Such an examination you will find in the reports in the professional papers of the conference on education held in May last. I should, however, like to refer, before I pass from the subject, to the programme of instruction in several of the American colleges, which, through the kindness of Mr. Cates, have been brought under the notice of many architects. In these programmes a course of scientific instruction is in each case provided, lasting several years, and taking in its turn history and draughtsmanship; but without enough attempt, so far as I can see, at securing for the student any familiarity with buildings. I trust that if these are seriously examined as precedents, it will be by the help of the light thrown upon them by observations from the pen of Mr. Wace appended to them.

The American schemes appear to me too theoretical, not artistic enough, and in other ways not suited as models for an English course of architecture, should such a course come to be established, as is very probable. It will be even less necessary to raise the question of technical education for artisans, which is one of the most important ones of the present day. The subject before us to-night is, it is true, to a great extent, a branch of technical education, for it relates to the education of the architect for the exercise of his art, and time will not serve us to travel outside its limits. I propose to pass at once now to the question of how, with the opportunities that London at present offers, you can be educated for your profession? Even that stage of preparation which the Institute examination marks cannot be reached without time. To become a great architect is the labour of half a lifetime. We have, however, had great architects in this country, and have them now; so it is clear that whether our appliances and methods are the very best or not, at least they *can* suffice. I once heard one of the greatest of modern water-colourists exclaim, before a gathering of artists, "It is not the water in the brush, but the spirit in the man that makes a painter in water-colours!" This is quite true; and if we take any great architect,—say, Sir Charles Barry,—it was the spirit in the man that made him what he was; still, the water-colourist does have water in his brush, and Barry reached his eminence by some path. Let us turn to the published memoir of him, and ask what was that path? Pupillage for a long term, travel for a long term, and then continuous effort,—first to obtain, and then to carry out, responsible practice,—is the answer that we shall obtain. Now, that simple programme will form the outline of the only course at present open to the architectural student of the present day, and I recommend both parts of it to your cordial adoption, not necessarily as the best possible programme,—on that I offer no opinion here,—but as the best possible in London in the year 1887; and I will endeavour to show how much pupillage and travel themselves can do for you, and what can be done to fill out, add to, and supplement these two cardinal elements. With or without sound preliminary training, let us suppose that the student begins his career as a pupil. The life of Barry tells us that he was articled for and worked out seven years. This is not perhaps too long for a man to work at the drawing-board, but it is too long to be in one place. The term now fashionable is three years, which is too short, and I believe that, as a rule, four years is a very useful term, and that then most men had better change, and spend two other years seeing the practice of other offices as assistants, and, as a rule, as paid assistants. I have not much to suggest to pupils; but I ought to point out that what is really intended to be done for them is not to teach them as they were taught at school, but to give them a chance. In consideration of the premium he has paid, a young man who for a long time is more of a hindrance than a help is tolerated in a place where the work would go on better without him, and it is an understood thing that he is to be allowed opportunities of learning if he will use them. This,—though it may not sound a very precious privilege,—is really of far more value than most young men have the remotest idea of, and the great danger, especially for students who come straight from school and have not had the training in self-culture which college affords is that the opportunities may not be properly made use of. Let me urge on the notice of any pupils who may hear me, half a dozen or so friendly hints:—first, to consider no trifle beneath their notice; secondly, to recognise that to acquire habits of punctuality, order, the mode of conducting simple affairs, endorsing letters, conveying messages, &c., are all essential to their success in after-life as business men; thirdly, to do everything entrusted to them as well as they can, but as far as possible to secure the difficult jobs and pass the easy ones on to some one else; fourthly, to let nothing pass that they do not understand without extorting an explanation from some one; fifthly, to visit the buildings on hand and the builders' workshops whenever there is a chance; lastly, to make sketches and notes of every possible thing, insignificant or otherwise. A pupil who will spend his four years in the practice of this line of conduct will leave the office a good deal nearer being an architect than he entered it. It

is, perhaps, right to add that though I may have given what does not seem a very brilliant account of pupillage, and though I am about to show that it must be supplemented somehow, I do not think that what it supplies can be got elsewhere. So practical a pursuit as an architect's business can, I think, only be learnt by taking part in the actual conduct of it; and though many pupils would do better had they spent some time in preparatory study before being articled, I see no reasonable prospect of any system being introduced to supersede pupillage without great disadvantage. In the pupil's career I include any subsequent time spent in somewhat similar work, though under the name of an improver or assistant. A still more useful addition to a pupil's course is a time spent in a position somewhat analogous to that of a clerk of works, or as resident draughtsman on some building. Naturally, this is a rare chance. Very few pupils of five or six years' standing, if any, are really fit to be of much service as clerks of works; but if they can in any capacity spend some time on a building, they will find opportunities for acquiring practical knowledge that are invaluable. Let us now inquire what advantage the student ought to be able to reap from pupillage, and from that kind of extension of it which I have sketched. First, as to buildings, our first head. He will learn little or nothing of their history, and in the ordinary course he will see little or nothing of old buildings, but he will have opportunities in a disjointed way of acquiring familiarity with many of the features, ornaments, mouldings, decorations, and with the general design of the buildings in course of erection by the architect to whom he is articled, and not unfrequently with the design of some ancient buildings, as shown in prints, books, photographs, and sketches,—Classic, Gothic, or Renaissance, according to the proclivities of his master. He ought to have the opportunity of acquiring a pretty thorough knowledge of ordinary construction, and in some cases of special construction, and of learning how to specify and how to make approximate estimates. He will be sure to have opportunities of learning something about materials; but probably most of them will be wasted unless he gains elsewhere some general systematic familiarity with the subject theoretically. He may get some acquaintance with the appearance of buildings in course of erection, and of course it may happen that he may come into contact with old buildings in course of decay; but this experience is generally reserved for later days. Passing to my second head "Familiarity with Men and Affairs." In a large office a pupil rarely has anything to do with men and not much with business. In a small office, the pupil often has to see people, and to devote part of his time to letter writing or accounts and writing out reports, and from all of which engagements he will by degrees learn that valuable familiarity with men and things which we term business habits. If he is at all observant and does his best to make himself useful, and especially if he writes a good hand,—a valuable, and I regret to add, a rare acquisition,—ought to become perfectly familiar with all the ordinary business documents that an architect has to do with, and so when he enters upon practice this part of his office routine will be at his fingers' ends. Much of the proper dealing with men must, however, be learned from his actual responsible contact with affairs in real life. My third head was "Drawing and Art." If a pupil goes into an office properly prepared, or, at least, well up in drawing the figure, and he has fair abilities, four years ought to make him at least a fair draughtsman. If in four years he thoroughly merits the praise of being a really good draughtsman, he has done well. The routine of preparing drawings from first to last should be familiar to him, and he, generally speaking, will have had an opportunity of making himself acquainted with perspective. Making designs is another matter; it depends upon other things than office work, and will not be learned in the office. As to art, as applied to buildings, or as seen in printing and sculpture, if the student is articled to an artist, and artistic work is being done during his term, he ought to gain much artistic training from office work. If (as is often the case) there is little to teach him fine art going on, he has to look for it elsewhere, and he need not look in vain, for many of the best artists in our profession have been brought up in offices where they had little chance of learn-



ing the fine art of architecture, though fortunately for them the technical art of building was learnable thoroughly. If I am correct in the view I have taken, it seems that the student unavoidably, and in the nature of things, is to look elsewhere than to the architect to whom he is articulated and the associates with whom he will work in the office for preliminary preparation and for several important parts of his training. As for preliminary preparation, it is impossible for an architect to have too good an education, and I wish that every student were a graduate of one of our Universities; but, at any rate, I hope that most will have obtained a thorough English training, with a good knowledge of, at least, one modern language, a fair amount of mathematics, and the elements of some of the natural sciences; that is to say, physics, and, if possible, geology and chemistry; and last, but not least, that he will be well grounded in drawing. It is seldom that a youth or his friends select architecture for his profession without his having some amount of skill in drawing; but it has rarely been carried far enough. The student should be able to draw the human figure from the antique fairly well, and ought to know something of perspective and landscape. If he has not advanced at least as far as this, it is better to spend some months at a drawing-school before entering an office at all. Some actual work in a joiner's shop is not a bad preparation for pupillage. Whether any part of this, which I call preliminary work, has to be taken up in addition or not, the following portions of the equipment I sketched a short time back must, it seems, be got elsewhere than at the office: As to Buildings, their history; much of their construction and materials, and science, and the superintendence of work. The study of existing buildings. As to Drawing and Art, design and the refinements of draughtsmanship, and fine art generally. As to Men and Affairs, all those parts of the conduct of practice which lie beyond ordinary routine, including the law of buildings. The most important of these is the study of erecting buildings, and I wish with all great emphasis to lay down distinctly the truth,—sometimes I fear forgotten,—that to study the buildings you must go to them. The knowledge about buildings which lectures, books, photographs, and prints convey, is not a knowledge of buildings. You must see, study, and sketch them. There is very great advantage in a student, after a sufficient number of years have been spent in preparing himself, taking a tour, an extended tour, and a continuous tour through as many of the regions of Europe that are architecturally rich as he can, and if it can be extended into the East so much the better. This sort of tour has, I think, fallen in the estimation of students partly because the facilities for short trips are now so good, partly, I think, because many men during the last twenty-five years have practised little else than English Gothic, and such have been contented to limit their studies to this country, with perhaps a visit or two to France, Belgium, and Germany. But the star of English Gothic is setting, and the student cannot afford to neglect Classic, Renaissance, Romanesque, and Byzantine examples, such as he must cross the Channel to study: and for good reasons which I cannot stop to go into now, six separate trips of a month each do not do one half, probably less than half, the good that one tour of six months will do. Some building or buildings must at some time be examined very thoroughly. I am disposed to think that the balance of advantage is on the side of comparatively few good examples most thoroughly investigated rather than a large number less completely studied. Each building selected should be measured and drawn out in detail, so that the drawing would suffice to re-erect the building, or the parts of it which are of architectural merit, if it were burnt. It is obviously convenient in many cases to select some English building for this kind of analysis. Of course, a much larger number of buildings must in addition be less thoroughly treated. Though I have urged the long Continental tour as desirable,—and, let me add, most enjoyable,—it must not be supposed that short periods of study of buildings near home are not great helps. Never lose a chance of visiting, examining, and drawing good work, old or new. There is a certain amount of very good old Gothic, and fairly good old Renaissance, to be met with in London, and the best modern work

of both sorts here is quite as well worth study as the old, only let it be the best. London also presents opportunities of studies in museums, of which, I think, few architectural students avail themselves as they might. We have an unrivalled collection of Decorative work, and Renaissance, and Oriental specimens at the South Kensington Museum, where there is also a magnificent series of casts, including many that would form excellent studies for architects. At the Architectural Museum there is a rich collection of Mediaeval architecture; and at the Crystal Palace a series of casts and models of every age, the Renaissance, Byzantine, and Gothic being very good indeed. In all these places students who want to work can get leave to draw with very little difficulty. I now turn to the other points in which the student of architecture requires help. First, I am bound, I think, to refer to that provision which this college has made for assisting him, a provision of which I am proud to say that in the past a large number of men now successfully pursuing the practice, and in later years numbers of men whom I hope to see successful in life, have availed themselves. Those portions of your necessary studies in which you can be helped by attending classes here are,—(1) The history of buildings. This, with an examination into their features, details, and the growth and metamorphoses of architectural styles, forms the subject of the A, or art course here. I do not pretend for a moment to have time, in a session of thirty evenings, or the ability, to tell the students all they require to know; but I claim that the course here gives a systematic and connected view of this history of ancient and modern architecture. I endeavour to make the subject interesting, and prefer to content myself with only taking up as much as can be done thoroughly, rather than to attempt to get over too much ground. There is a magnificent series of diagrams, which are lent to students to work from as well as hung up in the room, and I have endeavoured, with a success of which I confess I am a little proud, to induce the students themselves to draw illustrations of the subjects of the lectures.

The Materials and the Construction of buildings from the subject of course B, and here, as in the history of architecture as an art, I am far, indeed, from attempting to cover the whole field; but the course is consecutive, systematic, and thorough; it takes up all the principal building materials, and how to use them, and I endeavour to make sure work as we go. From both these courses I believe students derive the advantage that they have planted in their minds a sufficiently connected view of the art in the one case, and of construction in the other, for them to be able to appreciate the meaning of every fact which comes under their notice either in their reading or sketching, or on buildings; in other words, that beyond direct gains they are enabled to get advantage from many other sources of information which would otherwise be of less service. I desire to state very plainly that these courses are not so much directed to enable students to pass the examination at Conduit-street as to give them a real help in their education as architects; but I believe that in this way they will more efficiently aid those who are going in for these examinations than if I attempted to shape them exactly to fit the course of the question papers. I think, too, the final examination at the end of the term, and an intermediate one, which it is usual to hold, are of great service to those who are preparing for the Institute examination, by enabling them to see how much they are able to accomplish in answering a previously unseen paper of questions on architecture within a fixed period, and quite without assistance. I am sometimes asked if these courses give enough information to enable students to pass these divisions of the examination to which they respectively relate. My answer is, that it depends upon the student. If he simply attends and takes some notes, and does nothing else,—Certainly not. If he attends, and gives time and study at home to the subject, and tries to make all that he heard in the class-room his own, and then to pursue the lines suggested for further private reading at points where want of time obliges one to curtail part of a subject,—Yes. Not, however, forgetting that personal familiarity with some architectural buildings is absolutely essential

to success in the examination. Course C proposes to give such information on the general conduct of building operations and architectural practice, and on some of the laws respecting buildings, as is most needed by men beginning practice, including some notice of the supervision of building works, and the decay of buildings, and the measures to be taken to secure dangerous and ruinous structures. Here, again, I think that by giving what is most serviceable to the young architect, I am doing my best for him in his preparation for his examination. Here the work of this college stops; but I have little hesitation in saying that it will help you in the departments to which it is directed to master your subjects more thoroughly than by solitary study you easily can, and that what you will learn in this room is adapted to form the groundwork upon which your own further work may usefully stand. I regret that time warns me that I must condense as far as possible what remains for me to say, and give you bare references in place of stating matters at length. Before leaving this college I must point out that some of the sciences bearing upon architecture can be well studied here, and that the Slade school affords excellent means of instruction in drawing the figure, though in neither case are the courses specially arranged for architects. Some particulars of these will be found at the foot of the prospectus of my lectures. At King's College Professor Korr gives a course of lectures on the Arts of Construction. His ability and his long experience as a public lecturer are too well known for it to be requisite that I should say more to point out the value of the course. The most important subject remaining, Architectural Design, is to be learned best at the Royal Academy. One must be a good draughtsman to get in; but here not only is good drawing made better under the eye of that accomplished architect and teacher, Mr. Phane Spiers, but design is practised under the personal direction of the very first architects of the day, those I mean who have the honour of being members of the Academy. No opportunity so good as this exists, and no better opportunity well could be devised for students to acquire skill in design; and quite apart from the medals and prizes, this is enough to repay you for any trouble taken in obtaining admission. Next, I must refer to the Architectural Association and its work, a subject so considerable that I cannot do more than glance at it on general terms. A students' mutual improvement society, numbering about 1,000 members, with a library and at least a dozen classes and courses of lectures, and its own travelling studentship and series of valuable prizes, it is an organisation of great importance and with vast possibilities for good. I hope you will all belong to it, for from it individual portions of your architectural equipment can be well obtained. It is sometimes said that there are imperfections connected with the scheme of the Association, the most serious being that the work is to a certain extent fragmentary, and in the nature of things unequal, and that some of the amateur teachers are not practised instructors. Whether this be so or no, the facilities offered are very many and very great, and especially so in that all-important branch of your studies, the study of design. The elementary class of design, the class of design, and class for colour decoration are worthy the attention of you all as open to you before you can enter the Royal Academy, and to these classes many an architect is indebted for his first opportunity of learning and practising design. The practical side of our art is studied by the members of the Association in many classes, each good in its way, and each taking up a useful portion of the work. The visits to modern buildings, which are organised by the Association, are a means of learning how the best work of the present day is being done, and in themselves would be worth joining for. In the Brown Book of the Association you will find the whole programme set forth, and there, too, you will find the regulations and programmes of all the other organisations which I have alluded to. Let me recommend to your notice the page of advice to students which that pamphlet contains, and to your practice the personal consultation with a member of the committee of advice which it suggests and recommends. Among the announcements in the Brown Book, one will appear for the first time which I should be



pled to believe will be continued for many years,—the Studio established by Messrs. Bagge & Millard. This new and as yet untried venture, is fortunately in good hands, and if proceeded with, ought to afford admirable assistance to students in draughtsmanship and design and I hope also in construction. The Royal Institute of British Architects does not give any courses of instruction, but it possesses the best architectural library in London, and this is now accessible without charge and without more than the trifling formalities to all working students of architecture, including students at this college. The City and Guilds Institute has given in the month of July short courses of lectures on subjects, most of which are of value to architects. These, no doubt, will be repeated next summer. The establishment at this Institute of various classes bearing on our pursuits is in contemplation, meantime a class of exceptional instruction in masonry was conducted there last session by Mr. Harvey, and this subject is to be pursued together with the allied subject of descriptive geometry, under the same teachers this season. The instruction given by Mr. Harvey is spoken of by those who know most about it as exceptionally good, and there is nowhere else where the same subject, treated from an architect's point of view, is taught so thoroughly and practically. Here I might well add, were it not that I know that this address, or much of it, will, by the courtesy of the professional press, be read by students who cannot get to London, or who, being in London, cannot see their way to getting to Gower-street or Conduit-street. To any such I should like, with your permission, to address a parting word, and to say, "Courage, my friend. Remember, it is the spirit in the man, not the water in the brush"; and though I have spent the evening describing useful aids to study, there are few of them which a resolute and energetic student cannot dispense with. What I take to be absolutely essential is first work in an office, and that I take it you have; secondly, buildings to study, and there is hardly a parish in England where there is not at least a fragment of the noble Mediaeval architecture of our country within your reach; thirdly, books, and of these you must manage somehow to get hold of a few, but if your choice be not large you must be more thoroughly master the ones you have; and lastly, instruction in drawing. That happily the schools of art have spread through the country. Read, I pray you, the "Advice to Students," issued by the Institute of Architects, and appended to the programme of the examinations, and you will notice that there is not scant reference to the London advantages which I have dwelt upon, though I have good reason to think that the Board of Examiners are not insensible to their value; but that the course pointed out is one which a student, with comparatively little aid, may fight out for himself. Still, I am quite sure that the aid offered here and elsewhere will make that course easier, shorter, and I think, surer. In taking leave of the subject and releasing you, let me revert to what was said earlier in the evening upon cultivation. I trust that each one of you will not simply learn his profession and push his way, but will cultivate his mind, and so successfully that he shall be known, not merely as a safe constructor or a brilliant designer, but as a man of taste, of judgment, of varied knowledge, of some accomplishments: in short, that he shall be an ornament to his profession.

**Class of Masonry.**—We hear that the City and Guilds of London Institute is having a class-room specially fitted for Mr. Lawrence Harvey's class of masonry. It will be lighted in such a way that the light will be thrown direct on the drawing or work of each pupil, and that all cross lights and dazzling of the eyes will be avoided. The pupils will only have to bring their drawing instruments, drawing boards being provided by the Guilds Institute. The class will begin work on the 17th inst. Intending members who have not yet applied are requested to send their names before that date to Mr. Lawrence Harvey, 10, Great Queen-street, Westminster, S.W.

**The Association of Public Sanitary Inspectors.**—At the annual general meeting of this association, held at Westminster Town-hall, on Saturday last, October 1, Mr. Hugh Alexander, Chief Sanitary Inspector, Shoreditch, was unanimously elected Chairman of the Council, *vice* Mr. G. B. Jerram, C.E.

## Illustrations.

### INTERIOR OF A RENAISSANCE CHURCH.

**T**HIS is a study exhibited a couple of years since at the exhibition of the "Manchester Academy of Fine Arts," in which it is endeavoured to adopt the Renaissance style for a modern town church, in accordance with the requirements of Anglican ritual. The chief points aimed at are, 1, Economy in the cost of fabric (the chancel only being lined with stone); 2, Clear floor space, with uninterrupted view of the altar and pulpit; and 3, Wall space for the adoption of a complete scheme of pictorial decoration.

The church is calculated to seat 1,070, exclusive of choir and clergy, the nave being 102 ft. long, divided into five bays (and having a narthex of 17 ft. more on the west end), and 39 ft. in clear width; the aisles, intended only as passage ways, 8 ft. clear; the chancel and sacristy 41 ft. long, and having on the north side a morning chapel, and on the south, organ, vestries, &c.

The triforium of the nave contains illustrations of the suffrages in the Litany: "By the Mystery of Thy Holy Incarnation," &c.; with the four major prophets and four evangelists over the chancel arch, on the jambs of which are SS. Peter and Paul, the pillars of the church.

The chancel is surmounted by a dome, proposed to contain an "Adoration of the Lamb," and the transept roofs have angel figures bearing the titles of Our Lord from Isaiah and St. John. Behind the altar (which is raised thirteen steps from the floor of the nave) are reredos, after the manner of well-known Flemish examples, and setting forth pictorially the Eucharistic mystery, extend the width of the church.

The view given shows the north-east angle of the nave, with chancel and morning chapel beyond. W. HENRY JEWITT.

### COMPETITION DESIGN OF FULHAM VESTRY HALL.

This is the elevation of a design which was sent in for the above-named very ill-managed competition, by Messrs. Cheston & Perkin, and the drawing was subsequently accepted for exhibition in the architectural room of the Royal Academy. The elevation is picturesque in effect, and well suited to the architectural associations of the locality. It was intended to be executed in red brick and terra-cotta.

### NEW STOCK EXCHANGE BUILDINGS.

The recent additions to the Stock Exchange on an area of 20,700 ft., between Old Broad-street and Throgmorton-street, consist chiefly of a new "House" (so-called) for markets joined to the old "House," each being about 8,000 ft. in area; also of committee-rooms and offices, with a frontage of 96 ft. in Throgmorton-street, and offices let to brokers, with a frontage, which will be 186 ft. when completed, in Old Broad-street,—through both, an entrance to the Stock Exchange. In the basement of the latter are electric lighting and heating and ventilating engine-rooms.

The new "House" has an octagonal hall and a dome, 70 ft. diameter and 100 ft. high, two arched transepts with apses, and irregular aisles.

Materials used:—Peterhead granite high plinths, dome piers in large blocks with moulded bases, frieze round, doorways and archways; half-polished Aubigny and Portland stone arches, cornices and pendentives; Pavonazetta Carrara marble walls, built with them. The dome riveted panels of Hitchins's wire-work plastering; the latter also over transepts, and the same plastering in ceilings throughout the building. Entrances, lobbies and staircases lined with Turkey red, Ippepen and Italian marble. Joiner's work: wainscot and mahogany. The dome covered with diamond-shaped leaves in copper; all other roofs with lead. The fronts in the streets are Portland stone and granite.

Below the new Stock Exchange is a settling-room, lighted by electricity, as are also the strong rooms and the buildings above. The plastering of the old "House" has been removed, the pillars covered with Korea and Giallo-Antico marble from the Roman quarries

near Carthage, with Belgian pedestals, the walls with Pavonazetta.

About 700,000 cubic feet of air, cooled or warmed as required, are driven in per hour by fans, the exhausted air also being drawn away by similar means.

The work has been carried out from the designs and under the superintendence of Mr. J. J. Cole.

### HOUSES, CHISWICK.

THE drawing now published illustrates three buildings on Chiswick Mall. To the immediate right is shown old Walpole House, recently repaired for re-occupation. There is much that is interesting in its history, as it extends back to the Domesday Survey. In the Monasticon it is mentioned as in possession of the Dean and Chapter of Westminster, a prebendal house belonging to them having stood upon its site. Walford states that Barbara, Duchess of Cleveland in Charles II.'s time, died in the house, and that Dan. O'Connell later lived there some years.

Next to Walpole House are two semi-detached houses recently erected, and further to the left is Eyot Villa, the residence of Mr. John Thornycroft. Mr. John Belcher was the architect, and all the works have been executed by Messrs. Adamson. The drawing was in the recent Royal Academy exhibition.

### TOMBSTONES OF THE SEVENTEENTH AND EIGHTEENTH CENTURIES.

MANY of our country churchyards contain examples worth preserving of these interesting memorials. Frequently moss and lichen so thickly cover them, that the ornament is nearly hidden, but they have probably acted as a preservative.

The examples here given are taken from four churchyards only. The Quennington altar tomb is much injured by the roots and stems of ivy, and the turf is now above the base; but the one in Tewkesbury Abbey churchyard has been recently removed, and carefully re-set, owing, we believe, to the judicious and loving care of Mr. Collins, the builder. It is of a fine grained stone, and the carving delicately finished, but it is weather-worn in places.

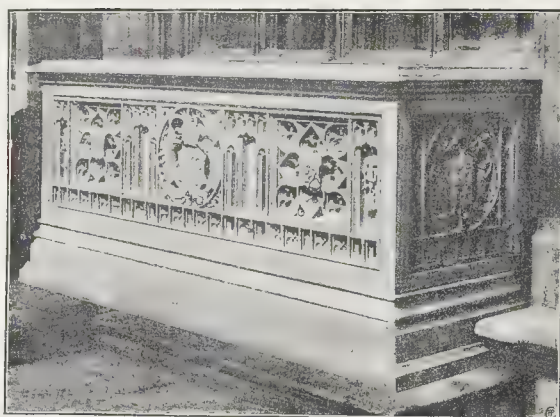
Some of the designs are rude, but there is a character and feeling about many quite lacking in much of the modern machine-made work for the like purpose; and they seem to show that a certain traditional art lingered among masons in quiet country places long after it had disappeared from large towns.

The Gothic revival has caused rather a feeling of contempt for them, quite undeserved, and has led, in many instances, to their destruction. All antiquarian and artistic feeling should be opposed to this, and it is the desire to foster a better appreciation of them which induces us to give these illustrations.

**Society of Engineers.**—The Society of Engineers had its first meeting for the Session 1887-8, on Monday evening, October 3rd, at the Town-hall, Westminster, Professor H. Robinson, President, in the chair, when a paper was read on "Stability of Factory Chimneys," by Mr. E. J. Hutton. The author entered fully into the theory of stability of tall chimneys, pointing out some errors in the formulae ordinarily used, and, in connexion with stability, considered the relative effects of wind pressure on various forms, as circular, octagonal, and square, and at various angles. He then showed that the section of chimney which combined the highest theoretical stability with the least amount of material was not the same as that required by practical considerations for its greatest efficiency in producing draught, and that a compromise had to be effected between the two forms. Some examples of successful chimneys were then given, and also of some that had failed, with an examination of the causes of failure.

**New Theatre at Brighton.**—We hear that the plans for the new Eden Theatre, to be erected in the King's-road, Brighton, were passed by the Local Authorities last week, and the work will be commenced in a few days. The building will, we are informed, "be practically fireproof," and provided with ample exits. Some special features will be introduced in the construction by the architect, Mr. Frank Matcham, of London.





EAST END PANEL.



CENTRE PANEL.



WEST END PANEL.

Monument to Bishop Courtenay in Winchester Cathedral.—Designed by Mr. G. H. Kitchen.

#### MONUMENT TO BISHOP COURTENAY, WINCHESTER CATHEDRAL.

This monument, designed by Mr. G. H. Kitchen, architect (the son of the Dean of Winchester), has been placed on the spot where the remains of the tomb of Bishop Peter Courtenay, who died on the 22nd September, 1492, were discovered by the present Dean in December, 1855. The coffin was then discovered having on its lid a long cross, at the foot of which was a small shield with the Courtenay arms. Round the coffin-lid was the inscription "Hic recondita sunt ossa Petri Courtenay, Episcopi primo Exon. deinde Winton, qui obiit A.D. mccccxii."

As the tomb stands close up to Fox's Screen three sides only of it are seen. Of these the long northward front has three chief panels. In the centre are the arms of the Bishop impaled with those of the See of Winchester, under the mitre; the shield has for supporters two dolphins, as we see them round the shield outside the Lady Chapel. Underneath is the Bishop's own motto, which appears also in the Lady Chapel, "In gloriam Dei." The right and left panels bear each a shield in centre, charged, the one with the Tudor rose, the other with the Portcullis, symbols which indicate the Bishop's close connexion with his friend and master, Henry VII. In the outermost small panels of the front is a symbolic ornament, which the Bishop employed elsewhere, a T cross, with the initials P.C. attached, and a bell suspended from it. This bell is an allusion to the great "Peter's Bell," which the Bishop gave to Exeter Cathedral.

The panel which fills the western end of the tomb bears the coat of the Courtenay family, with two swans as supporters on it; and over it and the corresponding panel on the east front is a scroll bearing the motto, "Honor Deo et Regi." The supporters of the eastern shield, which carries the arms of his father and mother, are two boars.

The lesser ornaments, the T cross and bell, and the gerbs and sickles in the spandrels of the larger panels, are all taken from the splendid chimney-piece which the Bishop placed in his palace at Exeter, where it is still to be seen.

The carving has been executed by Mr. Whitley, under Mr. Kitchen's superintendence.

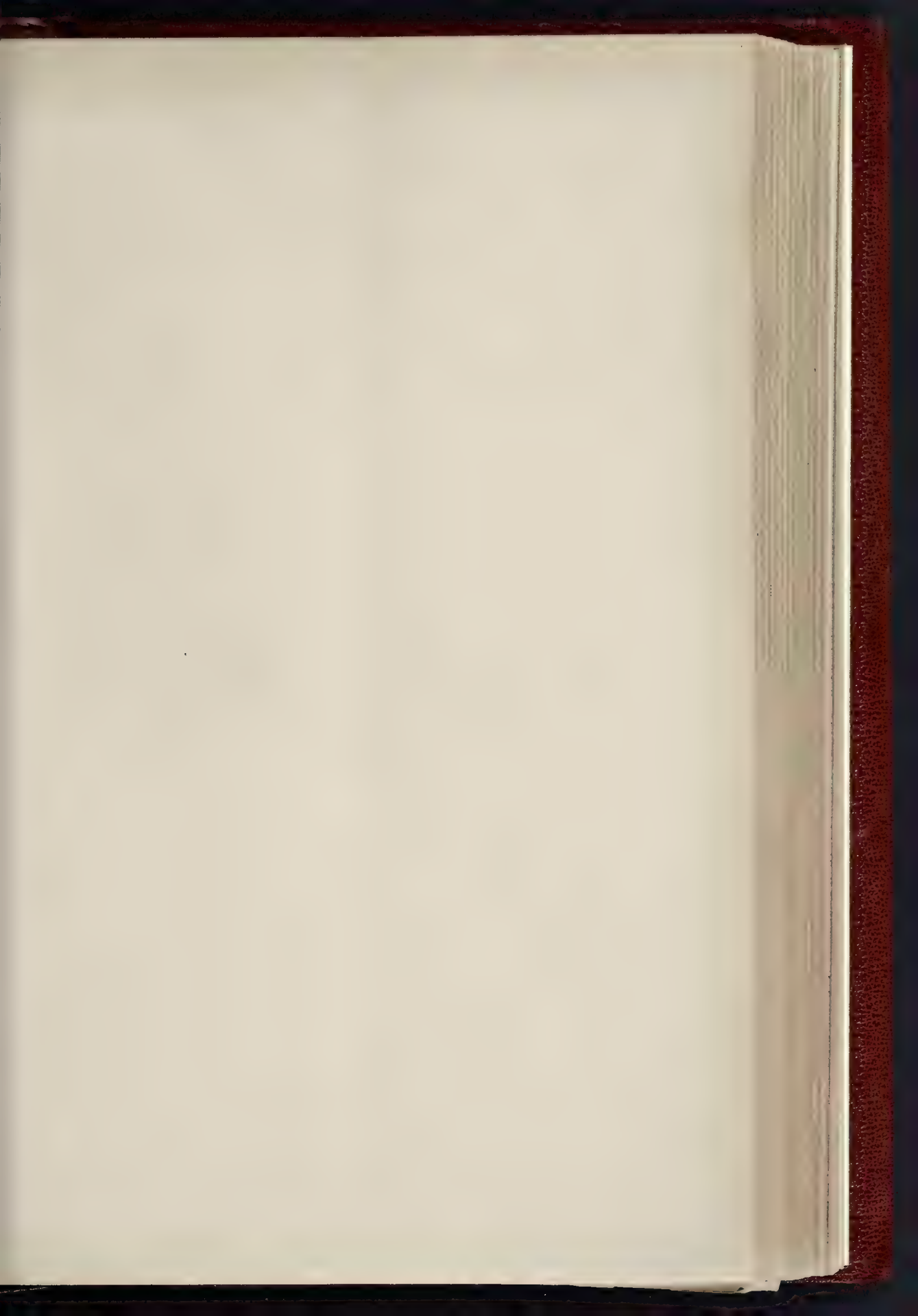
#### ON THE SIZE OF HOUSE DRAINS, AND THE USE AND MISUSE OF TRAPS.\*

RECENT investigations seem to prove that certain elements of ordinary atmospheric air,—chiefly oxygen,—acting upon aerobian microbes, destroy or attenuate their virulence, so that in either case the microbe, as a vehicle of specific disease, is annihilated. The significance of this fact, in relation to the proper ventilation of sewer and house drains, has, I think, not been generally realised. The earlier advocates of such ventilation,—among whom I venture to claim a place,—aimed rather at the dilution and rapid removal of sewage emanations than at the destruction of associated microscopic organisms; but they were not

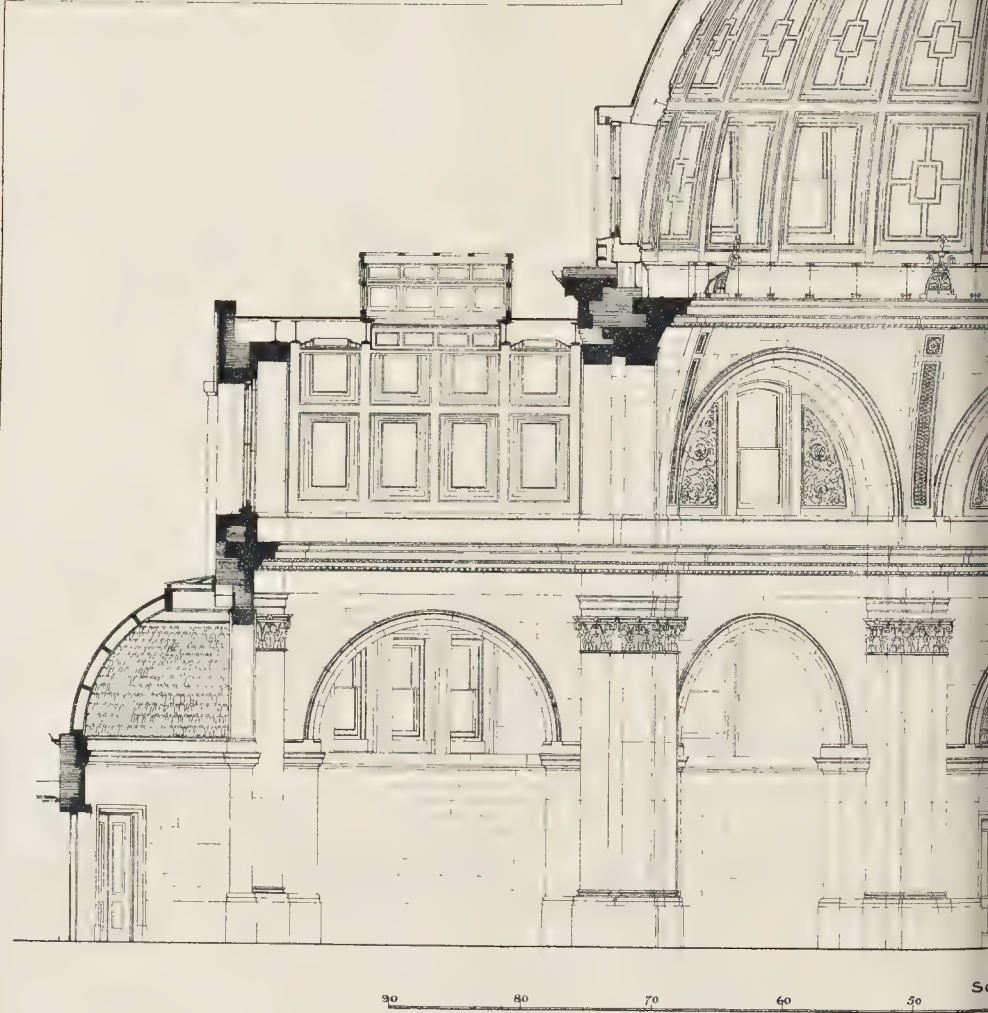
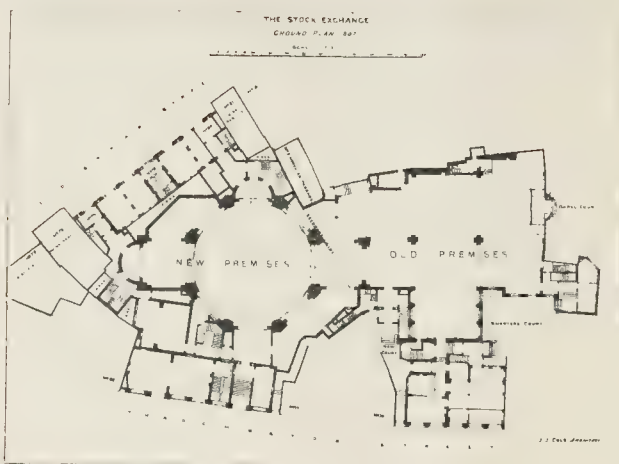
without some apprehension of the truth, since demonstrated, that such organisms are practically destroyed by the action of atmospheric oxygen. It is exactly thirty years since I myself published a paper on sewer ventilation, in which I endeavoured to arouse the better class of my fellow-citizens by pointing out the fact that while they in the most elevated and least crowded parts of the city had to submit to the frequent recurrence of epidemic disease, the people on the banks of the river (which seemed to them so pestiferous) were almost exempt from anything of the kind. And my explanation was this: I said that "the agents at work in both localities were identical, but they were differently developed." In the one case tainted air, undiluted and confined for miles in unventilated sewers, remained pestilential, whereas in the other, "mingling freely with the atmosphere, it became harmless,—as a homoeopathic globule in a glass of water." I should be inclined to use very much the same language now,—and I regret to say there is almost as much need to use it,—but we have made an immense stride when we are able to plant our feet upon ascertained fact instead of reasonable but somewhat vague deduction.

We may, indeed, say that we have now a new and potent argument in favour of drain ventilation. We advise it not merely for the dilution of noxious gases, and their rapid removal, or for the relief of hydrostatic pressure, or the aeration of sewage, but also for the destruction of disease germs, or at least the attenuation of suspended virus; and it is evident that if we succeed in this we render our aerial drainage, if I may so call it, innocuous, so that even if it accidentally

\* From a paper by Mr. John Honeyman, F.R.I.B.A., read at the Bolton Congress of the Sanitary Institute.



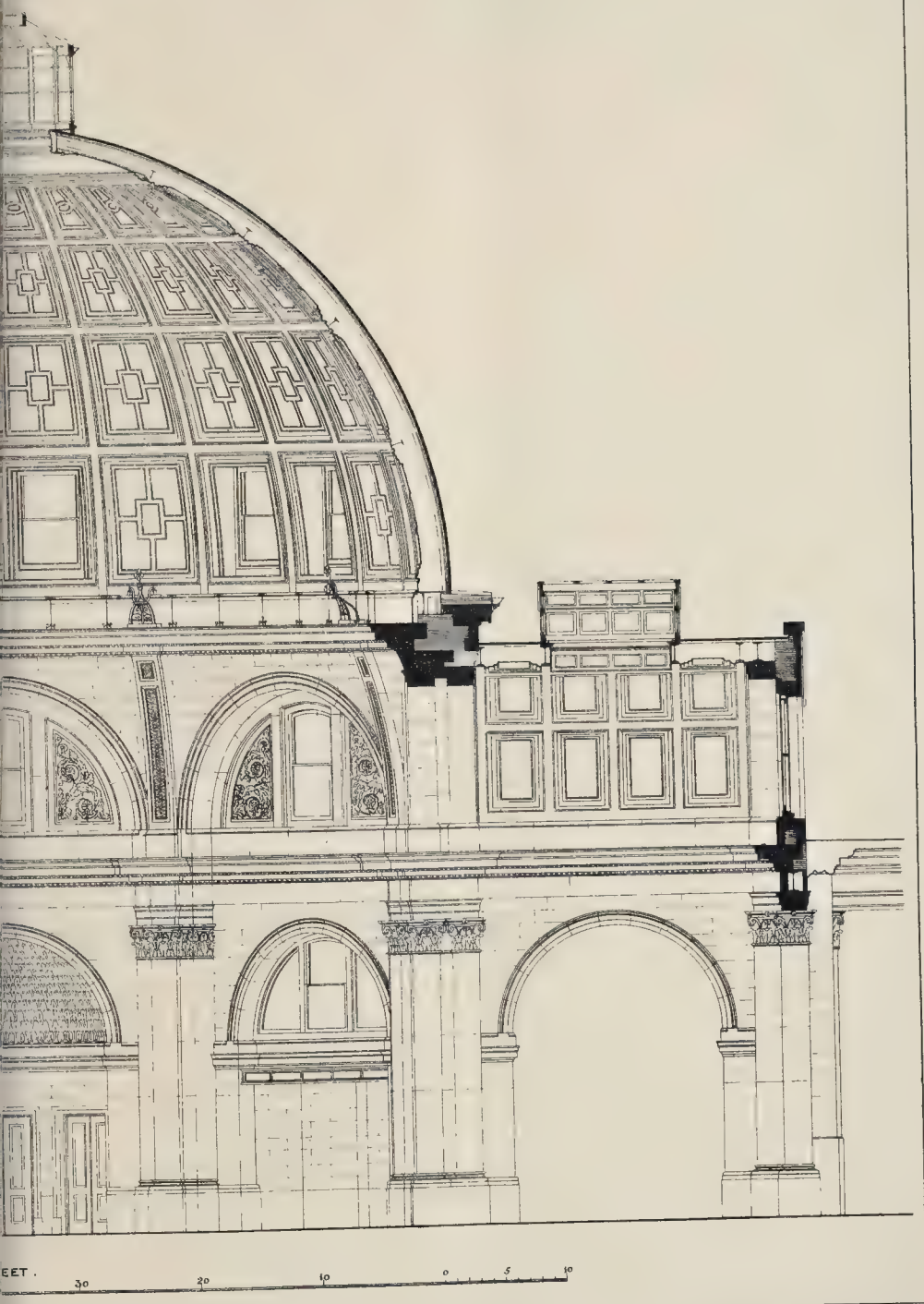




J. F. Kell Photo Lith & Printer

ADDITIONS TO THE STOCK EXCHANGE, THROUGH

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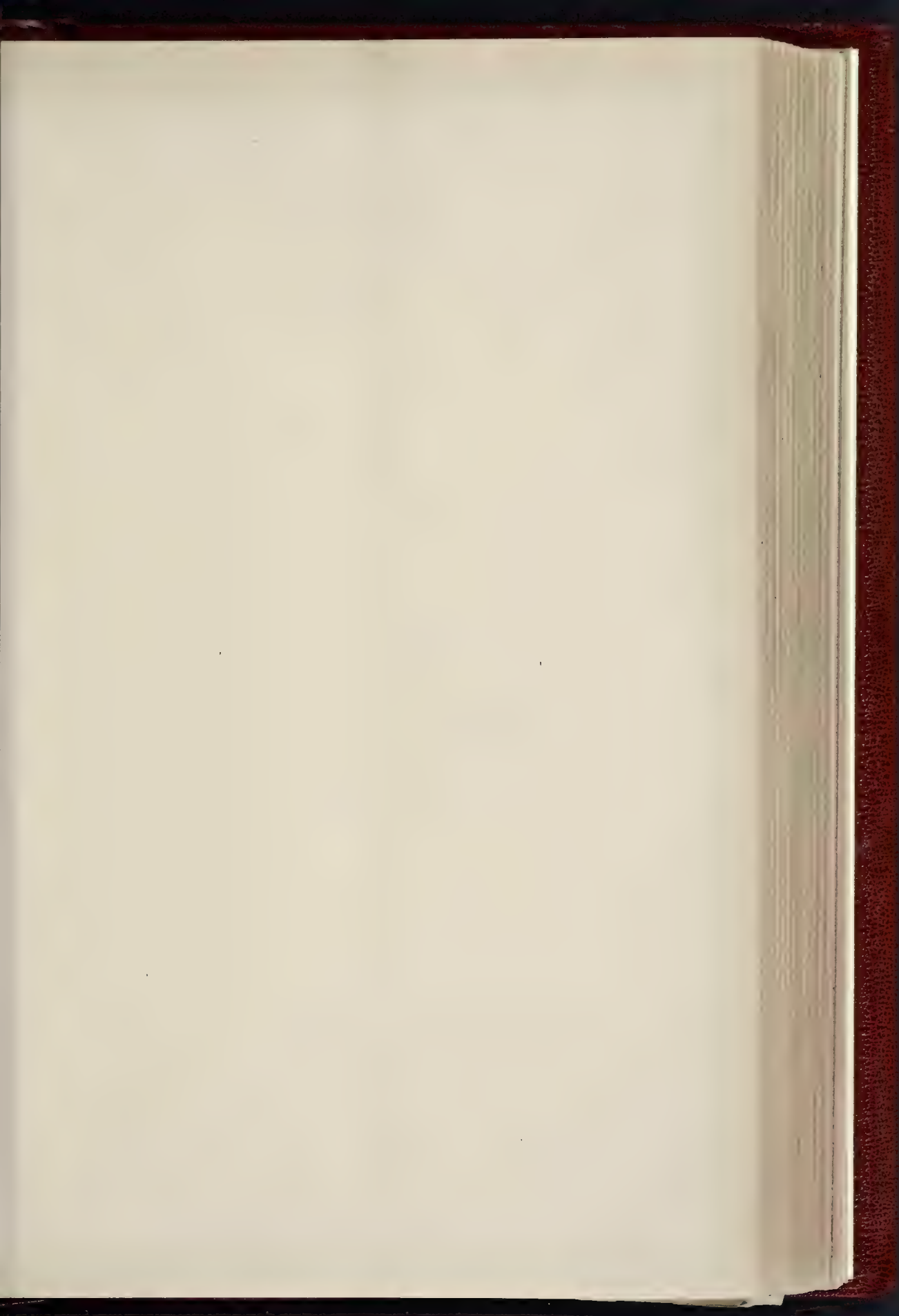


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TREET, CITY.—MR. J. J. COLE, F.R.I.B.A., ARCHITECT.  
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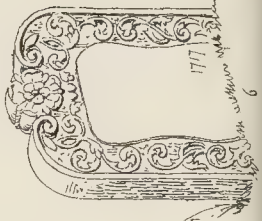
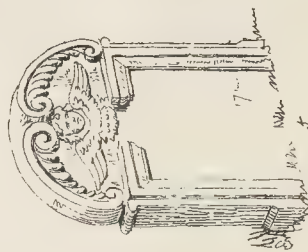
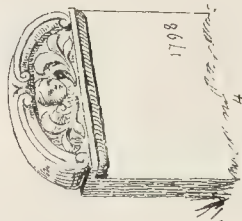
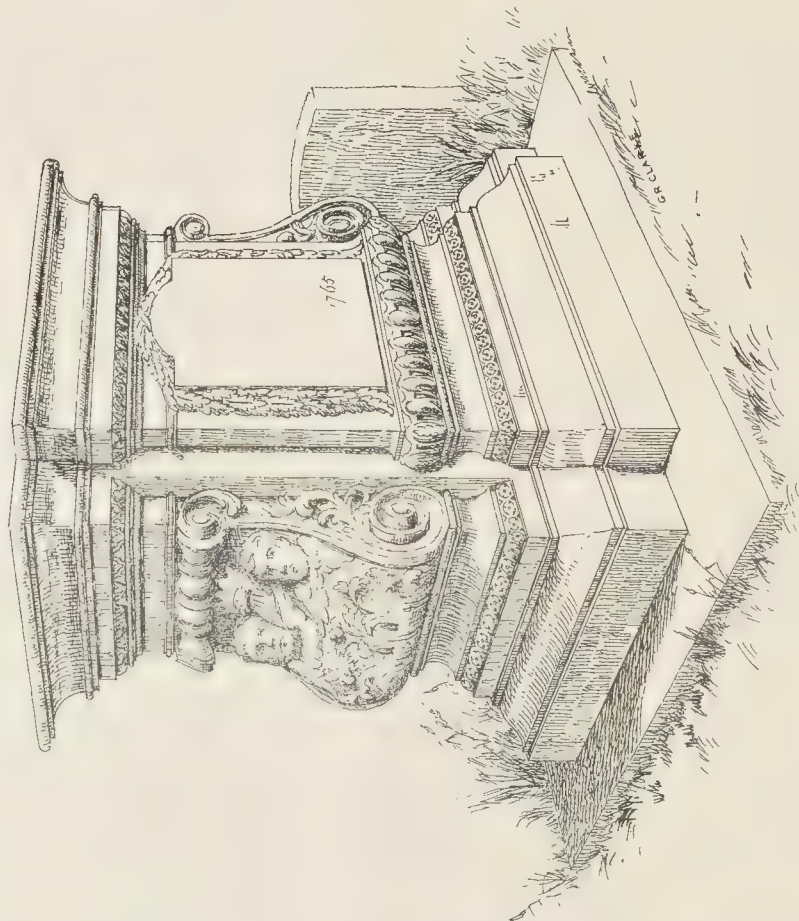
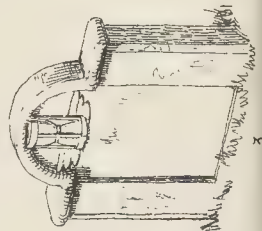
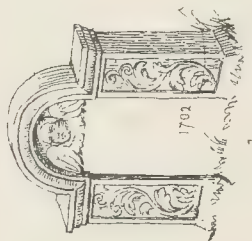






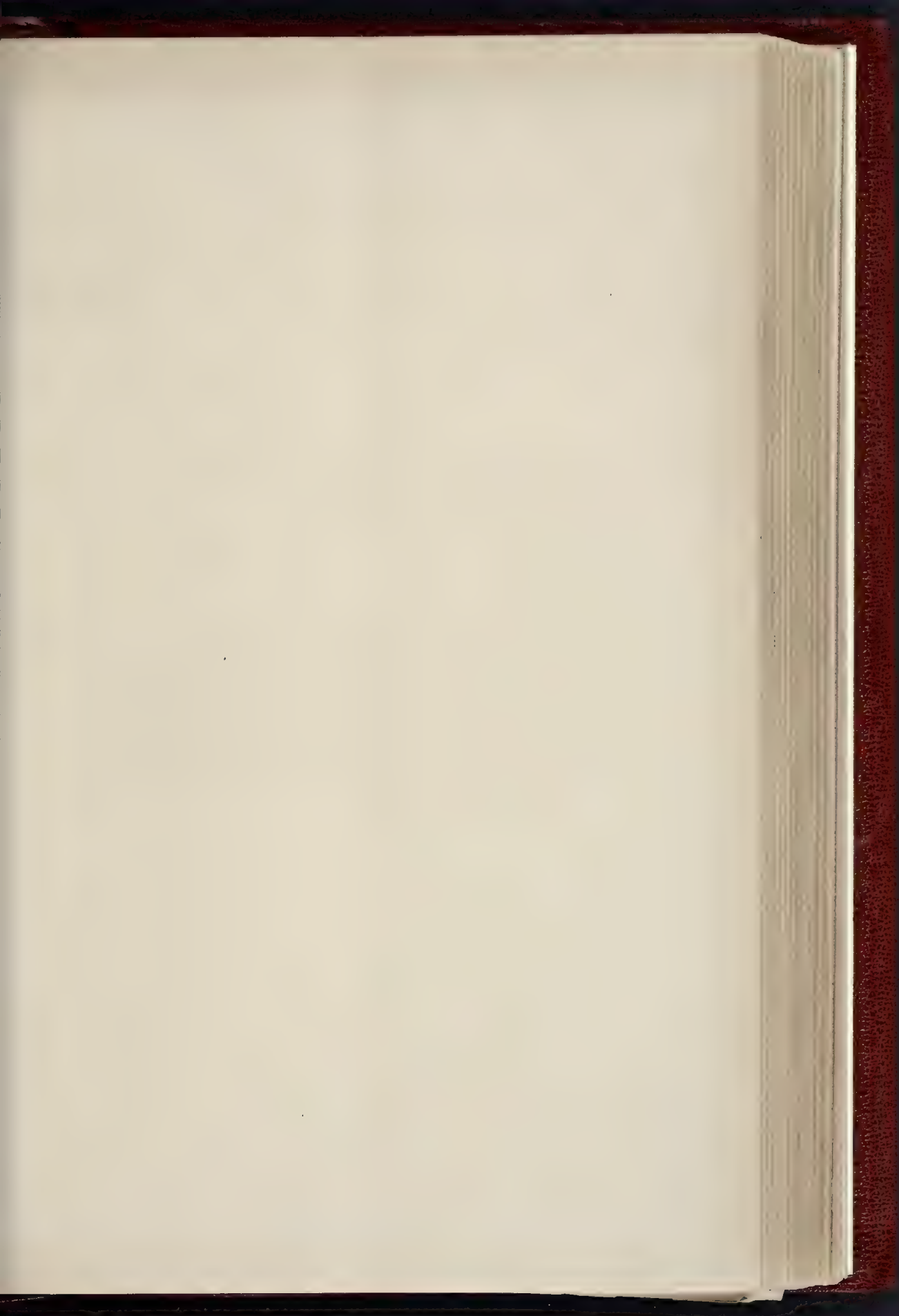
THE BUILDER, OCTOBER 8, 1887

# HEADSTONES 1 TO 5 AT COLN ST ALDYN GLOUCESTERSHIRE Nº 6 ORCHESTON ST MARY WILTS



ALTAR TOMB AT TEWKESBURY ABBEY

DRAWN BY MR. G. R. CLARKE.





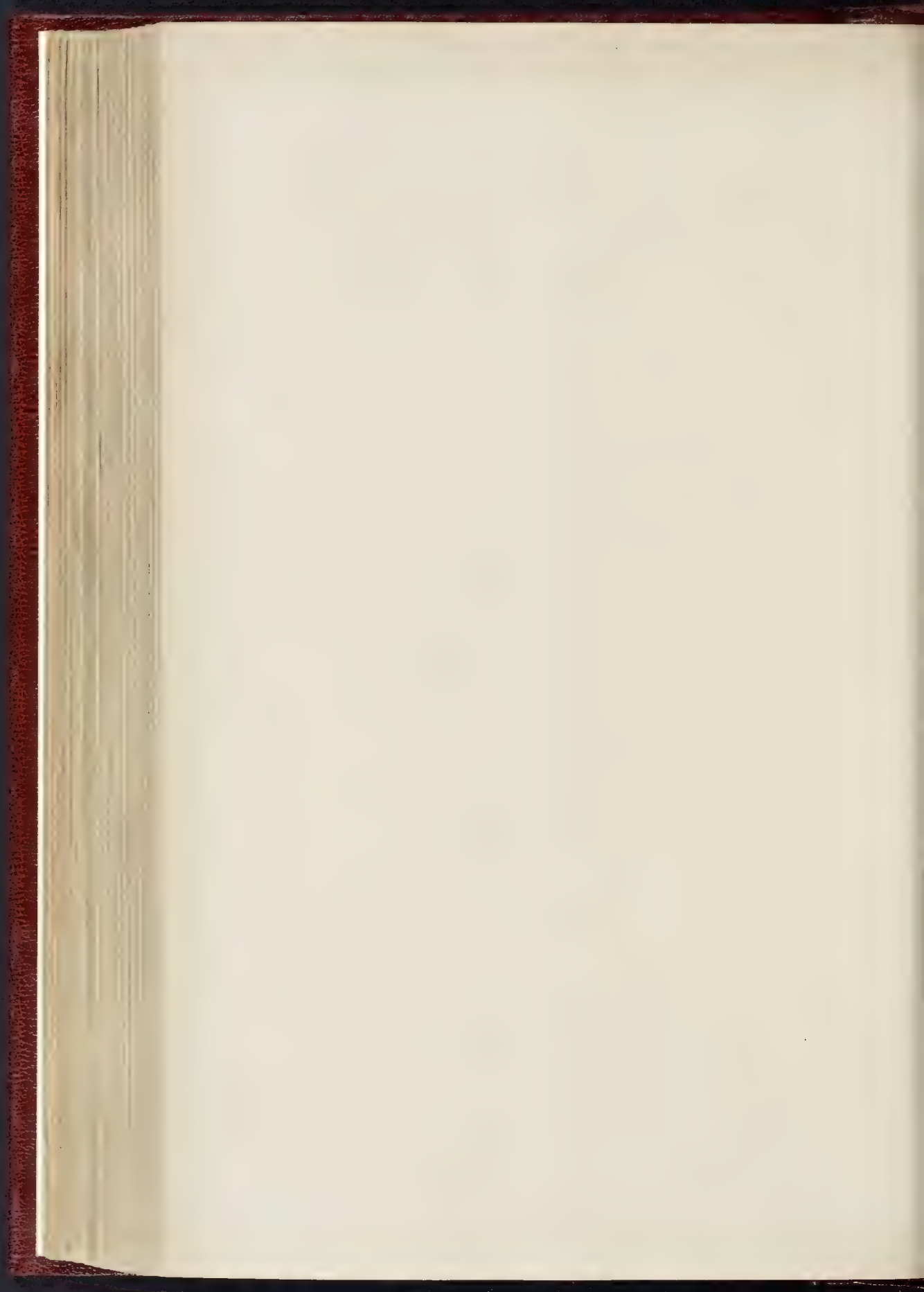
The image contains three architectural drawings of the Grosvenor Society building. The top drawing is a perspective view of the building's exterior, showing a large, ornate structure with a central clock tower and a prominent spire. The building features classical architectural elements such as columns and arches. Below the perspective view are two floor plans. The left floor plan is labeled 'Grosvenor Society' and shows the layout of the building, including rooms like 'Lobby', 'Office', 'Library', and 'Reading Room'. The right floor plan is labeled 'Grosvenor Society' and shows the layout of the building, including rooms like 'Lobby', 'Office', 'Library', and 'Reading Room'. The drawings are detailed and show the building's structure and layout.

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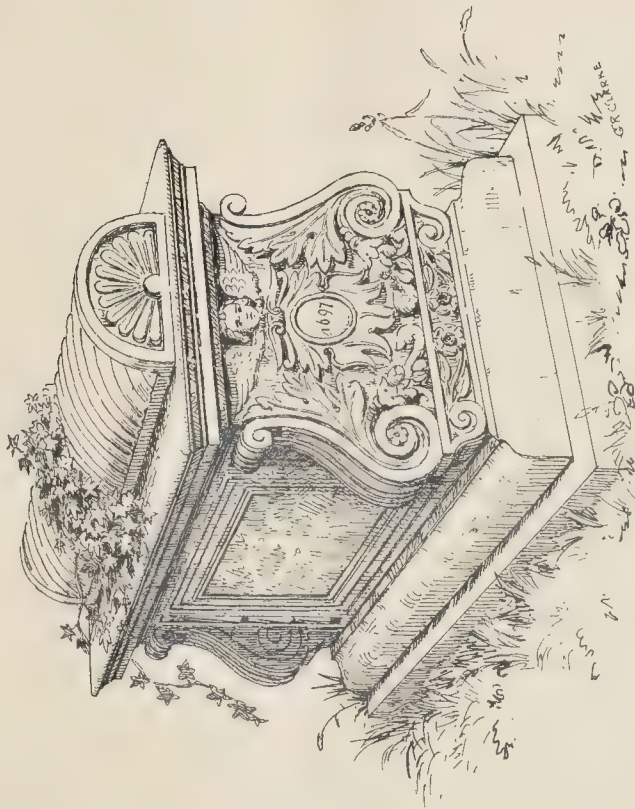
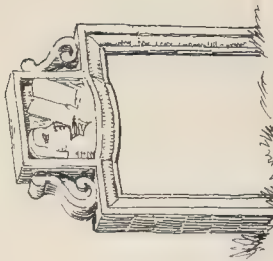
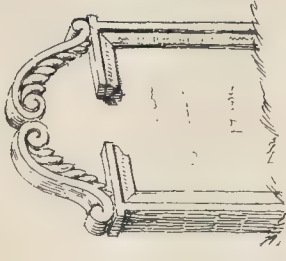
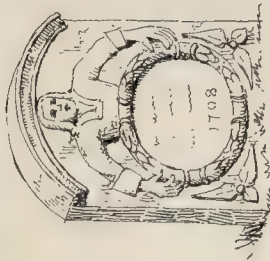
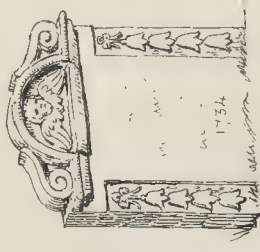


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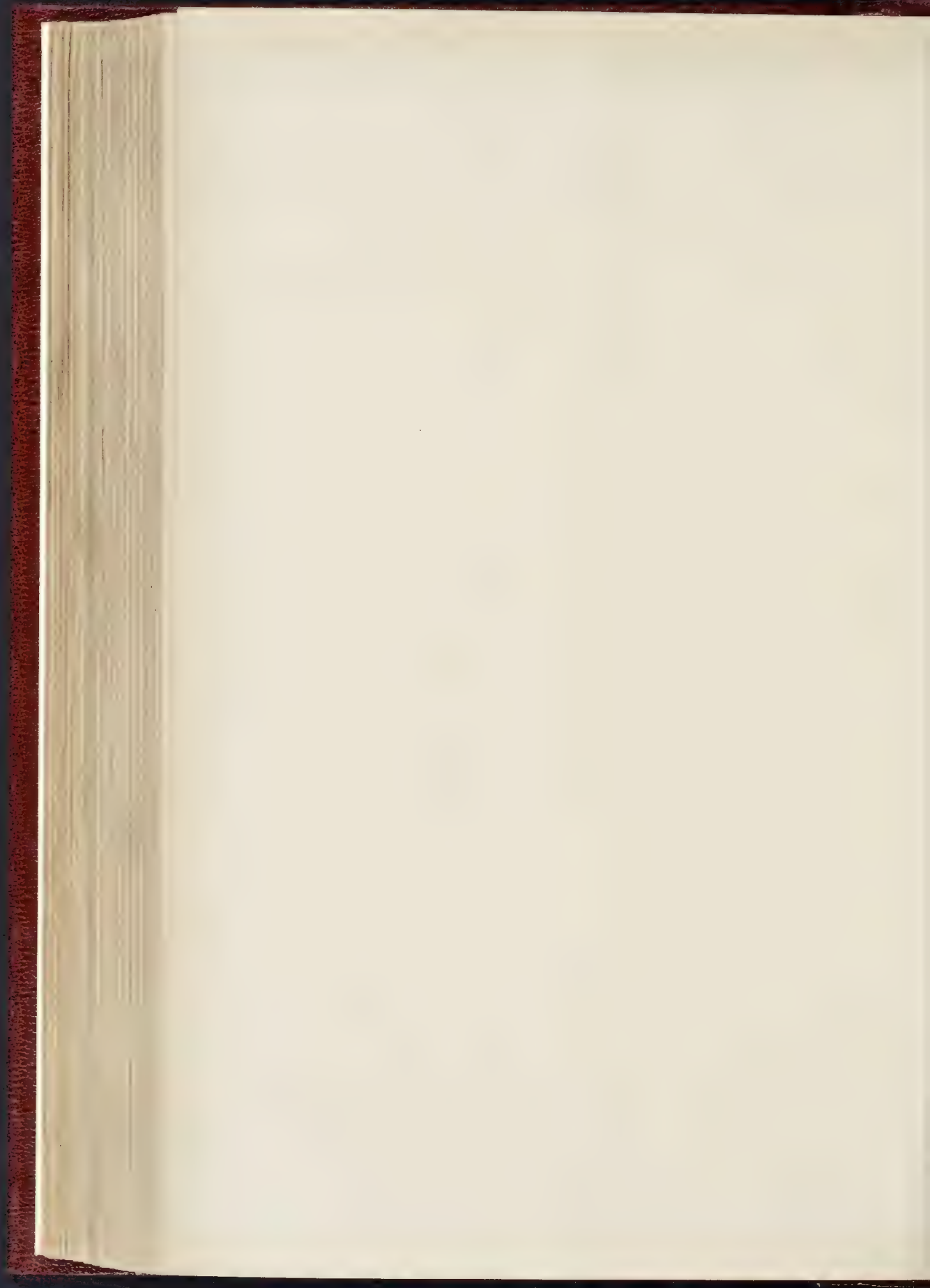


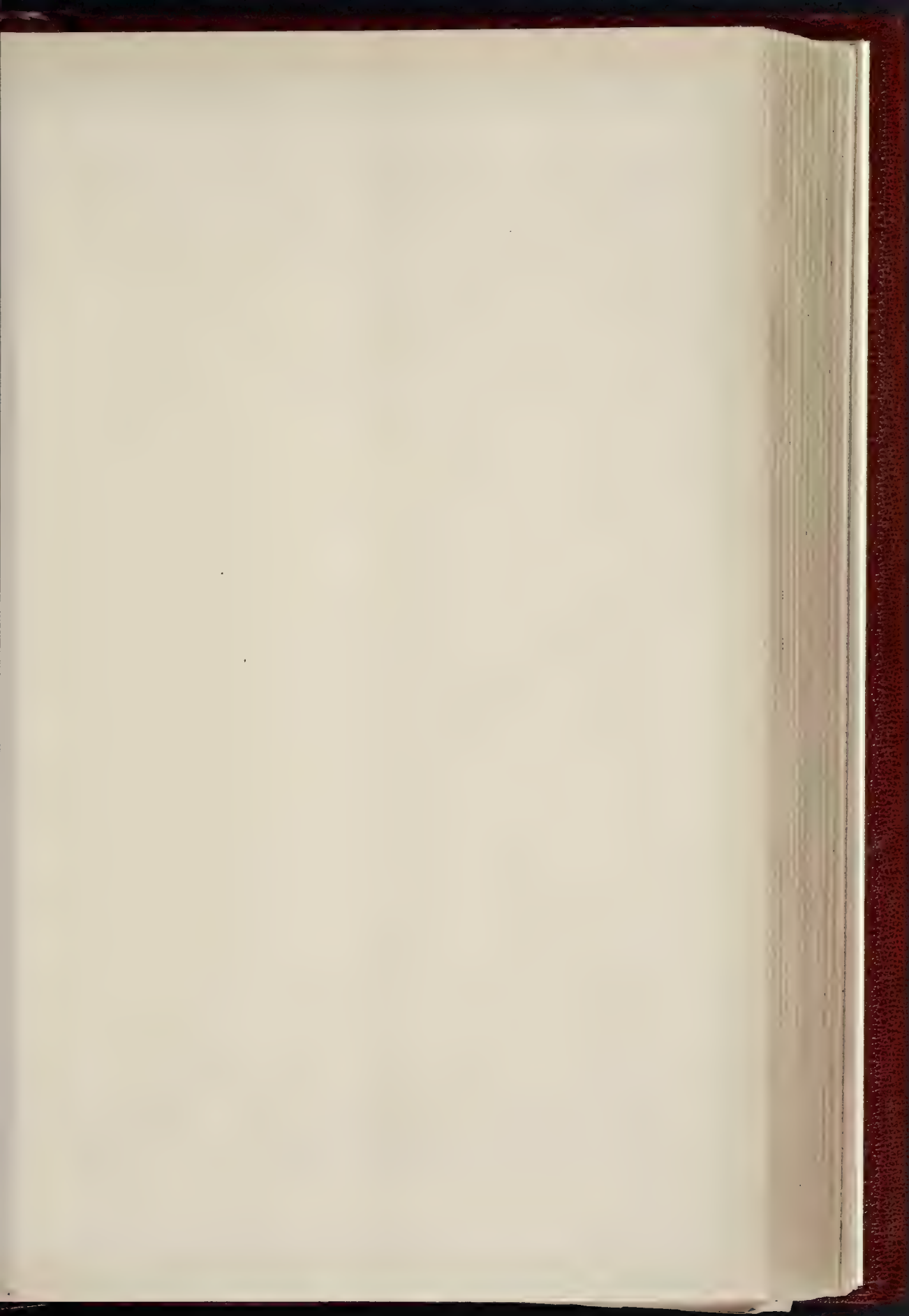
HEADSTONES AT COLN SAINT ALDWYN  
GLOUCESTERSHIRE



ALTAR TOMB AT QUENNINGTON GLOUCESTERSHIRE  
DRAWN BY MR. G. R. CLARKE.

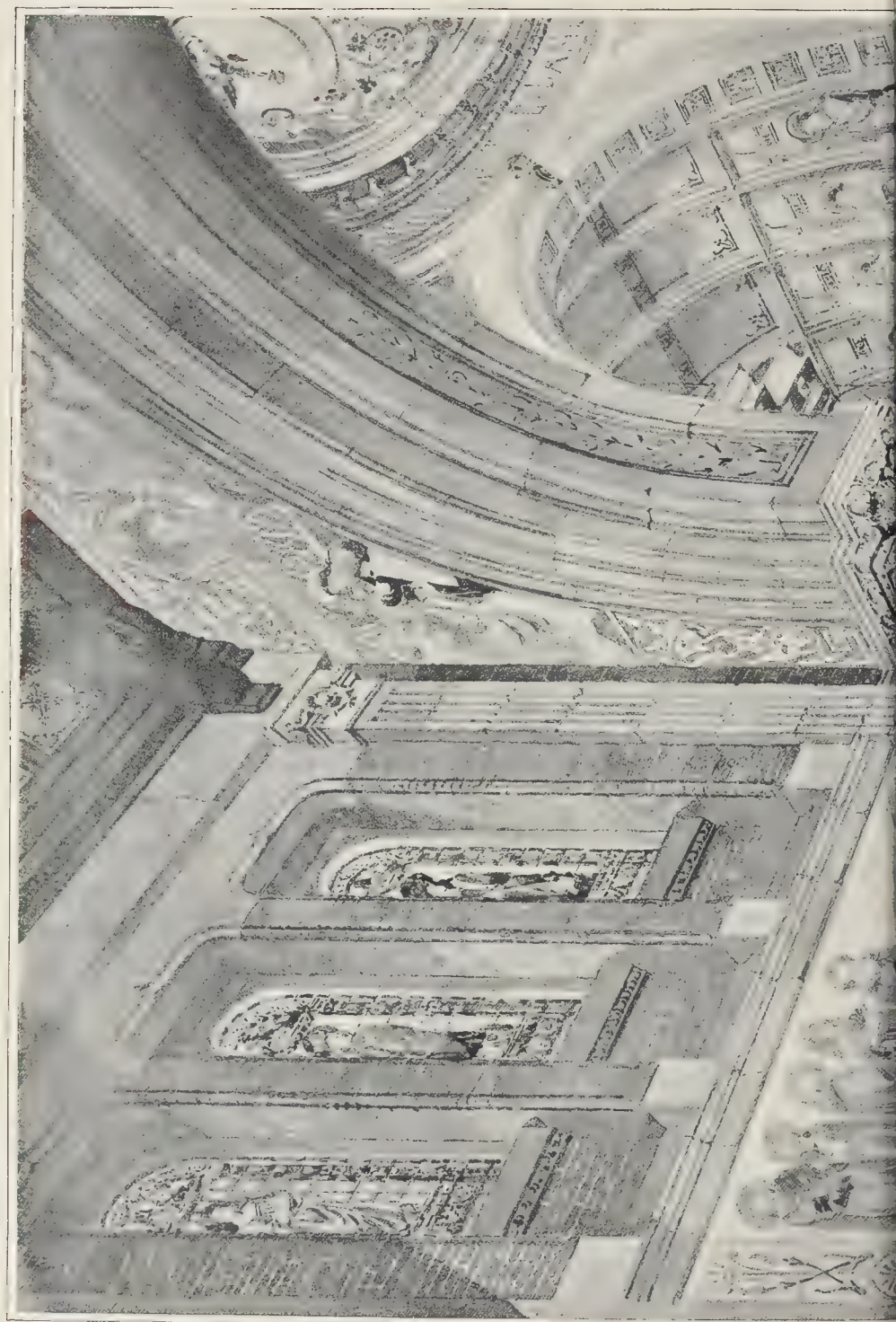


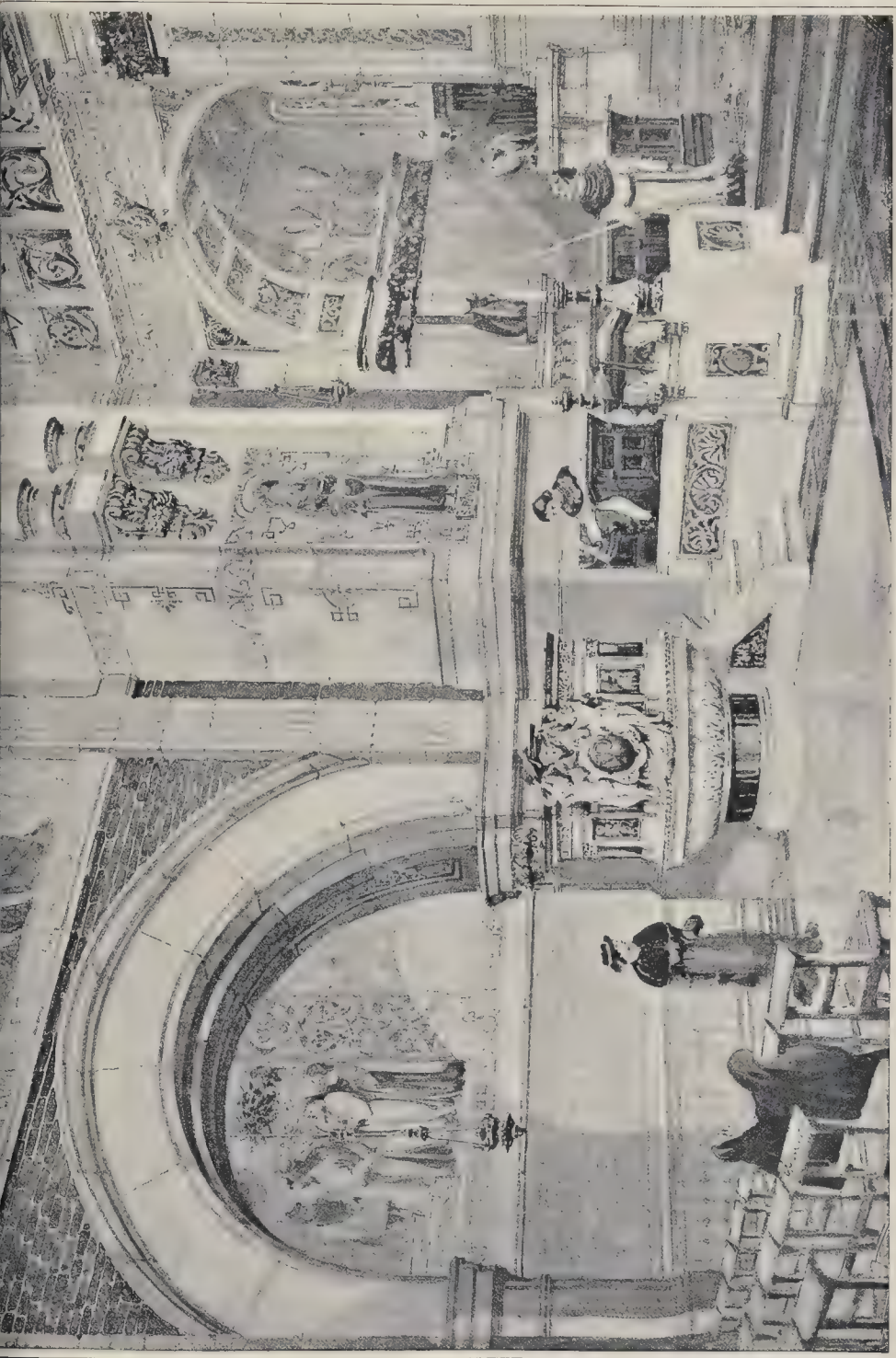






THE BUILDER, OCTOBER 8, 1887.





STUDY FOR A MODERN RENAISSANCE CHURCH. BY MR. W. H. JEWITT.





gained admission to our houses it would do no harm. To secure this, however, even partially, it is obvious that we must allow a much larger volume of fresh air to pass through our drains than has hitherto been customary,—in short, the more nearly we can make them approach in airiness to the condition of open drains the better.

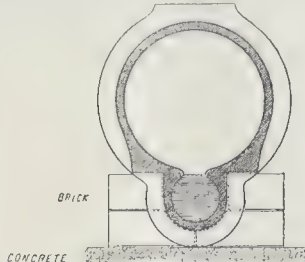
These remarks apply to drains of every size, but in this short paper I shall refer to house-drains only. One reason why I do so is that it seems almost a hopeless task to convince those who have control of the common sewers that anything in the shape of ventilation is called for. After nearly forty years of sanitarian effort, argument, entreaty, and painful and costly experiences, it is now almost as necessary as ever that those who connect their drains with common sewers should carefully protect themselves against the risks they run in doing so. In this and many other things, sanitarians have been very much like the "importunate widow," but after so many years' ineffectual reiteration of the same tale, they may almost be pardoned if they begin to despond. In the case of house-drains, however, they are able to appeal to individuals, and individuals are more amenable to reason. Now, our house-drains are under our own control; we can cut them off entirely from the common sewer and ventilate them as much as we like; and in view of the facts already referred to, this important question presents itself: Do we in practice ventilate our house-drains sufficiently to secure the best results? I think it is perfectly manifest that we do not, and that it is simply impossible to do so with drains of the size generally used.

Pipes of small diameter are recommended to facilitate rapid flow and scour; but we want rapid flow and scour of aerial as well as of liquid sewage, and we are met by this difficulty, that whereas small pipes are best for the one purpose, large pipes are absolutely necessary for the other. Now, while we admit the importance of dealing with the aerial as well as the liquid contents of drains, we have hitherto made no adequate provision for doing so. We have, no doubt, several schemes of drain ventilation which are theoretically good, and which are useful so far as they go; but they stop a very long way short of that thorough flushing of the drains with fresh air which is desirable. In order to bring out clearly the difference between what is usually done and what I think ought to be done, let us suppose that we are dealing with a house of moderate size, having, say, two baths, three water-closets, three basins, and three sinks. A 4-in. pipe would suffice to carry away the sewage from such a house, but in practice a 6-in. pipe would probably be used. Now in many,—I fear I must still say in most,—cases no attempt would be made to ventilate this drain at all, although soil-pipes connected with it would for the most part be ventilated. In some an outlet-shaft would be provided, 2 in. in diameter, in some 3 in., and, in a comparatively small number, shafts 4 in. or 4½ in. in diameter. Let us consider the state of matters in such a drain with the outlet-shaft of the largest size. If we suppose that the contents of the drain would fill a 4-in. pipe, the 4½ in. shaft would give an area almost equal to that of the remaining empty segment of the 6 in. pipe, so that, roughly, what we have to do is to ventilate a tube, say 5 in. in diameter and 100 ft. long, the greater part of which is horizontal. Even assuming that there are no restricting cowls or gratings at either end, it is manifest that in such a tube there could hardly be any appreciable current without the application of great mechanical force, even if we suppose the tube to be smooth and empty. But the tube we have to deal with is neither. It is rough, and it has for the greater part of its course an exposed surface, greater than that of a 5-in. tube, part of which is in motion in an opposite direction to that which the aerial current would naturally take. In such circumstances it is evident that the current would not only be sluggish, but variable, now in one direction, now in another, and often, when opposing forces were well balanced, stagnant. If such be the condition of a drain with a 5-in. air-outlet, I need hardly pause to consider the condition of the great majority now in use, which have nothing like so much ventilation.

Of course everything depends on what we mean by ventilation. If we mean by that term such a change of air in the pipes as is possible under the conditions just described, we may admit that some of our house drains are venti-

lated; but if we mean by it constant flushing of our drains with fresh air having something like its normal proportion of oxygen, then I fear we must say that none of our house-drains are ventilated; with such restricted sectional area and consequent friction the thing is impossible.

The question then comes to be, can we provide the air space necessary for ventilation without either extending the exposed surface of the sewage or of the contaminated periphery with which the air must come in contact? I venture to think that it is quite possible, and indeed easy, to do so by means of a simple contrivance which I now submit to you (see diagram). A drain-pipe such as this may



be made of any ordinary size, but assuming that one having the upper portion 12 in. in diameter would suffice, let us contrast it with the drain already described. In the first we had a sectional area for the transmission of air of (omitting fractions) 15 in., in the other you have 120 in.; in the first the surface of sewage exposed is 6 in., in the other 2½ in., assuming that the maximum flow would fill a 4-in. pipe; so that in this new pipe there would be fully a half less exposed surface of sewage and eight times the amount of air with increased velocity; besides which the flow of sewage would be more rapid, being more confined. In such a drain 100 ft. long, open and unobstructed at both ends, the current would not be overpowered by friction, and would hardly be affected by the comparatively trifling area of moving surface; and we by no means advise that it should be open at the two ends only, but at as many points as practicable along its course. Dealing with comparatively pure air we should be at liberty to make intermediate openings without risk,—the fresh air would thus have the upper hand and keep it. We can give air as well as water too much to do, and in fact it is more dangerous to overcharge air than water with impurity.

But while I recommend the use of large pipes immediately in connexion with the house,—that is to say, on the inlet side of the manhole and intercepting trap,—I must observe that in most cases it will be advisable to use pipes of small diameter between the intercepting trap and the outfall, especially if that outfall be a common sewer. In that case our object must be to leave no room for air in the pipe,—to use pipes large enough to hold the sewage and no more, so that when full, or nearly full, the air may be expelled from them. I speak of things as they are, not as they ought to be. Our sewers ought to be in a different condition, but while they remain a source of danger the more completely we shut them off from our dwellings the better, and the less we allow their polluted air to remain in contact with the seal of our intercepting trap the better. Where the outfall is good and the branch may be safely ventilated the large pipe of the section shown will be best. In short, the use of the one or the other is indicated by the practicability or otherwise of thorough ventilation.

I must now make one or two remarks on the use of traps in connexion with a thoroughly ventilated house-drain. The complete isolation of a house-drain is a fundamental condition. It must not be connected aerially either with a common drain or with the drain of any other house. Having secured that condition by means familiar to you all, and having also secured the thorough flushing of the drain with fresh air and water, it follows that trapping, as a protection against foul air, is unnecessary.

We are practically safe, and the fewer traps we have either outside or inside the traps we do not require to trap soil-pipes, rain-water pipes, or gullies; and by leaving them trapless we only the better insure the purity of the air

in the drain. The truth is that by a multiplicity of traps we create a multiplicity of obstructions and deposits, and to that extent interfere with the rapid cleansing and efficient ventilation of the drain. The only excuse for using traps inside at sinks, baths, and the like, is to protect the inmates from cold draughts and smells from waste-pipes. For this purpose some obstruction is no doubt necessary, but it need not take the form of a syphon trap. If it does it is most desirable that every trap of the kind should be accessible and cleansable from the vessel with which it is connected. Scullery sinks should be provided with a grease-box, which would also serve as a trap; but it ought to be inside, easily got at, and regularly cleaned by the servant who works at the sink. By appliances at present in use it is impossible to catch the grease in close proximity to the sink, especially where much hot water is used, but I think the difficulty may be got over by a contrivance which I shall now describe. This consists of a shallow box encased with cold water, and covered with a movable grating resting about ½ in. or more, according to circumstances, below the level to which the waste water will rise. The casing or jacket is really an expansion of the cold water supply to the sink, and the water in it would therefore be frequently replaced. The contents of the sink entering this box would at once spread over the cold bottom and impinge against the cold sides and raised central division. Much of the grease would rise through the grating and congeal above it, and thence be easily removed; but a good deal would, no doubt, adhere to the bottom and sides of the box. A depression is made at the end of the box to catch sand or other solids; the size would be in proportion to the amount of work to be done in the sink. It is evident that such a box would be quite easily cleaned, and that the cleaning of it could not be neglected without interfering with the use of the sink; moreover, as it would not be enclosed in any way, it would not be out of sight and therefore out of mind.

I shall conclude with a word or two about the trapping of water-closets. The ordinary wash-out closets have necessarily traps which prevent the inconvenient or otherwise objectionable ingress of external air, but I have no doubt that a good valve closet without any trap is hygienically a greatly superior apparatus. The external air is effectually excluded in this case by the water held in the basin; but it would be sufficiently excluded by the valve itself if we assume that the air in the house-drain is innocuous; there is, therefore, no use of a trap in addition to the valve, and without that obstruction the contents of the closet are at once discharged into the drain and carried clear of the house in a few seconds. In this way you not only with certainty get quit of excrementitious matter, but also of water which has been in contact with it; whereas in trapped closets you may get rid of the former but not of the latter, and in many varieties you get rid of neither. It is about twelve years since I first ventured to use trapless closets, and I have recently had an opportunity of comparing some of these, which have been in use for more than ten years, with trapped closets of about the same age, with the following result: in no case was I able to detect the slightest smell from a trapless closet, however long I held the valve open, and in every case where the closet was trapped a most offensive smell was perceptible if the valve were kept open for a few seconds. All my experience, indeed, points to this,—that our best chance of safety lies in so contriving our house-drains and plumber-work that there shall not be one single receptacle where stagnation is possible throughout our entire system, and that the pure air of heaven shall constantly permeate every nook and cranny of it.

Besides plenty of air, a good scour, and periodical flushing, one thing more is desirable, if not essential, if the contents of our house-drains are to be harmless, and that is that they should be regularly cleaned. I may not enter upon this subject now, but venture to say that I see no difficulty whatever in having this cleaning done periodically at less expense, and with very much less trouble to the occupants of the house, than a somewhat analogous operation to which we are quite accustomed,—the sweeping of chimneys. There is, indeed, no reason why we should not have drain-sweeps as well as chimney-sweeps.



## PUBLIC SEWERS, AND HOUSE DRAINAGE.\*

*Public Sewers.*

As the necessity for some of the requirements of house drainage depends on the sewer, the writer proposes to say a few words on this subject before dealing with house-drainage proper.

So far as the drainage of a house is concerned, it is necessary to deal with sewers as they exist, not with a theoretically perfect condition of things. Sewers, as separate pieces of construction, may be, and frequently are, admirable; but as channels for the rapid removal of all that passes into them they are faulty.

Sewers in most of our towns are designed not only for the removal of excreta and vegetable matter, but they have also to receive a large amount of storm-water, necessitating the presence of washings from roofs, street sweepings, &c., and they should therefore be constructed to provide a rate of flow in them which shall remove much heavier substances than those contained in sewage proper. If this be not done, the more ponderable matter will subside, and even if this subsidence be regular, there will be a considerably reduced rate of flow due to friction; and as the subsidence never is regular, bars will be formed in the sewer which, unless removed by flushing or excavating, will in time close the sewer altogether, or make it nothing better than a cesspool.

The necessities of practice and the configuration of the ground in almost all cases prevent the possibility of sewers, worked by gravity only, being laid to such gradients as will produce a regular rate of flow sufficiently rapid to remove the ponderable matter, or the sewage proper, in a space of time sufficiently short to prevent deposits and fermentation in the sewer; thus, as fermentation must necessarily take place, and as the householder has no power over the cleansing or ventilation of the sewer, it becomes his duty to separate the occupants of his house from the possible and probable effects of any direct connexion with a receptacle or channel which contains gases injurious to health, and may contain the germs of serious disease which have passed into it from some other habitation.

If the drainage of all houses were in such a condition as to get rid of all matter liable to decomposition at once, and it were not the fact that, owing to the faulty construction of many house-drains, decomposition has already become active before the matter to be removed has ever reached the sewer; if the sewer were self-cleansing and thoroughly ventilated, and the dangerous matter were removed before fermentation set in; if it were not the channel through which must necessarily be passed excreta carrying with them the germs of disease, there would be no necessity for the careful separation of the several systems of house-drainage from the sewer proper. But, as sewers do receive matter already decomposed, as they do not at once remove matter subject to decomposition, and as they are not thoroughly ventilated, it is necessary that each house should be disconnected as effectually as possible from any chance of contamination from this source, and the intercepting trap between the main house-drain and the sewer is a necessity.

Much exception is taken to the system at present in force for the ventilation of sewers, and it is proposed by some to put a large ventilating-shaft at the head of every sewer; but a very small amount of calculation will prove clearly that, even if the openings into the street were closed, any such system would be perfectly ineffectual, and that if the street-openings remain as they are, any such ventilation would not extend beyond the first or second of these openings. If sewers could be cut off into short lengths with an effectual seal at either end there would be no difficulty about the matter; such an arrangement is easily ventilated; but how to ventilate a large length and area of pipes, opening in many places either into the air or to other sewers, the writer knows not. The ventilation of a coal-pit will serve to illustrate the difficulty.

Street-openings are frequently offensive to the sense of smell because the sewer is foul, but this is not a reason for closing up the openings

into the streets, which would have the effect of forcing the gases into the houses by the pressure of the sewage when increased in volume during the day, or by a sudden access of storm-water, or by the expansion of the gases themselves, or by a combination of two or more of these forces; but it is a reason for increasing the number of openings, and thus reducing the temperature in the sewer as compared with the outside atmosphere in cold weather, and diluting the gases to the utmost extent possible. It is of course obvious that if fresh air be admitted foul air must be expelled.

If sewers can be efficiently ventilated there should be no delay in doing it. The proposal which seems to the writer to have the most practical value is that of carrying a pipe from the sewer to a point above the roof of every house, or of certain houses on one side of the street only, or alternately on one side and the other, but so that ventilating-pipes shall not be opposite each other on the two sides of the street. The ventilators should not be connected with the house-drain or with that part of it which is in the street (as this is liable to be flooded, and the ventilation would then be stopped), but with the highest point in the sewer. To make such a system of ventilation efficient, it would be necessary that a street-opening should be placed midway between each pair of ventilating-shafts; or if the shafts did not rise to the same elevation above the sewer, they should be so spaced that each should receive an equal amount of air in proportion to its requirements from the street-opening, and the latter should be of ample dimensions, so that the indraught should not be checked. Taking the difference of temperature between the column of air in the ventilating-pipe and that of the atmosphere at the street-opening at 5°, or assuming that the expansion of the gases produces a head equal to this difference of temperature, then a 4-in. pipe 40 ft. high might be expected to change the air in a 60 ft. length of 3 ft. sewer running one-third full, in 13·7 minutes (see Hood on "Warming and Ventilating Buildings," p. 364); or in other words, in order to change the air in 27 cubic feet capacity of sewer five times per hour, a ventilating-pipe 40 ft. high, and having a sectional area of 12·56 in. will be required, on the supposition that a difference of temperature equal to 5°, or a difference of head representing the same amount can be secured. Having made these few remarks on the condition and ventilation of sewers, the writer proposes to proceed to the consideration of house-drainage proper.

*House-Drainage.*

It is proposed to take certain propositions as axioms granted by all sanitarians, and to enlarge on these. The axioms are taken from a report prepared by a committee appointed by the Civil and Mechanical Engineers' Society. If no remark be made on any particular axiom it is considered that none is required.

(1.) Every drain, or part of a drain, inside a house, and all soil-pipes, shall be water-tight throughout. The writer believes that this requirement can be thoroughly carried out with glazed stoneware pipes, if they be thoroughly bedded in concrete, and no contact with any part of the foundation of the house be permitted. He, however, prefers to use cast-iron pipes where a drain passes through a house, and considers that with this material it is to be preferred that the supports should be at considerable intervals, that access to all the joints should be simple and easy, and that the drain should be in such a position that it will come under constant inspection. Under these conditions leakage can be quickly detected, and injuries from rusting may be reduced to a minimum.

(2.) The main drain of the house shall be ventilated at its upper extremity by means of a continuation of the soil-pipe, or by a special pipe provided for the purpose, such ventilating-pipe, whether connected with the soil-pipe or otherwise, having a clear sectional area of at least 10 square inches throughout, and being carried to such a height that its outlet shall be at least 3 ft. above the eaves of the roof, and the same distance above any window or opening in the roof not being a chimney, or not less than 6 ft. distant from any chimney or opening in the roof, whether of the house to which it belongs, or of the next adjoining house, measured in any direction. The main soil-pipe shall be similarly ventilated, and if there be more than one soil-pipe, then each such soil-

pipe which shall be longer between the basin of the closet and the main drain than 8 ft. shall be similarly ventilated. The main drain shall be disconnected from the sewer or cesspit by means of a syphon trap of approved construction, provided with means for cleaning the trap, and the portion of the drain between the trap and the sewer or cesspit, and it shall be ventilated by an inlet air-pipe or ventilated disconnecting manhole; and if there be more than one outlet ventilating-pipe connected with the house-drain, then each such portion of drain and outlet ventilating-pipe shall be provided with a suitable syphon trap and an inlet air-pipe, or disconnecting manhole, as already described; and the area of the inlet air-pipe shall in all cases be at least double that of the outlet ventilating-pipe in the clear.

It is contended by some writers that the inlet for fresh air should be at the head of the drain, and the outlet at or near the disconnecting manhole. The objection to this arrangement is that the soil-pipe will either remain unventilated, or a separate system of ventilation will have to be provided for it, thus introducing unnecessary complications. The argument in its favour, that it follows the flow of the drain, does not seem to be at all conclusive, for as house-drain ever runs more than one-third full, unless under most exceptional circumstances, there is not much reason to fear that the air passing up the drain, which is more volatile than the water flowing down it, would have its current arrested by the traversing current of water; on the contrary, it is probable that the effect would be that the current of air would be temporarily accelerated, and especially would this be the case when, as frequently happens, the drain has a diameter of 6 in., while that of the ventilator is 4 in.; also, if the water in the drain were giving off vapour, this would rise in the drain and travel in a direction contrary to that of the water; this, therefore, seems to be the natural direction of the current.

Writers have repeatedly stated that the number of ventilating-shafts should, if possible, be increased indefinitely, and from some of the statements to this effect it may be inferred that the relative elevation of the several shafts is a matter of no importance, and that rain-water pipes may be used for this purpose. It cannot be too often or too urgently repeated that this is altogether a mistake (see Hood on "Warming and Ventilating Buildings," p. 360); that under no circumstances should rain-water pipes be used as drain ventilators; they cannot go above the eaves of the roof, and therefore the foul air from them is liable to enter the house; also, if more than one upcast shaft be used it will not, unless each shaft be of exactly the same height, heated to exactly the same extent, and affected by the wind in just the same manner, — increase the ventilating efficiency, but will rather diminish it. The writer has frequently come across systems of ventilation which were faulty on this account; but when the system of ventilation is simple, — that is to say, where there is one upcast shaft for each inlet, where the inlet opening is of ample dimensions, and leads as directly into the drain as possible, with few or no angles or bends, — he has found no difficulty, and he is of opinion that cowlings of any kind should be avoided, and that a mica return flap on the inlet opening is unnecessary. Where the work can afford it, a ventilating disconnecting manhole should be built, as it affords easy access to the drain; but a perfectly satisfactory arrangement can be made without it so long as the drain remains in good order.

The disconnecting trap should be self-cleansing; therefore it must be of large radius, with easy curves in all directions, and there must be no projections or corners in it which will either arrest the flow through it or tend to collect deposit. These requirements condemn all forms of dip trap, and, in fact, the only trap which will satisfy them is the ordinary syphon trap, if the radii of the curves be sufficiently great, and it be of good form throughout and well glazed. No inspection pipe in the middle of the length of the trap is possible; this would seriously retard the flow and cause deposit. A cascade action is recommended by some, but consideration will, it is thought, show that this action, while it may, by the greater head obtained with a small supply of water, force an obstructed trap, does not really offer any advantage which does not exist to a greater degree in the ordinary syphon described above. If with the cascade action a greater

\* From a paper by Mr. Reginald E. Middleton, M.Inst. C.E., M.Inst. M.E., Vice-President of the Civil and Mechanical Engineers' Society. Read at the Bolton Congress of the Sanitary Institute.



local head be obtained with a reduced amount of water, it is at the sacrifice of the general gradient of the drain, and therefore of the rate of flow in it. With the cascade action the distance travelled is greater than with the other system for the same fall, and the very fact of the head being obtained proves conclusively that this trap has a retarding effect on the flow, and the conclusion arrived at by the writer is that it is far better to make the best of the gradient procurable, to have a length of drain next to the trap from 1 ft. 6 in. to 2 ft. long, falling at the rate of 1 in 6, than to have a local vertical fall, whether small or great, and that in this manner a far better scouring action and a cleaner trap would be secured than with a cascade action trap.

(3.) No pipe which passes through any part of a house, not being a soil-pipe or soil-drain, shall be connected directly with the main drain.

(4.) No water-closet shall be situated next to a larder or place where food is stored. No pan-closet or D-trap shall be used, and every water-closet shall be trapped, and shall be arranged so as to prevent syphonage.

(5.) The overflows from safes of closets and of baths, and from cisterns, shall be discharged into the open air in an exposed position, and shall not be connected with the soil-drain or rain-water pipes, either directly or indirectly, but shall act as detectors.

(6.) All sinks, baths, lavatories, and urinals shall be trapped with suitable traps, and the discharges from them shall be carried outside the walls of the house, and shall not be connected directly with any soil-drain, nor shall they be introduced under the grating of any trap, but they shall terminate in the open air, and not near any window or other opening.

The writer is aware that many sanitarians prefer to introduce the pipes leading from sinks, &c., under the gratings of the yard gullies; but he thinks that this is a mistake, and that it is far preferable that the discharge should be made fully in the open air, so that there may be as little chance as possible of the collection of any matter in the pipes, than that it should be hidden out of sight and, possibly, choked. If the gratings became foul from this cause, it is better that this should be apparent than that it should be hidden; it is the object of scientific drainage to bring any collections of foul matter to light, not to hide them.

(7.) All water-closets, urinals, and slop-sinks shall be provided with suitable flushing-cisterns, and the flushing-pipe for any closet shall not have a less internal diameter than 1½ in., and the height of the flushing-cistern above any closet, urinal, or slop-sink, shall not be less than 4 ft. It shall be impossible to draw water from any cistern used for flushing purposes for any other purpose than that of flushing.

(8.) The cisterns used for general purposes shall be easily accessible, and shall be provided with covers ventilated into the open air outside the house by a rising pipe other than the overflow-pipe; and no pipe from them shall be connected in any way with any soil-pipe, drain, or with any pipe receiving the discharge from any bath, lavatory, urinal, sink, or flushing-cistern.

(9.) No rain-water pipe used to receive the waste from any bath, lavatory, sink, or urinal, shall be placed near a window or other opening; and no rain-water drain shall connect directly with a soil-drain, and no rain-water pipe shall be used as, or connected with, the soil-pipe nor as a ventilating-pipe.

Though there are many bad sanitary appliances in the market, the selection of good ones is a simple matter, requiring little more than common-sense knowledge, it being obvious that sharp bends and angles and straight vertical sides are undesirable; that all utensils should retain matter liable to decomposition for as short a time as possible, and should pass it quickly to the drain, which in its turn should pass it quickly to the sewer. Complications both in apparatus and in the drains and ventilating and inspecting chambers, are most undesirable, and economy without loss of efficiency should be studied. Finally, whatever sanitary work is done, it is of the first importance that it should be done well, that the construction should be thoroughly accurate, and carried out in a trustworthy manner.

**City of London Court.**—A new building for the City of London Court, designed by Mr. Murray, is, the *City Press* says, to be erected by the Corporation, at a cost of nearly 14,000l.

### THE WALLS OF CHESTER.

SIR,—Mr. Thompson Watkin says I have not answered his question about the absence of mortar in the Chester walls, or, I suppose, in a portion of them. I have, it seems, in vain referred him to the walls of Dijon, Sens, Bordeaux, and Artois. In all of these, as in the walls of other towns, the sculptures were placed carefully without mortar, just as they were found in the Chester and London walls. The *castra* of Richborough, Reculver, and Lyme are, or should be, well known to archaeologists. Like that of Chester, the walls are upon layers of boulders without mortar, but above they are strongly cemented. It is in the absence of any underground foundation that the walls of Roman *castra* are distinguished from Mediæval buildings.

When Mr. Watkin asserts that the origin and date of the Continental walls, mentioned above, have been disputed, he is correct; but the arguments used to prove them Mediæval were as illogical and futile as those adduced in favour of a Jacobean theory to explain the walls of Chester. M. Schuermans, in a masterly article on the walls of Artois, has shown the utter impossibility of their being other than Roman. See the *Bulletin des Commissions Royales d'Art et d'Archéologie*, 1877.

Mr. Watkin says that the eminent gentlemen whose names he prints as converts to the theory of himself and Mr. Shrubsole still adhere to their opinion. But is it really so? We do not see them writing in support of it.

As soon as possible, I shall endeavour to give my views on what are now the important questions, namely, to what cause may we ascribe the peculiar construction of the Chester walls; and the probable period. In the meantime, I rest in perfect confidence that truth and common sense will prevail.

C. ROACH SMITH.

Temple-place, Strood, October 1st, 1887.

SIR,—I will endeavour to complete my remarks on this subject, now that I have Mr. Watkin's reply, page 476. Before doing so I will answer one of his inquiries, the remainder as we proceed. Do I know of any Roman wall in England built entirely without mortar? No. Here is, however, one of the most telling arguments in favour of the Roman theory. If the Romans did not build the wall thus, could any other people? They are, at least, likely to have done so. They would have relied upon the huge size of the stones and their Continental custom, and it would have been in harmony with other works already cited where, in part, mortar is not used. We can in those works trace their tendency to construct in this manner. On the other hand, would any builders of the seventeenth century, or of the time of Anne; or, to go back to the Edwardian period, since a part of the wall is pronounced to be of that time, have been likely to build without mortar? Can Mr. Watkin tell me of any city wall so erected? Or, can he tell me of any other important building? There are three periods for him to choose from. It must be remembered that there was artillery to be guarded against, and is there even the bare possibility of its being omitted in a work of such magnitude as the walls of Chester? I have already shown that it is the lower portion only that is so constructed. Are the builders of either of the three periods likely to have built the base without, and the upper part with, mortar?

The details of the construction now require notice, and the uniformity of design wherever opened is first in importance. At all the points observed there are the same lower courses of massive stones, much the same tool-marks, a plinth of varying size, as we find in the Roman wall of London. No mortar, except to the Roodeye wall, where it is used because it had more to do; to resist, perhaps, the wash of the tides and certainly the thrust of the bank. This mortar is as hard as flint, and Mr. Frank E. Williams has detected pounded brick in it, and has sent me specimens. The work is the same except the mortar, at the Kaleyards, called Edwardian by your correspondent, the same wherever the massive stones are visible. This uniformity of design in the lower portions proves that the latter were built at one time, and it is incredible to think that it could have been so rebuilt at any one of the three periods named, the lower part without, the upper part with, mortar. The absence of mortar to stones confessedly Roman is an item of detail of no

little value, since, even on the supposition that the stones were brought from some other Roman buildings, it proves that the Romans did actually build largely without mortar at Chester. The same remark applies equally to the moulded stones which have evidently been taken from a large number of small buildings, which were in like manner built without mortar, except to some of the upright joints. If re-used in Roman times, the absence of mortar is accounted for. If at any later time, it seems incredible. There are the stones, open to the observation of every one, and their evidence in this respect is not capable of being denied. There is, however, an important detail which must now be considered. None of the stones that I have seen have Lewis-holes of modern form. Mr. Jones has kindly measured what does appear for me. They average only 1½ in. deep, 1 in. broad, and 6 in. long, straight sides. Some are T-shaped. It seems impossible or nearly so for stones to be lifted by their means, and if so they indicate that the stones were rolled into position, that labour was cheap, and that progress was slow.

Is any builder of the seventeenth century, or later, with such a mass of work to do, likely to have undertaken it without at least some of our modern appliances? Is not this evidence fatal to any late date?

I may here note Mr. Watkin's remarks relative to the recent rebuilding of part of the wall west of the North Gate. The work he describes could hardly be Roman, except, perhaps, that what he calls the buttress wall may have been, in part, the backing of the wall of Roman date. He is speaking of the south face. Let him look at the north. Nearly all the way up to the little gate referred to, going west from the North Gate, he will see an almost continuous course of Roman stones, in some cases two, in some three, mostly of large sizes, with tool-mark patterns, which appear never to have been disturbed. How far this goes below ground I cannot say. In Mr. Hughes's shed, just east of the new opening, and ninety-four paces west from the centre of the North Gate, is a curious set-off, made up, not with the chamfered plinths as to the east of the North Gate, but with a quarter-round springing from a fillet, very like one of the coping stones we found built up in the wall. Beside this is another stone similar, but shifted in position, as some of the other Roman stones are. All above is of later date, and if opened it is very likely it would be found to resemble the bulk of the poor work described. Why did not your correspondent say something as to these stones? They have always been visible, they are very distinct, and tell their own tale. They can be found again west of the opening named. I am unable to divine your correspondent's objection to regard these stones as Roman work *in situ*. They clearly form part of the wall left and right of the North Gate, where we know, from Pennant's description and view, that a Roman double archway existed until the middle of last century. What more reasonable than that the wall should survive when the gate has been pulled down? In reply to his question, I cannot tell him of any cornice to any other Roman city wall, nor can he tell me of any such wall which retains its full height. We have nothing, therefore, to judge by.

But there is other evidence,—that of cost. It is a very easy thing for any one to assert any date that he considers possible; but at Chester, I believe, this can all be checked by documentary evidence. Mr. Earwaker, in his interesting discourse at the Town-hall, told us that there were hundreds of documents showing the acts of the municipality. I have not examined them, and the test I am now about to propose ought to be decisive for or against me. I therefore asked your correspondent,—p. 441,—(1) which statement as to age he considered most likely to be true, and (2) relative to the extent.

He replies (p. 477), "I believe the newly-excavated portion of the north wall to have been constructed in its present state (or mostly so) immediately after the siege; the North Gate, cornice, and walls." "During the repairs in Anne's reign."

He does not, thus, say that the whole of the city walls are of these dates, as I had understood him to do in some of his other letters. I am unable, therefore, to carry out my test to the whole of the city wall, but still to sufficient for the purpose.

I accept his answer, but it is bound to apply



equally to the small portion of the north wall from the North Gate to the Phoenix Tower, a distance of 394 ft., where the wall is only of moderate height, excepting a portion which I will not include, for it is thinner, clearly of later date than the Roman stones, which do not appear here. They go visibly from one of these points to the other, allowing 50 ft. to clear the modern work at the North Gate, and also the other exception named in addition. The part of the wall above the Roman masonry we must assume for this purpose to have been erected at the same time, as I made clear in my inquiry, or later.

I have taken out the quantities of this portion, and find that, at current local prices, which I have verified, it would cost 2,560*l.* to erect the small length of wall as it now stands, the stone being supposed to be ready to hand for use from some older wall and not bought.

Let your correspondent reduce this to the currency of temp. Charles I. or Queen Anne, and let him, or any of his local friends, trace the records of the municipality to find entry of it. I will add to this, to make it even more certain. The Murangers of Chester have (or had) the task of the repair of the wall. Let him search through their accounts as well. If the entry had ever to be made he is sure to find some allusion to so heavy a work. Alas! for the Murangers, theirs could have been no easy office, if your correspondent is right, for this cost applies to only 394 ft. out of eight or nine thousand feet, forming the entire circuit of the city wall.

This is not all. If a careful observer examines these walls he will be able readily to find traces of repair after repair. At the North Gate he can count six such places close together. If this were a new wall at the periods named, the unhappy custodians must have had to pay for all of these since its erection! What a small outlay does the 1,000*l.* for repairs, temp. Queen Anne, recorded at Pemberton's Parlour appear? Yet it is spoken of as a heavy outlay (as it doubtless was). The work then done can be readily traced. It seems to be among the newest portions of the wall, done in great part with poorly selected stone, laid after the foolish local plan, any way except on its natural bed. Beside this work, the Roman stones appear to be un injured.

The Roodey wall is referred to, and Mr. Watkin ventures upon a supposition derived from its present position, with the readiness so often met with. Conjectures in this respect are of no value. I have my own, but I do not state them for this reason. In the meantime it has to be remembered that it lines out exactly with the present western wall at Water Gate.

Finally, your correspondent refers to the ease with which Roman stones lying about Chester could have been found when wanted, and he thus accounts for their presence in the wall. Let him take a rule and measure the cubic contents of the vast mass of what he acknowledges to be Roman stones, now in the wall. He will be startled at the quantity, and be bound to abandon the supposition. In the short length of the North Wall already referred to, it amounts to about 21,840 cubic feet. This is sufficient to build a block of masonry about as lofty as the central tower of the cathedral, and about 14 ft. square, but perfectly solid.

A still greater obstacle than the possibility of finding such a mass of stone lying about is the fact that the walls are very fairly coursed. Each is slightly different from those above and below, and there is a certain amount of variation. The builders had, therefore, not only to find Roman stones, but stones that would fit in with the courses, the facework being undisturbed. While this search was supposed to be made, the suburbs of Chester were lying in ruin after the siege, and stone, if wanted, must have been abundant. There was, therefore, no necessity to search for Roman stones.

My remarks have been demurred to on account of the few hours I spent at Chester. I found the time all too long to go through baseless theories, which ought never to have been put forward. I addressed myself to this examination unfettered by any preconceived opinion, except, perhaps, rather in favour of the non-Roman theory, from a recently published article. I am assured that the great bulk of observers will come to the conclusion that the unmortared portions of the walls of Chester are of Roman date, *in situ*, although

that Roman date may be a late one, and that the mortared parts are of varying Medieval periods down to our own day.

E. P. LOFTUS BROOK.

SIR, Mr. Brock, in describing a section of our north wall (p. 441, *ante*), writes that "from the base the wall rises to a height of about 10 ft. without mortar, and 8 ft. with mortar." Allow me to correct this. I have visited the excavation with the City Surveyor, and on the spot ascertained that from the base the wall of massive stones rises to the height of the so-called Roman cornice 19 ft. 4 in., and is without mortar in its several courses, dry earth supplying its place. The mortar seen by Mr. Brock is a modern and superficial repair on the inner face only. This correction is material, since in judging of its age, or whether it is Roman or otherwise, it is important to know whether 19 ft. of the wall, or, according to Mr. Brock, only 10 ft. of it, is without mortar. Over the area returned by Mr. Brock as mortar, I saw a workman passing his arm between the layers of stone, first removing the dry earth, and then feeling for inscribed stones. I do not think he could have done this with Roman work. I think that most of your readers will agree with me that a wall made up of 19 ft. of loose stones without mortar, supported behind by 14 ft. of soil, has scarcely the look or characteristic features of a Roman military wall, or is likely to deceive any one familiar with such work.

GEORGE W. SHRUBSOLE.

Chester, Oct. 1st, 1887.

SIR, Permit me to supplement my letter in last week's *Builder* [p. 476] with a few remarks, more especially on the subject of the Roodey stones, serving, amongst other purposes, as the abutment of a bridge across the creek. Naturally there is much inquiry on the point. Excavations at the Roodey in 1874, for a new intercepting sewer, revealed the fact that this creek at its mouth had been some 300 ft. wide. Mr. Shrubsole read a very interesting paper on it before the Chester Archaeological Society (see *Chester Chronicle*, March 28th, 1877), and in my "Roman Cheshire" I have gone fully into the matter, its bed was peat, covered with silt, and above was rubbish of post-Roman and Saxon times. It existed, though almost completely choked up, till the beginning of this century, or, in fact, till some forty years since, being a large open drain. The deep depression in the field between the wall and the Militia Barracks, and the deep "dip" in the wall itself, reveal its site.

The existence of this creek explains, as I have pointed out ("Rom. Chesh.", p. 103), the passage in the "Polychronicon" that Elfedra "enclosed the city with new walls, and made it high two such as it was before, so that the castle that was sometime by the water without the walls is now in the town within the walls." Why the castle was more than the whole of the western side of the walls should be "by the water" would be puzzling, if we had not evidence that the castle rock was more or less surrounded with water, the creek being on its north side, and the extension of the wall from Novgate round the castle, to meet the advanced Saxon wall on the Roodey side, in the vicinity of this creek explains how the castle came to be included within the wall.

But was the mouth of this creek built upon by Elfedra? I think not: but only excavation can show this. If not, a bridge would be necessary, but I do not think it would be an arched one, probably in imitation of Roman work; there would be one or two rude stone pillars and a roadway of timber.

I have always admitted that the large stones supporting the bank at this place are of Roman origin, though not *in situ*, and I should much like to see excavations in their rear. Sir James Picton, I may add, thoroughly seconds this idea, and thinks more would be learned by an excavation on the spot named than in any other.

W. THOMPSON WATKIN.

Liverpool, Oct. 3rd, 1887.

#### REFUSE DESTRUCTORS.

SIR,—I, with others, have reason of complaint against the general tenor of Mr. Jones's remarks upon Furnaces for the Destruction of Towns. Refuse in his paper of a few weeks ago, a reprint of which appeared in your paper of the 10th ult.

In referring to Hardie's patent, Mr. Jones says it is composed of the old saddle-shaped boiler. This is not the case. Again, because I use forced draught, somewhat like Young of Glasgow; again, he is incorrect, and does not take the least notice of the most essential part of the patent, viz.: the drying of the refuse in closed vessels or chambers, heated by the waste heat and flame given off by the burning of the refuse on the hearth of the furnace, and drawing off the noxious vapours as they arise through the fan with fresh air; the mixture is forced into the ashpit, and through the burning refuse of the hearth of furnace (which in my patent extends the whole length and width).

The bulk of the noxious vapours arise during the drying of the refuse, and up to now the drying has been carried out in open pits leading to the chimney, and from thence to the surrounding atmosphere, which it contaminates. This is the fault of furnaces

of the type of Fryer & Co., and others. I am aware that Mr. Jones says that in passing through his crematory furnace the objectionable fumes are burned and destroyed. I say, but to a very limited extent, unless with very large additional cost of apparatus. It being impossible to burn them without air, or other supporter of combustion, if cold air is used, temperature is reduced, or if heated there is the increased expenditure of heating it, besides requiring a separate furnace for the work. In my system the fumes of the drying-chamber are drawn off and mixed with air (required for combustion) passed through the grate-bars of the furnace in minute quantities, and with this fresh air, passing immediately through the fire, enters into combustion, along with the matter on the hearth, and becomes innocuous before going to the chimney. This is done by a single furnace.

It is evident that Mr. Jones, having omitted remarks upon such portions of my patent as are considered points of value, had not examined the specification properly, or that his omissions have an object. He ought to have been more explicit in his remarks, or should have left out any mention of it.

T. G. HARDIE.

Burnley, Oct. 4, 1887.

#### BOLTON EXHIBITION.

SIR,—Thanks for your graphic notice of our patent w.c. in your Saturday's issue.

May we be allowed to point out to you that you are wrong in saying we have no means of cleansing trap of w.c. If you will kindly refer to the diagram again, you will find we provide ready means of access to this trap, and with regard to the washing of the pan, we beg to inform you that in practice we find very little if any soil touching the back of the pan. The pan extends considerably towards the back to prevent its being soiled.

DUCKETT & SON.

#### THEATRES.

SIR,—To prevent such events as that at Exeter, how would it answer to give always to every person as they pass in to any public meeting or entertainment a small plan with sections showing all the means of entrance of such buildings? Many would understand them, and thus be as well acquainted with the internal arrangement of such buildings as they are with the outside streets.

It would more than pay the manager of such public buildings or hotels by the advertisements which might be printed upon the back.

R. F. CAMPBELL.

\* \* This is done, we understand, at Drury Lane, and it is a right thing to do, but it will not in itself prevent piques, though it may do something to mitigate the results.

#### PROVINCIAL NEWS.

Bury St. Edmunds.—A new lodge is about to be built at the entrance to the Bury St. Edmunds Grammar School for the Governors. Mr. Frank Whitmore, of Chelmsford, is the architect.

Gallowhill (Northumberland).—A large country mansion is in progress at Gallowhill, near Bolam, for Mr. Charles Perkins, J.P. The contractors are Messrs. Joseph Burnett & Son, of Birtley, and the architects are Messrs. Septimus Oswald & Son, of Newcastle-on-Tyne.

Liverpool.—The foundation-stone of the new engineering and technical department of the Liverpool University College was laid on the 1st inst. by the Mayor (Sir James Poole). The want of more accommodation has long been felt, and the architect, Mr. Waterhouse, has been asked to scheme out a building capable of accommodating the main departments of the college, excluding the scientific and technical; his plans have been approved by the council, and sketch plans were exhibited to the public on Saturday. The building, of which the foundation-stone was laid on Saturday, consists of a shaped block resembling the form of the letter L. The long portion of the block forms a room about 100 ft. in length, which is to be a joiner's workshop. The shorter part of the block comprises the laboratory, lecture-hall, and various class-rooms. The longer side of the block faces Brownlow Hill, and has a frontage of 170 ft. The eastern face extends 102 ft., and it is here that the main entrance will be constructed, it being an arched doorway 12 ft. in height, and opening into an entrance hall. The style of the building is Gothic. Upon the ground-floor there will be the joiner's shop. The entrance hall of the other part of the building leads into a large laboratory. Behind the eastern frontage of the building there is to be a boiler-house, in which will be placed the furnaces and boilers necessary to drive the



machinery of the shops, and to work the lift which runs from the ground floor to the top story. The boilers will also supply the hot-water pipes with which the entire building is to be heated, pipes extending through all the rooms on each floor. Upon the first floor the chief room is for a museum, the cottage being to Brownlow-hill. The lecture hall, which is 40 ft. by 34 ft., has seat room for over a hundred students. On the same floor there is an apparatus room, small lecture hall, and rooms for the professor and assistants. A lavatory and two rooms for the accommodation of the porter complete the provision of the first floor. The main part of the second floor is occupied by a large drawing-room. An examining-room and class-room lead to the south, and upon this floor are also superintendent's room, and several small diagram rooms. The height of the main building roof is 60 ft., while a small tower, which rises beyond the rest of the building, reaches 80 ft.

**Morpeth.**—New business premises are in course of erection in Bridge-street for Alderman B. Grey. Mr. James Waterston, mason, and Messrs. G. & C. Haswell, joiners, are the contractors employed. The architects are Messrs. Eptimius Oswald & Son, of Newcastle-upon-Tyne.

#### CHURCH-BUILDING NEWS.

**Holme-next-Sea.**—St. Mary's Church, Holme-next-Sea, which has been closed for the last two months for the purposes of restoration, was re-opened on Sunday, the 25th ult. The work of restoration was commenced about three years since, when the roof, which was in a very dilapidated state, was replaced by a new one. The old-fashioned pews, which were painted in various colours, have now been removed and new open benches substituted. Prayer desks have been placed in the chancel, and a stone pulpit has been presented to the church by Miss Blyth. The works have been carried out by Mr. Southgate, of Hunstanton, under the direction of Mr. William Adams, architect, Lynn.

**London.**—A new church for the English Wesleyan Congregation was opened on Wednesday, the 5th inst., at Vanbrugh Park, Hackney. The building consists of a nave, transepts, lecture hall, class-rooms, &c. The exterior is of Kentish Rag and Bath stone, and the whole of the roof, pews, pulpit, reredos, &c., is selected pitch-pine and the outer doors of oak. The tower and spire at the angle of the building towards Mycena and Vanbrugh Park roads is over 100 ft. high. The site as presented by Mr. Young, a member of the congregation. Mr. Thomas Arnold was the architect and Mr. James Morter, of Stratford, the contractor. The stained glass was executed by Messrs. Pepper & Boyes, the carving by Mr. Allen, the gable pendants by Messrs. Marshall, of Heltenham, the enclosing fencing by Messrs. Ayllis, and the heating by Messrs. Haden & Son, of Trowbridge.

**Over Winchendon (Bucks).**—The interesting little church of Over Winchendon, near Aylesbury, has recently been re-opened by the Bishop of Oxford, after renovation under the direction of Mr. William White, F.S.A. The plans were prepared some fifteen years ago, but the raising of sufficient funds proved a considerable difficulty and caused much delay in carrying out the work. The chancel is of the period of transition from Norman, with two round windows in the east gable and a corbel between them inside, with the string course twisted round it, on which was placed, perhaps, the image of a saint, or, as is thought more likely, a rood. If circumstances should permit, it is proposed to put a large cross here, made of red oak, reaching up to the roof, with a reredos beneath containing a representation of St. Mary and St. John on either side of the base, painted on canopied panels, for which the figures have been already drawn by the architect. In each side wall are three lancets, and at the south a recess, apparently of a priest's door, now blocked on the outside, and immediately westward of this is a low side window, also blocked, of later date. There is a pointed chancel arch of simple or rather of rude construction, and a screen of later date against which new oak "return stalls" have been fixed. It is within memory that the wooden steps to the rood-loft remained. The nave is of Norman date, and in its south wall is a richly-moulded

doorway, and one simple window, of Norman date, with a recessed arch inside. The timber porch has been reconstructed as before, but without the plastering. The north door has been opened out; the north aisle is of fourteenth-century date; the windows have flowing tracery. The aisle opens from the nave with two round arches, and one pointed with flat soffits and large rectangular piers evidently cut through the old wall. The chancel fittings are of oak. The old altar and altar-rails have been re-used somewhat altered. Some Mediaeval benches have been refixed at the west end. The other benches are made up in deal. They stand on floors of wood block. The passages and the chancel are laid with the old slabs, one containing a good brass made up with tiles.

**Shrewsbury.**—The dedication of Holy Trinity Church, Belle Vue, Shrewsbury, which has been rebuilt, took place last week. The old church, whose foundations were begun in July, 1836, consisted of a nave 60 ft. by 46 ft., with a flat plaster ceiling 24 ft. high; at the west end was a small tower, under which was the entrance lobby, from this was a staircase leading to a large inconvenient gallery; a very small apse at the east end formed the chancel. A new chancel with side aisles was built in 1861, by the late Mr. S. Pountney Smith, and this is the only portion of the old structure at present standing. The foundation stone of the new nave was laid twelve months ago. The new nave is 87 ft. long by 25 ft. wide, and has north and south aisles 14 ft. 6 in. wide, with arcades of five spans; the nave is lighted by clerestory windows, and is 30 ft. high to the wall-plate. The roofs are all of red deal, boarded and felted on the outside and covered with Sedan green slates. The whole of the work has been carried out in brick, the exterior and interior being faced with Rusbon red pressed bricks, relieved with dressings and bands of Grinshill stone, and the arches of arcades are formed with outer ring of brick and inner ring of stone, the columns being Forest of Dean blue stone, with caps and bases of Grinshill. The levels of the old chancel floor have been altered to suit the new nave, the altar being approached by eight steps. The nave and aisles are seated with low-framed benches of pitch-pine, chairs being placed in the chancel aisles, and also at the west end of the nave, and the north aisle of the chancel will be fitted up for daily services. The choir stalls are of oak, and will accommodate fifty persons. The flooring under all seats is laid with wood blocks, making a noiseless and dry floor; the passages and porches have been laid with plain red tiles, in herring-bone pattern, by Messrs. George Woollicroft & Son, of Hanley. The encaustic paving of the chancel is the work of Messrs. Minton, Hollins, & Co., of Stoke-on-Trent. A baptistery is formed by a semicircular projection from the west wall of the nave; the roof of this is covered with copper, the floor will be laid in mosaics, and the lower part of the wall will be adorned with fresco painting; the old font, which is of meagre proportion and design, is temporarily refixed, a new one of alabaster having been promised. The organ has been moved to a new position, and rebuilt. The glazing of the windows is in cathedral tinted glass, executed by Mr. John Davies, of Shrewsbury. Ventilation is provided by means of inlets through the aisle walls, and the church is lighted by string-courses of gas jets, both sides of the nave, 21 ft. from the floor, and brackets in the aisles. This work has been carried out by Messrs. Alltree & Lea, of Shrewsbury. The heating has been executed by Messrs. J. L. Bacon & Co., of London, by means of a 1½-in. iron piping, laid in trenches down the passages of the nave and aisles. A general scheme of subjects for filling the windows of the church with painted glass has been prepared by Messrs. Heaton, Butler, & Bayne. Two of the windows in the aisle have already been filled in by them, and also the five lights in the baptistery. The church will accommodate 822 people, being an increase over the old church of about 340 sittings. The whole of the work has been executed by Mr. Richard Price, builder, Shrewsbury, from the design and under the superintendence of the architects, Messrs. Lloyd Oswald & Pountney Smith, of Shrewsbury. Mr. H. L. Whittingham was the clerk of the works throughout.

**Sutton (Surrey).**—New Christ Church, Sutton, is designed in the Gothic style of the early part of the thirteenth century, and is intended, when complete, to accommodate 1,000 worshippers. The work in the present contract

consists of nave, 92 ft. long, 30 ft. wide, and 48 ft. in height from the floor to the semi-circular barrel vaulted ceiling; north and south aisles, of the same length as the nave; chancel; on the north side of the chancel, clergy vestry, choir vestry, organ-chamber, furnace-room, lavatories, &c. Accommodation will thus be afforded for 900 persons, inclusive of the choir. The tower and spire, which will be 160 ft. in height, the northern baptistery, south chapel, and south porch, are intended to be dealt with in a future contract. The materials employed in the construction are local stock bricks for walls, faced internally and externally with local red bricks; Monk's Park Bath stone for columns, caps, and bases of interior and for external weatherings, and Broseley pressed roofing tiles for roof coverings. Internally the floors will be paved with wood blocks, with the exception of the space within the communion-rails, where Broseley pressed tiles of ornamental pattern will be used. The warming is to be effected by means of hot water on the low-pressure system, the pipes being carried under the whole length of aisles, and ventilation is provided for by controllable air inlets through the hot-water pipes and in the sills of windows, and exhaust ventilation through the ceilings. A special feature is made of the organ, the chamber of which is on the north side of the chancel immediately over the choir vestry, with a separate chamber for bellows and blowing-engine, in the basement. The organ manual will be placed on the south side of the chancel adjoining the reading-desk, and will be connected to the organ with pneumatic tubes carried in a tunnel constructed under the floor of chancel. The seating, choir stalls, and most of the furniture and fittings, are included in the present contract, amounting to £6,788, which is being carried out by Messrs. T. Gregory & Co. from the designs of Mr. J. T. Newman, F.R.I.B.A., and Mr. William Jacques, A.R.I.B.A.

#### STAINED GLASS.

**Canterbury.**—A large painted window, with subjects of the "Ascension," "Agony in the Garden," &c., and containing the Fagge and Macclesfield arms, has lately been erected in the parish church, Westbere, to the memory of the late Mrs. Parker, wife of Major F. G. S. Parker. The window, which is fourteenth-century in character, has portraits of the deceased lady and her son introduced, and has been designed and executed by Messrs. Chas. Evans & Co., under the supervision of the architect, Mr. E. P. Loftus Brock, F.S.A.

**Enderby.**—This parish church has lately been further enriched by the addition of a painted Jubilee window with representations of St. George, &c., the work of Messrs. Chas. Evans & Co. An elaborately-engraved brass beneath has the following inscription:—"To the glory of God and in commemoration of the 50th year of the reign of Queen Victoria. Erected by the Congregation. June, 1887."

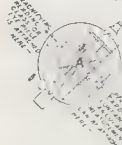
**Preston.**—A stained-glass window has recently been placed in St. Wilfrid's Church, Preston, representing figures of St. Elizabeth, St. Peter, and St. Agnes. The work was designed and executed by Messrs. Warrington & Co., of London.

**Southampton.**—There has recently been erected in St. Luke's Church, Newtown, Southampton, by Mr. Gamlen, of Newtown House, a two-light stained-glass window, in memory of his wife. It contains four scenes from the 10th chapter of St. Mark, relating to the healing of the blind Bartimeus by Christ. The work has been designed and executed by Mayer & Co., of London and Munich.

**School of Art Woodcarving.**—The School of Art Woodcarving at the City and Guilds Institute, Exhibition-road, South Kensington, has re-opened after the usual summer vacation. To bring the benefits of the school more within the reach of the artisan class a remission of half fees for the evening class is made to artisan students connected with the trade. Instruction is also given by correspondence to amateurs unable to attend the school classes. During the past year the students have been engaged on various architectural and other important works. The public are permitted to visit the school and inspect the work in hand on application to the manager on any weekday except Saturday between the hours of 11 a.m. and 4 p.m.



## SETTING OUT CURVES WITH THE USE OF A THEODOLITE



NOTE.—THE THEODOLITE IS SET UP OVER THE POINT MARKED A AT THE JUNCTION OF THE CURVE WITH THE STRAIGHT LINE, AND THE VERNIER UPON THE HORIZONTAL PLATE CLAMPED TO 360° OR ZERO—THE CROSS HAIRS IN THE TELESCOPE ARE THEN DIRECTED TOWARDS ANY P.C. UPON THE TANGENT LINE, THE LOWER LIMB OF THE INSTRUMENT IS CLAMPED WITH THE CROSS HAIRS ACCURATELY SET ON THE TANGENT LINE, THE VERNIER PLATE UNCLAMPED, AND THE TANGENTIAL ANGLES SET OUT AS REQUIRED.

TANGENTIAL CHAINS	ANGLE	TANGENTIAL CHAINS	ANGLE	TANGENTIAL CHAINS	ANGLE
5	5-43-8	20	1-25-9	50	3-34-4
8	3-34-8	25	1-8-7	60	2-28-7
9	3-11-0	30	5-7-3	70	2-46
10	2-51-9	35	4-49-1	80	2-15-5
12	2-23-2	40	4-22-9	160	1-07-7
15	1-54-6	45	3-38-2	240	7-2

IN THE ANNEXED TABLE, THE UNIT OF LENGTH FOR A RADIUS, IS OF THE SAME DENOMINATION AS THE UNIT OF LENGTH EMPLOYED FOR THE CHORD SO THAT THE SAME CHAIN MUST BE USED IN ANY SINGLE CURVE, FOR THE MEASUREMENT OF THE CHORD, AS IS ASSUMED FOR THE RADIUS—IN RAILWAY WORK, CURVES OF OVER TWO MILES (160 CHAINS) RADIUS, CAN BE SET OUT ACCURATELY BY TWO CHAIN-CHORDS, & ACCOMPLISHED BY MEASURING THE CHORDS WITH A COUPLE OF CHAINS TIED TOGETHER, AND TAKING AS THE UNIT ANGLE DOUBLE THE VALUE OF THE TANGENTIAL ANGLE FOR A SINGLE CHAIN CHORD.

CURVES OF LESS THAN 1/2 CHAIN'S RADIUS SHOULD BE SET OUT IN HALF CHAIN-CHORDS—THE UNIT ANGLE FOR USED IN ANY SINGLE CURVE, FOR THE MEASUREMENT OF THE CHORD, AS IS ASSUMED FOR THE RADIUS—IN RAILWAY WORK, CURVES OF OVER TWO MILES (160 CHAINS) RADIUS, CAN BE SET OUT ACCURATELY BY TWO CHAIN-CHORDS, & ACCOMPLISHED BY MEASURING THE CHORDS WITH A COUPLE OF CHAINS TIED TOGETHER, AND TAKING AS THE UNIT ANGLE DOUBLE THE VALUE OF THE TANGENTIAL ANGLE FOR A SINGLE CHAIN CHORD.

NOTE.—THE TABLE OF ANGLES, SET OUT IN THE ANNEXED TABLE, IS FOR THE USE OF THE THEODOLITE, AND IS NOT TO BE USED FOR THE PURPOSE OF SETTING OUT CURVES BY THE CHORD METHOD. THE ANGLES GIVEN IN THE TABLE ARE IN MINUTES, AND ARE TO BE SET OUT BY THE VERNIER PLATE OF THE THEODOLITE, AND NOT BY THE CROSS HAIRS.

THE TANGENTIAL ANGLE FOR A CHORD CONSISTING OF ANY NUMBER OF LINKS, MAY BE OBTAINED FROM THE PRINTED TABLES, BY MULTIPLYING THE TANGENTIAL ANGLE GIVEN FOR A CHORD ONE CHAIN IN LENGTH, BY THE FRACTIONAL EQUIVALENT OF ONE HUNDRED LINKS, CONTAINED IN THE LENGTH OF CHORD REQUIRED.

THE TANGENTIAL ANGLE FOR A CHORD CONSISTING OF ANY NUMBER OF LINKS, MAY BE OBTAINED FROM THE PRINTED TABLES, BY MULTIPLYING THE TANGENTIAL ANGLE GIVEN FOR A CHORD ONE CHAIN IN LENGTH, BY THE FRACTIONAL EQUIVALENT OF ONE HUNDRED LINKS, CONTAINED IN THE LENGTH OF CHORD REQUIRED.

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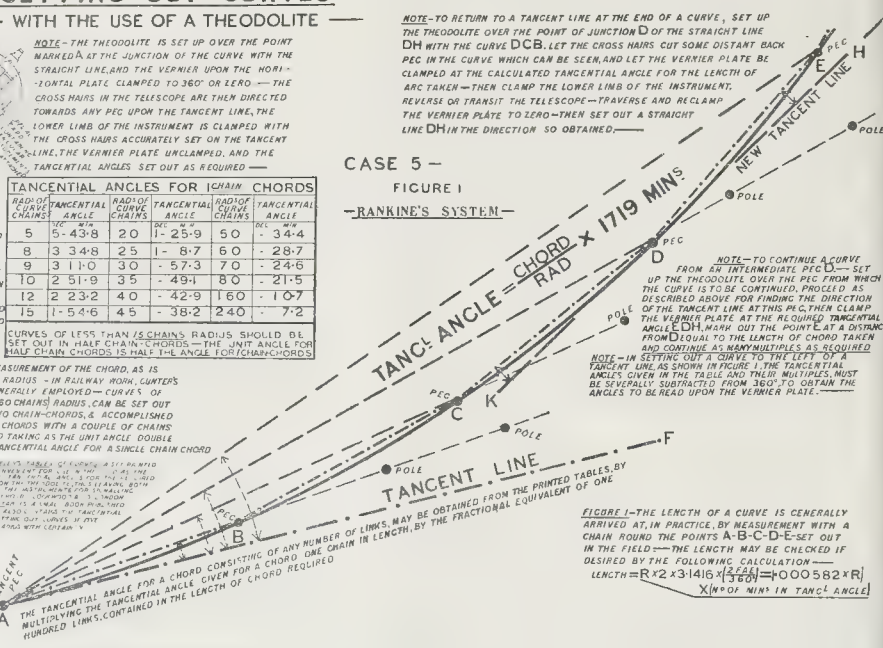
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CASE 5—

FIGURE 1

—RANKINE'S SYSTEM—

NOTE.—TO RETURN TO A TANGENT LINE AT THE END OF A CURVE, SET UP THE THEODOLITE OVER THE POINT OF JUNCTION D OF THE STRAIGHT LINE DH WITH THE CURVE DCB. LET THE CROSS HAIRS CUT SOME DISTANT BACK P.C. IN THE CURVE WHICH CAN BE SEEN, AND LET THE VERNIER PLATE BE CLAMPED AT THE CALCULATED TANGENTIAL ANGLE FOR THE LENGTH OF ARC TAKEN—THEN CLAMP THE LOWER LIMB OF THE INSTRUMENT, REVERSE OR TRANSIT THE TELESCOPE—TRAVERSE AND RECLAMP THE VERNIER PLATE TO ZERO—THEN SET OUT A STRAIGHT LINE DH IN THE DIRECTION SO OBTAINED.

NOTE.—TO CONTINUE A CURVE FROM AN INTERMEDIATE P.C.D.—SET UP THE THEODOLITE OVER THE P.C. FROM WHICH THE CURVE IS TO BE CONTINUED, PROCEED AS DESCRIBED ABOVE FOR FINDING THE DIRECTION OF THE TANGENT LINE AT THIS P.C., THEN CLAMP THE VERNIER PLATE AT THE REQUIRED TANGENTIAL ANGLE DH, MARK OUT THE POINTS AT A DISTANCE FROM D EQUAL TO THE LENGTH OF CHORD TAKEN, AND CONTINUE AS MANY MULTIPLES AS REQUIRED.

NOTE.—IN SETTING OUT A CURVE TO THE LEFT OF A TANGENT LINE, AS SHOWN IN FIGURE 1, THE TANGENTIAL ANGLES GIVEN IN THE TABLE AND THEIR MULTIPLES, MUST BE SEVERALLY SUBTRACTED FROM 360° TO OBTAIN THE ANGLES TO BE READ UPON THE VERNIER PLATE.

FIGURE 1—THE LENGTH OF A CURVE IS GENERALLY ARRIVED AT, IN PRACTICE, BY MEASUREMENT WITH A CHAIN ROUND THE POINTS A-B-C-D-E—SET OUT IN THE FIELD—THE LENGTH MAY BE CALCULATED IF DESIRED BY THE FOLLOWING CALCULATION:  
LENGTH = R x 2 x 3.1416 x  $\frac{\text{ANGLE}}{360}$  = 4000582 x R  
(X NO. OF MINS IN TANG. ANGLE)

## The Student's Column.

### LAND SURVEYING AND LEVELLING.

#### XV. SETTING OUT CURVES.

CASE 5 illustrates the best method for setting out curves of very large radii, and is based upon the fact proved in Case 1, that at any portion of a circular curve, the angle subtended by an arc of a fixed length is constantly the same, no matter in what part of the curve the arc or distance be taken, and the angle subtended by any other distance is proportional to that distance. To apply this principle in practice, the late Professor Rankine suggested the measurement of a chord line, which should be taken in comparative short lengths, so as to be practically equal to the length of the curved line adjacent to the length of chord. An accurate circle might thus be completely set out the same as a polygon of an infinite number of sides; but in practice, so long as the length of the curve line is not more than one link greater than the length of chord, the method is accurate. Referring to fig. 1 it will be seen that the length of the chord A B is practically equal to the length of the curve A B, but the length of the chord A C is less than the length of the curve A B C, and the length of the chord A E is very much less than the length of the curve A B C D E.

The length of a chord line which subtends an angle of 60 degrees at the centre of a circle is equal to the radius; but the length of an arc or curve equal to the radius subtends an angle at the centre of the circle of 57.29 degrees. For a radius of two miles (160 chains) it will be found that the length of a chord of two chains is approximately equal to the length of the curve it connects, but that for a radius of less than one-tenth of this distance (16 chains) it is advisable to take half-chain chords. For curves of less than 5 chains (320 ft.) radius, the arc subtending an angle of 60 degrees at the centre of the circle is so soon approached, and the length of chords to be measured would be so small, that the method shown in Case 3 will furnish the best curve. On the other hand, when Case 3 is applied to curves of over 5 chains radius, the length of the tangent lines from their point of intersection to the commencement and end of the curve is so long, while the perpendicular offsets become so short, that the method explained by Case 5, with the use of a theodolite for setting out the tangential angles, is more advisable.

A very convenient list of tangential angles multiples for curves, from 5 to 200 radius, and has been compiled by Mr. Alexander Beazeley, M.Inst.C.E., and is published as a set, printed on card, for use in the field. The special card, giving the required tangential angles for any required radius, can be placed on the theodolite in one of the clip spring pieces which are intended to hold the magnifying-glass for the reading of the vernier. The angles marked upon the card are calculated from the formula given in Case 1, namely, "Angle in minutes equals the chord divided by radius when the result is multiplied by 1719." This angle is set out with the use of the opposite vernier, as indicated by the small sketch of the plan of a theodolite at the top of our diagram.

We give a copy of the figures upon one of these cards as an illustration:—

Radius 20.			
1	1	26	358 34
2	2	52	357 8
3	4	173	355 42
4	5	433	354 16
5	7	93	352 50
6	8	353	351 24
7	10	13	349 58
8	11	273	348 32
9	12	533	347 6
10	14	193	345 40

#### Multiples for 20 Rad.

1	85-94367
2	171-88734
3	257-83101
4	343-77468
5	429-71835
6	515-66202
7	601-60569
8	687-54936
9	773-49302

With the use of a book containing the angles required, the angle is read, and the book placed away in the pocket, so as to leave both hands free for setting the instrument; but with the use of a card temporarily fixed upon the theodolite the angles to be set out are constantly under inspection.

Nineteenth Century Art Society.—Monday, the 10th inst., has been appointed for the reception of works of art intended for the Autumn Exhibition of the Nineteenth Century Art Society, at the Conduit-street Galleries.

## VARIORUM.

Messrs. Crosby, Lockwood, & Son have sent us their list of books for the forthcoming season. The list includes "A Dictionary of Terms used in the Practice of Mechanical Engineering; comprising upwards of 6,000 definitions," compiled and edited by the author of "Pattern Making"; "Practical Surveying: a Textbook for Students preparing for Examinations or the Colonies," by George W. Usill, A.M.I.C.E., author of "The Statistics of the Water-supply of Great Britain"; "Marble and Marble Workers: A Handbook for Architects, Artists, Masons, and Students," by Arthur Lee, author of "A Visit to Carrara," "The Working of Marble," &c.; "Our Granite Industries," by G. F. Harris, F.G.S.; "Tables, Memoranda, and Calculated Results for Mechanics, Engineers, Architects, Builders, Surveyors, &c.," selected and arranged by Francis Smith, fourth edition; "Lockwood's Builder's and Contractor's Price Book for 1888, containing the latest prices of materials and labour in all trades connected with building," edited by F. T. W. Miller, A.R.I.B.A.; and "House Painting, Graining, Marbling, and Sign Writing, with a Course of Elementary Drawing, and a Collection of useful Receipts," by Ellis A. Davidson, fifth edition, with coloured plates.—Mr. B. T. Batsford, of 52, High Holborn, has sent us his new catalogue of new and second-hand books on Civil and Mechanical Engineering, Geology, Electricity, and many other scientific subjects. The catalogue will repay perusal, as it includes a large number of standard works "without which no [technical] library is complete."—"Shorthand Celebrities of the Past," by Edward Pocknell, Past-President of the Shorthand Congress, illustrated by twenty-two portraits drawn by Arthur Fredericks (London: James Wade, 18, Tavistock-street, Covent-garden), is an interesting and timely souvenir of the recent very successful International Shorthand Congress held in London. The text consists of short biographies of twenty-eight "celebrities," from Trithemius, or Tritheim, Abbot of Spanheim (1483-1506), down to James Henry Lewis (1786-1853). The list of shorthand worthies thus treated includes John Jewell (1522-1571), Bishop of Salisbury; Dr. Timothy Bright, whose tercentenary was one of the events celebrated by the recent Congress; John Byrom, F.R.S. (1691-1763); and Thomas



Janney (1705-1770), whose history is somewhat remarkable. While shorthand now plays a very important part in the work of the world, there are many who believe that it is as yet in its infancy, though it has made great strides within the last fifty years, owing mainly to the labours of Mr. Isaac Pitman, the inventor of shorthand, who has lived to see the jubilee of the introduction of his system of shorthand. An event which was marked during the Congress by the presentation to his family of a bust, an admirable portrait-bust from the chisel of Mr. Brock. It is satisfactory to see that *pari passu* with the practical use of the art, the literature and what may be called the technology of shorthand are not being neglected, for besides Mr. Pocknell there are other workers in this field, most notably Dr. Vestby-Gibson, who has just published his "Bibliography of Shorthand."

# RECENT PATENTS.

## ABSTRACTS OF SPECIFICATIONS.

11,121, Window Fastenings. H. S. Harris. At the top ledge of the lower sash of an ordinary window, a plate of brass, having two sides fixed at right angles to it, is placed; a lever is secured between these sides by means of a pin running through it and the aforesaid sides. Fastened to the plate at one end of the lever, is a spiral spring, and at the other end of the lever is a pin or small piece of metal, which keeps the lever in position, ready for use. To the lower ledge is affixed a catch. With this apparatus, the window being closed, the end of the lever and the catch meet and lock automatically, rendering it impossible for the window to be closed without being secured. It cannot, moreover, be opened from the outside. When opening the window it is only necessary to press the end of the lever, thereby depressing the spring and unlocking the casement.

13,597, Fall Pipes, &c. J. Parsons. One end of the fall-pipes or pipes used for various purposes, as soil-pipes, waste-pipes, rain-water pipes, &c., are made with one end slightly narrowed or contracted, and on the other end is a socket to correspond with the tapered end. When two pipes are connected, the jointing substance is compressed by the weight of the pipe above it, and a solid joint is effected. The method of fastening is also improved, nails or spikes being driven into the wall at an acute angle, and thus holding the pipes without the necessity of cutting plug-holes in the brickwork.

17,119, Trapping Drains and Sewers. P. F. Richards. A trap having on the intake side a floating ball of copper, supported on a curved dip, forming the water seal, with a clear water-way round the curved dip, is the improved form. On the tide or other side, after rising on the outside side of the trap, the water in the trap runs and so fills the ball and blocks it against the intake of the trap, and on the falling of the ball the trap again comes into action.

12,330, Waste-Preventing Cisterns. J. J. Taylor. The improvement is in stamping the cisterns, which are known as "two-gallon waste-preventing cisterns," out of one piece, care being taken to prevent the iron after each different stamping operation.

13,537, Improved Flushing Apparatus. D. Lyon. The idea is to raise water by partial vacuum over and into the top of a trapped outlet, the top of which is at least 2½ in. above the standing level of water in the cistern on the discharge of the water syphonage ensues without the employment of valves or tight-fitting parts. The specification describes the mechanism for this purpose.

5,280, Fixing Roofing Sheets. C. J. Latter. A forked piece of metal is employed in combination with the double or folded edged roll caps securing the roll cap to the roof by sliding into the sliding-down clips before described. A saddle-piece is also fitted to the flanged end of the roll cap in such manner that when used against a drip all the same is a perfectly water-tight joint.

9,906, Bolts for Doors. A. E. Earl. The object is increased safety, and consists in passing a pin through a hole in an ordinary bolt, so that when the bolt is shot forward it cannot be pushed back without first removing the pin.

## NEW APPLICATIONS FOR PATENTS.

Sept. 23.—12,893, S. Harrison, Testing Gas Pipes and Fittings.—12,900, T. Murphy, Compressed Air Door Regulators.—12,919, A. Wells, Revolving Food Shutters.—12,925, J. Macneil, Gun Guards and Ventilators.—12,975, W. Horn, Door Latch.—Sept. 26.—12,979, A. Knevett, Domestic Fire-

grates.—12,981, W. Murray, Gates.—13,011, W. Jones, Pipe Cutter.—13,018, R. Prowse and D. Dalg, Sliding Windows, &c.—13,022, J. Carey, Roofing Tiles, &c.—13,025, J. Fisher and L. Booth, Fireproof Curtains or Screens for Theatres and other Public Buildings.

Sept. 27.—13,065, E. Weldon, attaching the Blades of Saws to Handles.

Sept. 28.—13,110, A. Harris and J. Hannay, Fireproof Theatre Curtains.—13,111, S. Bennett, Hoists or Lifts.—13,127, A. Stephenson, Butt-hinge and Method of Fixing same to Doors.—13,161, S. Huntley, Devices for Facilitating the Cleaning of Drains, &c.

Sept. 29.—13,180, J. Hargreaves, Manufacture of Cement.—13,193, J. & T. Stanley, Preventing the Spread of Fire in Theatres, &c.—13,207, A. Morley and H. Wilson, Indicators for Electric Bells.

## PROVISIONAL SPECIFICATIONS ACCEPTED.

11,068, J. Speakman, Paint Restorers and Removers.—11,334, A. and R. Knox, Wood Planing Machines.—11,434, O. Elphick, Syphon Cisterns.—11,438, J. Cantle, Fireproof Holders for Joists for Party Walls.—11,587, J. Holt, Latches and Bolts for Doors, &c.—11,703, A. Rose and R. Hunter, Safety Fasteners for Window-sashes.—11,745, W. Ormrod, Self-lubricating Mould for Brickmaking Machines.—11,772, S. Spencer, Window Fastening.—11,829, W. Crozier, Locking Sash Fastener.—12,034, A. Ledger, Drawing-boards and T Squares.—12,279, E. Williams and J. Morgan, Fire-grates.—10,950, J. Bean and W. Cairns, Closing Doors and Preventing the Slamming of Same.—11,410, J. Reid, Rendering Doors, Windows, Casements, &c. Air-tight or Draught-proof.—11,833, R. Herrmann, Wall-papers, &c.—11,937, J. Homan, Fireproof Floors.—11,961, B. Turner, Door Springs.—12,014, G. Brewer, Automatic Apparatus for Closing Doors.—12,052, W. and S. Denham, "Filler" for French Polishing.

## COMPLETE SPECIFICATIONS ACCEPTED.

### Open to Opposition for Two Months.

12,463, F. Prouvay, Saws.—12,374, W. Buchan, Ventilators.—15,493, J. Shanks, Lavatories or Wash-hand Basins.—16,612, L. C. Harris, Gas Chandeliers, Gasoliers, and Brackets.—1,463, B. Bancroft, Automatically Closing Doors, &c.—1,493, J. and J. Wilson, Curing Smoky Chimneys.—9,122, J. Lowe, White Lead.—10,236, C. Gregson, Concrete Walls, &c.—14,580, H. Perry, Machine for Sticking and Varnishing Paper-hangings.—15,336, A. Hildge, Indicator Bolts for Doors.—15,584, P. Walker, Ventilators.—3,483, S. Holt, Door-spring.—4,001, E. Lecker, Shop Window-sittings.—9,187, A. Reichert and G. Yingling, Sawing Machine.

## RECENT SALES OF PROPERTY.

### ESTATE EXCHANGE REPORT.

SEPTEMBER 23.  
By Mr. Woods.  
Blandford-square, 29 and 21, Byron-street, 54 years, ground-rent 74 10s. .... 4280  
By BATES & SONS (at Cromer).  
Norfolk, Cromer—142 plots of freehold land ..... 3,063  
SEPTEMBER 27.  
By E. ROBIN & HINE.  
Dalston—Ground-rents of 39s. a year, term 30 years ..... 490  
By H. HAINES & SON.  
Holloway—Improved ground-rents of 132s. 10s., term 21 years ..... 1,000  
By J. H. HAINES & SON.  
Crouch Hill—106, Stroud Green-road, 89 years, ground-rent 34 8s. .... 460  
By W. A. BRACKENBURY.  
Brixton—23, Holland-road, 37 years, ground-rent 4s. 10s. .... 200  
Westminster—3, Rochester-street, 30 years, ground-rent 10s. .... 465  
By FULLER & FULLER.  
Upper Clapton—Ground-rents of 48s., reversion in 94 years ..... 1,310  
Mount Pleasant-lane, Moreton Lodge, freehold ..... 2,110  
Ground-rents of 43s., term 16 years ..... 410  
By T. BANNISTER (at Hayward's Heath).  
Hayward's Heath (near) Hanley Farm, containing 166a. 3r. 13p., freehold ..... 5,400  
Part of Gravelly Farm, 39a. 1r. 4p., freehold ..... 1,800  
SEPTEMBER 28.  
By MARLER & BENNETT.  
Battersea—68, Castle-street, 90 years, ground-rent 4s. 6s. .... 240  
Nos. 55, 57, 59, and 61, Inworth-street, 90 years, ground-rent 20s. .... 600  
West Bromwich—18, 19, and 20, Culverne-street, 77 years, ground-rent 37l. 10s. .... 2,160  
South Kensington—5, Station-buildings, 14 years, ground-rent 16s. .... 150  
SEPTEMBER 29.  
By J. LEES.  
Mickleham—A pair of coppyhold cottages ..... 340  
Coppyhold business premises and goodwill ..... 730  
Four cottages and a plot of land, part freehold and part coppyhold ..... 680  
By J. G. PREVOSE.  
Leytonstone-road—Two plots of freehold land ..... 80  
Mile End—32 to 40, even, Ernest-street, freehold ..... 90  
Limehouse—65 and 67, Church-row, freehold ..... 195  
Mile End—121 and 127, St. Paul's-road, 86 years, ground-rent 5s. .... 455  
No. 6, Gold-street, 36 years, ground-rent 2s. 17s. 8d. .... 215

By H. A. HENDERSON.  
Dalston—102, Norfolk-road, 74 years, ground-rent 6s. .... 2350  
Hackney—32, Avenue-road, freehold ..... 375

By E. STRIMSON.  
South Lambeth-road—22 and 23, Thorne-road, 74 years, ground-rent 10s. .... 640  
Peckham, Queen's-road—Lime Cottage, 27 years, ground-rent 6s. .... 150  
Peckham Rye—No. 108, St. Ann's Lodge, 26 years, ground-rent 16s. .... 500  
Kenish Town—8 and 6, Clarence-grove, 41 years, ground-rent 8s. 10s. .... 435  
City—The lease and goodwill of 33, Bishopsgate-street Without, term 16 years ..... 740  
Southwark—6, Merrick-square, 38 years, ground-rent 6s. .... 450  
Wandsworth—10 to 22, even, Edmund-street, 65 years, ground-rent 24s. 10s. .... 550

## SEPTEMBER 30.

By O. & H. WHITE.  
Brixton, Elliot-road—Langton Lodge and Langton Villa, 70 years, ground-rent 4s. .... 380  
Old Kent-road—2 and 4, Uawin-road, 95 years, ground-rent 24s. .... 55

## MEETINGS.

### TUESDAY, OCTOBER 11.

Parkes Museum (Lectures for Sanitary Inspectors).—Mr. J. Gordon, on "Scavenging, Disposal of Refuse and Sewage." 8 p.m.

### FRIDAY, OCTOBER 14.

Parkes Museum (Lectures for Sanitary Inspectors).—Professor W. H. Corfield, M.A., M.D., on "Sanitary Appliances." 8 p.m.

## Miscellaneous.

**The Water Supply of Tottenham.**—Having regard to the very rapid development of the district under their jurisdiction, the Tottenham Local Board of Health are making important extensions to their system of water supply. The works include an artesian well at the Longwater pumping station, 12 ft. in diameter down to the chalk, and carried by a 24-in. boring in the chalk to a depth of 450 ft. from the surface; two 50-horse-power engines, pumps, boilers, water-tower, and engine-house. The scheme has been designed by Mr. W. A. H. De Pape, Chief Waterworks Engineer, and the operations are being conducted under his personal superintendence. Mr. W. Brown, of Tottenham, is the contractor for sinking the well; Messrs. Wood Bros., of Sowerby Bridge, for making the engines; and Messrs. Wilkinson Bros. for erecting the buildings. The works recently constructed from Mr. De Pape's plans comprise large reservoirs and a water-tower at Mount Pleasant. The entire scheme will involve an outlay of 25,000l., and when it is completed Tottenham will occupy a very favourable position in respect to its water supply as compared with many other districts adjacent to London. As to quality, it is stated that the water which is obtained from the chalk stands nearly equal to Kent and Colne Valley in the analytical reports of Dr. Frankland to the Registrar-General. A singular feature in connexion with the sinking of the well is the variation in actual strata from those shown by the trial boring: in one instance a layer of limestone rock, 15 ft. thick, being met with, the substance having previously been entirely unknown in the district.

**The Edinburgh Theatres.**—The Scotsman says that the Burgh Engineer and Firemaster have completed a portion of their report on the condition of the Edinburgh theatres, and the remainder, which is in progress, is expected to be ready at an early date. The part prepared deals with the Lyceum Theatre and Newsome's Circus, and bears evidence of a close examination having been made into both houses. The strictures passed on the circuses are now, of course, of little account, the building having been burned to the ground, but the result of the inspection of the Lyceum will be made the subject of mature deliberation. It is understood that in respect to this theatre several recommendations with the view to further insuring the public safety are made. While on this subject, we may mention that it is said to be the intention of Mr. and Madame Newsome to rebuild their circus in Nicolson-street, Edinburgh, as soon as matters are settled with the insurance company.

**Brussels.**—A new National Theatre is being built in Brussels. When completed it will be the largest and finest theatre in the country, and is to be named the Flemish Theatre. For the ventilation Messrs. Robert Boyle & Son's system has been adopted, the extraction of the vitiated air being effected by the latest improved form of the air-pump ventilator.



**Liverpool Engineering Society.**—The usual fortnightly meetings of this Society were resumed at the Royal Institution, Colquhoun-street, on Wednesday, October 5th, Mr. John J. Webster, M.Inst. C.E., President, in the chair. A paper was read by Mr. F. Huddleston, M.Inst. C.E., on the Coaling Appliances of the Port of Liverpool. The coal annually shipped at Liverpool, Birkenhead, and Garston is rather more than three million tons; from 600,000 to 650,000 tons is exported to foreign parts, most of the rest being used as bunker coal. The Liverpool High Level Coal Railway at the Wellington and Bramley-Moore Docks was opened for use in 1856, and in 1884 the accommodation was doubled. The appliances consist of nine hydraulic cranes, with powers varying from 10½ to 24 tons, used to load vessels of all classes, and one balance-tip for loading flats. The traffic at the present time is carried on by means of locomotives and hydraulic capstans, but up to the year 1884 horses only were used. The level of the railway is about 21 ft. above the quay, the space beneath it being made use of as sheds, &c., and there is no interference with the ordinary traffic to and from the docks. The coal shipped is from the north-west and south-west coalfields of Lancashire, and is brought down by the Lancashire and Yorkshire Railway Company, who provide extensive sidings at Sandhills. The Birkenhead appliances consist of three hydraulic hoists and seven low-level balance-tips in the east and west floats. The hoists are used for vessels of large size, while the balance-tips put bunker coal into flats, which are afterwards taken alongside the steamships in the various docks; about 200,000 tons of South Wales coal is shipped yearly at Birkenhead for bunker use. The shunting at the tips is done by horses. The sidings for coal wagons are at the Cavendish Wharf. Liverpool and Birkenhead together ship two million tons per annum. At the North-Western Railway Company's Docks, at Garston, there are eight vertical drop-balance-tips worked from a high level and fed by hydraulic capstans. These ship annually rather over one million tons of coal from South-West Lancashire, the greater part of which probably goes coastwise.

**The German Screw Industry.**—The manufacture of screws in Germany is chiefly centred at Berlin, where screws are now made in such quantities and of such qualities that these products are esteemed not only in Germany, but in other countries. The principal manufacture is that of fine screws worked bright, from the larger sizes for machinery, down to the smaller kinds for watch-work, &c., the materials employed being iron, steel, brass, German silver, &c. Efforts are now being made to increase the production of rough black screws for ordinary wood and ironwork. This class of screws has hitherto been principally made in Westphalia, but the development of screw-making machinery which will take the place of hand labour, in Berlin will, it is considered, cause a great change. There are in the Westphalian district, near Hagen, fifteen screw manufacturing, employing in all about 3,000 workpeople. The Berlin industry comprises twenty-eight factories, with about 1,500 workpeople. As these are, however, almost exclusively engaged in the manufacture of screws, while at the various establishments near Hagen only about one-third of the workpeople are employed in this particular industry, it is claimed that Berlin is at least as important a seat of screw manufacture as the Hagen district. Berlin used at one time to draw its supplies of raw material almost entirely from Westphalia, but of late years the constantly increasing employment of ingot steel instead of finished iron, has developed the use of Brunswick raw material, from Peine, which is cheaper than the Westphalian product, owing to the shorter railway journey it has to make. Steam machinery is exclusively employed for making bright screws, one factory having lately erected a new steam-engine of 45 horse-power. The screw-making machines in use are upon a system invented by Kernall some thirty-five years ago, but which has since been much improved. The manufacture of these screw-making machines constitutes a special branch of Berlin industry. The introduction of new automatic machinery will, it is expected, lead to a further development of the manufacture of screws, more particularly in connexion with the making of nuts for the larger sizes of machine bolts. The history of the Berlin screw

manufacture is considered to disprove the assertion that an important metal article can only be made in the immediate vicinity of the works where the raw material is produced. This result is attributed to the intelligence and skill of the Berlin workmen.—*Iron.*

**Electric Wire Casings.**—Mr. Samuel Elliott, of Newbury, has sent us his book of designs and sections for moulded wood casings and covers for electric wires, many of which are of new design. Architects and others concerned for buildings in which electric lighting is used will find it worth while to obtain this catalogue.

**Sanitary Appliances.**—Messrs. Thos. Crapper & Co., of Marlborough-road, Chelsea, have sent us a copy of their illustrated catalogue of sanitary appliances, and we have recently had an opportunity of inspecting at the works some of the items shown in it. Their improved fittings for baths are very simple; each valve is separate, and can be easily disconnected. Some good closet apparatus are on the list; of these we may specially mention the "Elastic Valve-Closet," No. 2, which has a special rim to prevent the escape of water over it. A cheaper apparatus is the "Marlborough" closet, which is of the pedestal type, in one piece of earthenware. Messrs. Crapper & Co. also make a very good syphon water-waste preventer, fitted with tranquilizer for deadening the sound of filling. We might make a long list of commendable things to be found in the catalogue, but we conclude by mentioning Messrs. Crapper's excellent air-tight frames and covers for manholes, side entrances to drains, &c. The covers are not hinged to the frames, so can readily be removed when necessary, so as to allow full access to the manhole or entrance.

**The Middlesex Hospital.**—The new buildings, which have been in course of erection for the past twelve months, were opened on Monday by the Lord Mayor. The Trained Nurses Institute is a plain substantial building, erected on the lines of the adjoining Nurses' Home, and affords accommodation for twenty-four trained nurses, including sitting-room, bath-rooms, office, store and linen-rooms. A door is formed in the division wall on each floor, giving access to the home and the hospital, on the basement floor a large dining-hall has been built, and is connected to the existing refectory. The kitchen has been enlarged, and is fitted up with gas ovens, steam closet, boiling coppers, &c. The heating is by steam coils, and the ventilation is by Verity's patent waterspray tubes, with a large exhaust cowl on top. The Residential College is a large building, erected for the accommodation of the medical students practising at the hospital; it contains separate apartments for thirty-three students, with the warden's bed and sitting-room, bath-rooms, and box-room. On the ground-floor is a large dining-hall, a common room, and a study or reading-room. The entrance is from Cleveland-street, and opens into a spacious entrance-hall; another entrance is from the hospital garden. The basement contains stewards' rooms, kitchen, scullery, stores, and servants' rooms. The front is built of stock bricks, with red brick dressings, the cornices being in moulded red bricks to match. The garden front is of a more ornamental character, being built of red bricks with buff-coloured terra-cotta dressings. There are four tiers of bay windows, with casements and fanlights. A porch entrance is here added with ornamental iron gates, and railings on each side to match. In addition to the present medical school buildings, another large building has been added, giving a lecture theatre, physiological class-room, laboratory, library, students' and luncheon-room. These are approached by a fireproof staircase constructed in a wing adjoining, openings being made in the walls, giving access to the rooms on the several floors. The entrance is from Cleveland-street, with another entrance from the Hospital garden. The entrance-hall and corridors are paved with Ebner's polished marble concrete, Hyatt's prismatic lens lights being used to give additional light to the lavatories below. The whole of these buildings, as also the museum, is heated by hot-water pipes and coils. The library and lecture theatre are lighted by Wenham lamps, the other gasfittings being of the ordinary kind. In the hospital considerable additions and alterations have been made; the old steam boiler has been replaced by a new one of the marine multibulbar

type: this is made of steel plates, and is worked at a pressure of 80 lb. on the square inch; a Bradford's large size hydrant extractor, and a large size washing machine have been added, also a 4-ft. Blackman's air propeller; two sets of drying houses heated by 4-in. steam pipes were also necessary to meet the increased demands on this portion of the work. The hospital kitchen has been fitted with modern cooking appliances, all of which were supplied and fixed by Messrs. Slater & Co., of High Holborn. The terra cotta was supplied by Messrs. Wilcock & Co., of Barmantofts, Leeds, 2,007 pieces being made, and delivered in seven weeks. The iron railings are by Richardson, Ellson, & Co. The stoves, chimney-pieces, and tile hearths from Thos. Elsley, of Great Portland-street. The locks and furniture were made to master keys by Charles Smith & Sons, of Birmingham. The furnishing is by Shoolbred & Co. The fittings and sanitary appliances are from Messrs. Dent & Hellyer, of Newcastle-street Strand. Messrs. Holland & Hannen were the contractors, Mr. Beal being their foreman and works. Mr. Keith D. Young is the architect, and Mr. Thomas Gamage the clerk of works.

**English Machinery for America.**—We have previously had occasion to record the manufacture of some splendid specimens of the roll casters' and roll turners' art in South Staffordshire, for use in linoleum mills. Hitherto the rolls have been mainly for Scotch mills. Now, however, the United States have come to this country for a complete machine plant for linoleum mills, weighing altogether some 300 tons. The whole work is in the hands of Gloucester millwright, and the rolls have been supplied from the West Bromwich locality. Three very fine rolls have been despatched, weighing respectively about 13 tons, 20 tons, and 24 tons, and the turning of the same in the lathe has been accomplished very successfully. The work is quite a triumph of the engineer's craft, and deserves special mention. The rolls are made with a hollow core through the centre, through which, in operating on the linoleum manufacture, a jet of steam is constantly kept passing to keep the rolls warm. The more importance attaches to the contract since the American buyers intimate that if the plan when erected is found to work satisfactorily, a duplicate order may probably be placed.—*Engineer.*

**A Year's Building Operations in Glasgow.**—At a meeting of the Glasgow Dean of Guild Court the other day, Lord Dean of Guild Blackie submitted a summary of the year's transactions of the Court. During the twelve months ending 31st August last the number of linings granted was 238, being an excess of 38 beyond the numbers of the previous year. The excess was wholly due to an increased number applicable to churches, halls, and schools, warehouses, stores, &c., and to alterations and additions. Those applicable to shops, 39 in all, were fewer by three than those of the previous year. These 39 linings comprised 1,028 houses and 79 shops, as compared with 1,262 houses and 52 shops in the previous year. The aggregate value of the property included in the 238 linings was estimated at 424,730l., as compared with 394,540l. in the preceding year. The excess was due to the increase under the four headings of "public buildings," "churches, halls, &c.," "warehouses, stores, &c.," "alterations and additions," which amounted to 250,280l., as against 188,490l. in the previous year. On the other hand, dwelling-houses and shops had decreased from 208,050l. in the preceding year to 174,450l. Comparing the amount of business transacted in the Court five years ago, he said that in 1883 dwelling-houses figured to the amount of only 88,650l., and had risen in 1887 to 174,450l.; warehouses, stores, and workshops, which in 1883 stood at 291,461l., were in the past year registered at only 73,100l. Churches, halls, and schools had during the same period risen from 35,500l. to 63,200l., and alterations and additions had decreased from 71,670l. to 58,930l. These figures, he said, did not seem to indicate any marked revival in the local building trades, but possibly, looking to the fact of the area of the municipality being a fixed quantity, and now presenting a comparatively fixed space for the erection of new buildings, the figures he had quoted might be susceptible of a more encouraging interpretation than he had felt at liberty to put upon them.



**The Obelisk in Central Park, New York.**  
Although it was stated a year ago, as recorded in the *Builder* of October 2nd, 1886, that the Egyptian obelisk in Central Park, New York, had not been so thoroughly protected by the hot asphalt treatment it received in the autumn of 1885 as was expected, a second year's experience somewhat modifies that statement. The obelisk has just been examined again, and the result of the examination is to the effect that the treatment has been useful as a preventive further scaling from the action of frost. This would seem to prove that the effects of the preservative process adopted only begin to show themselves after a lapse of time.

**Peterhead.**—Messrs. D. Macandrew & Co., Aberdeen, whose offer was accepted (in October last year) for the erection of the various structures comprising the prison and accessories for the accommodation of the convicts to be employed in the construction of the harbour of Refuge at Peterhead, have been pushing the work forward with great expedition. The governor's house, offices and stores, school officers' quarters, warders' quarters, kitchen, baths and washhouses, and infirmary, are all slated, and the plasterers progressing rapidly inside. The mason work of the gatehouse and refractory cell block will be completed by the end of this month (October). The cell block is 156 ft. 10 in. long by 40 ft. wide, four stories in height, and built entirely of cement concrete. A spacious corridor, 18 ft. wide, runs the entire length of the building, and extends to the full height of the block, viz., 40 ft. The cells are ranged on each side of this corridor, twenty-six on each side, fifty-two on each floor, or 208 in all. Three tiers of galleries are carried round the corridor at the levels of the first, second, and third floors respectively, being reached by one main central iron staircase. Each cell is separately ventilated. All other buildings are of rubble granite masonry of the dull red colour of the well-known Peterhead granite. The door and window lintels, quoins, plinths, string and cornice courses, chimney copings, and other dressings are moulded of cement concrete polished by hand, giving the appearance of freestone, looking exceedingly well and in harmony with the red granite. Even in a locality where granite is so abundant and so easily obtained as at Peterhead, the Prison Commissioners have saved nearly 2,000l. by the option of concrete dressings. The whole of the cell blocks will be heated by powerful hot-water stoves. The prison will be lighted with gas supplied by the Corporation of Peterhead. The site of the prison is on a clay bank, 40 ft. or ft. above the level of the sea just adjoining; and the whole of the buildings will be drained by means of glazed tile-ware pipes discharging into the sea. The prison works are expected to be finished in May next year, and the total cost amount to 31,000l. The buildings are designed by the official architects of H.M.'s Prison Commissioners for Scotland, and are being carried out under the superintendence of Mr. McHardy, the Acting Commissioner. Mr. Alford is surveyor, and Mr. John McIntosh the resident clerk of works.

PRICES CURRENT OF MATERIALS.

TIMBER.		£.	s.	d.	£.	s.	d.
Greenheart, B.G.	ton	6	0	0	7	10	0
Task, E.I.	load	8	0	0	13	0	0
Sequoia, U.S.	foot cube	0	2	3	0	3	0
Alb. Canada	load	3	0	0	4	10	0
Birch	load	2	0	0	3	10	0
Elm	load	3	10	0	4	10	0
Fr. Dantia, &c.	load	1	10	0	4	0	0
Oak	load	2	10	0	4	10	0
Canada	load	3	0	0	6	0	0
Pine, Canada red	load	2	0	0	3	10	0
Do. yellow	load	2	0	0	4	0	0
Lath, Danish	fathom	8	0	0	8	0	0
St. Petersburg	load	4	0	0	5	10	0
Wainscot, Riga	log	0	0	0	0	0	0
Odessa, crown	load	2	10	0	3	0	0
Deal, Finland, 2nd and 1st	std. 100	7	0	0	8	0	0
4th and 3rd	std.	5	10	0	6	10	0
Riga	load	5	10	0	7	0	0
St. Petersburg, 1st yellow	load	8	0	0	13	0	0
2nd	load	7	0	0	8	0	0
white	load	6	10	0	8	10	0
Swedish	load	6	0	0	13	0	0
White Sea	load	0	0	0	0	0	0
Canada, Fine, 1st	load	16	0	0	24	0	0
2nd	load	10	0	0	15	0	0
3rd, &c.	load	8	0	0	9	0	0
Spruce, 1st	load	8	0	0	9	0	0
2nd and 3rd	load	5	0	0	7	0	0
New Brunswick, &c.	load	5	0	0	6	10	0
Battens, all kinds	load	4	0	0	10	10	0
Flooring Boards, sq., 1 in. pre-	load	0	8	0	0	11	0
Second	load	0	6	0	7	8	0
Other qualities	load	0	4	0	6	8	0
Cedar, Cut, 1st	load	0	0	32	0	34	0
Honduras, &c.	load	0	0	3	0	0	3
Australian	load	0	0	2	0	0	3
Mahogany, Cuba	load	0	0	4	0	0	3
St. Domingo, cargo average	load	0	0	4	0	0	3
Mexican	load	0	0	33	0	0	33
Tobacco	load	0	0	33	0	0	5
Honduras	load	0	0	34	0	0	5
Maple, Birch, &c.	load	0	0	5	0	0	7
Rose, Rio	load	8	0	0	11	0	0
Bahia	load	7	0	0	9	0	0
Bor, Turkey	load	5	0	0	12	0	0
Batin, St. Domingo	load	0	0	5	0	0	0
Porto Rico	load	0	0	6	0	0	10
Walnut, Italian	load	0	0	33	0	0	33
METALS.		£.	s.	d.	£.	s.	d.
Iron—Bar, Welsh, in London	ton	4	15	0	5	0	0
Do. in Wales	ton	4	3	0	4	10	0
Staffordshire, London	ton	5	10	0	6	0	0
COPIES.		£.	s.	d.	£.	s.	d.
British, cast and ingot	ton	43	10	0	44	0	0
Best selected	ton	44	10	0	45	10	0
Sheets, standard	ton	50	0	0	0	0	0
Chili, bars	ton	30	15	0	40	0	0
YELLOW METAL.	lb.	0	0	42	0	0	43
LUG.		£.	s.	d.	£.	s.	d.
Pig, Spanish	ton	11	16	3	0	0	0
English, common brands	ton	12	0	0	0	0	0
Sheet, English	ton	13	1	3	0	0	0
SPECIAL.		£.	s.	d.	£.	s.	d.
Swedish, special	ton	15	15	0	15	17	6
Ordinary brands	ton	15	10	0	15	12	6
TIN.		£.	s.	d.	£.	s.	d.
Straits	ton	105	0	0	0	0	0
Australian	ton	105	0	0	0	0	0
English ingots	ton	108	0	0	0	0	0
OILS.		£.	s.	d.	£.	s.	d.
Lined	ton	19	17	6	20	5	0
Cocunut, Ceylon	ton	31	0	0	32	0	0
Ceylon	ton	23	15	0	0	0	0
Palm, Lagos	ton	22	0	0	0	0	0
Repeased, English pale	ton	25	0	0	25	15	0
Do. brown	ton	24	0	0	0	0	0
Cottonseed, refined	ton	21	10	0	0	0	0
Tallow and Oleine	ton	25	0	0	46	0	0
Lubricating, U.S.	ton	5	0	0	0	0	0
Do. refined	ton	6	0	0	12	0	0
TURPENTINE.		£.	s.	d.	£.	s.	d.
American, in casks	cwt.	1	4	9	0	0	0
Stockholm	barrel	0	14	0	0	14	8
Archangel	barrel	0	9	6	0	9	9

TENDERS.

**BASINGSTOKE.**—For furniture and fittings for the Basingstoke School Board. Mr. C. Bell, F.R.I.B.A., architect, 9, New Broadstreet, E.C.1.—  
Crook & Son ..... £263 17 0  
Collings & Graves ..... 862 10 0  
Pine Bros. .... 890 0 0  
Chappell ..... 633 0 0  
Goodall ..... 627 10 0  
North of E. S. F. Co. .... 598 9 8  
Taylor ..... 556 0 0  
Heywood ..... 549 13 0  
Newbury ..... 549 0 0  
Kingsbee ..... 545 0 0  
Newson ..... 538 0 0  
Educational Supply Association ..... 519 11 10  
Wake & Dean, London (accepted) ..... 490 7 0

**BEXHILL (Sussex).**—For finishing two houses in the Western-road. Mr. J. B. Wall, architect, Walbrook—  
J. King ..... £250 0 0  
J. Cole ..... 487 0 0  
W. Sands ..... 450 0 0  
Murrell Bros. .... 425 0 0

**BIRMINGHAM.**—For supplying the wrought-iron casements for the new Victoria Law Courts, Corporation street, Birmingham. Messrs. Aston Webb & E. Ingress Bell, architects, 19, Queen Anne's Gate, Westminster—  
H. Hope, Birmingham (accepted) ..... £263 0 0

**BLACKFRIARS.**—For sundry works at No. 10, Blackfriars-road, for Mr. H. W. Harris—  
Exton & Burton, Kingsland (accepted) £103 0 0  
[No competition.]

**BLACKFRIARS.**—For sundry works at No. 13, Blackfriars-road, for Mr. A. Cohen. Mr. C. H. Black, architect—  
Exton & Burton, Kingsland (accepted) £124 0 0

**BOW.**—For alterations to the Earl of Eglinton public-house, St. Stephen's-road, Bow. Mr. Joseph Harris, architect—  
Lusk ..... £255 0 0  
Timmes ..... 233 0 0  
Walker ..... 195 0 0  
Salt (accepted) ..... 163 0 0

**COLCHESTER.**—For the alterations and additions to No. 54, Priory-street, for Mrs. B. White. Mr. J. W. Start, architect and surveyor, Cups Chambers, Colchester—  
Dupont ..... £193 0 0  
Shead ..... 194 0 0  
Chambers ..... 188 15 0  
Ambrose (accepted) ..... 142 0 0

**EAST WICKHAM.**—For the erection of a house at East Wickham. Mr. A. K. Stenning, architect—  
Douglas & Paine ..... £1,779 0 0  
Crosley ..... 1,666 0 0  
Cooper ..... 1,660 0 0  
Duncan ..... 1,615 0 0  
Sagey & Son ..... 1,580 0 0  
Bray ..... 1,579 0 0  
Kent Building Co. .... 1,529 0 0

**FAREHAM (Hants).**—For the erection of new whitening cottages, stabling, chimney-shaft, and other works (exclusive of large iron roof), for Mr. Henry Rogers. Mr. Fred Bath, F.R.I.B.A., F.S.I., Crown-chambers, Salisbury, architect. Quantities supplied—  
J. & A. Gammon, Petersfield ..... £2,736 0 0  
W. J. & C. S. Young, Salisbury ..... 2,679 0 0  
G. Stallard, Havant ..... 2,440 0 0  
H. J. Kite, Salisbury ..... 2,414 10 6  
G. H. Blackman, Fareham ..... 2,273 12 0  
J. Plummer, Fareham ..... 2,274 7 3  
W. B. & C. Light, Portsmouth ..... 2,250 0 0  
J. H. Corke, Southsea ..... 2,093 0 0  
C. Mitchell, Woodtall, Downton ..... 1,972 19 8  
H. Ingram & Son, Woking ..... 1,999 18 0  
\* Accepted, subject to deduction for gravel and cement.  
† Withdrawn.  
For large Iron Roof to the above.  
J. Lysaght, Limited, Bristol (accepted).

**GIPSY HILL.**—For decorative works to General Brownlow's house, 87, Gipsy-hill. Mr. J. B. Wall, architect, Walbrook—  
Stacey Bros. .... £170 0 0  
P. Wilkes ..... 135 0 0  
W. Phippen ..... 132 7 0  
T. D. Leung ..... 130 0 0

**HADHAM (Herts).**—For the erection of a public hall for the Much Hadham Public Hall Company, Limited—  
Cates, Fuckeridge ..... £839 0 0  
Burton, Sawbridgeworth ..... 802 0 0  
Whitaker, Standon ..... 698 11 0  
Halestrap, Hadham ..... 547 10 6  
Thurgood, Hadham ..... 439 15 0

**HAMPTON.**—For repairing roof, &c., at the Girls' Orphan Home, Tangly Park, Hampton. Mr. Tabberner, architect—  
Richardson ..... 122 15 0  
Brown & Powis ..... 117 0 0  
Horwood ..... 91 0 0  
Bailey (accepted) ..... 85 18 0

**Kew.**—For erecting two semi-detached villas at Forest-road, Kew, for Mr. J. T. Sharpe—  
Bowl & Lightfoot (accepted) ..... £200 0 0

**LAVERSTOCK (near Salisbury).**—For the erection of new school-buildings and other works. Mr. Fred Bath, F.R.I.B.A., F.S.I., Crown-chambers, Salisbury, architect. Quantities supplied—  
Toward & Stevens, Salisbury ..... £297 18 0  
J. W. Hopkins, Wilton ..... 836 0 0  
E. Hale, Salisbury ..... 819 0 0  
Trough & Saunders, Laverstock ..... 915 19 0  
F. Beale, Andover ..... 803 0 0  
T. Dawkins, Barford St. Martin ..... 859 9 0  
W. J. & C. S. Young, Salisbury ..... 852 15 0  
G. Harris, Salisbury ..... 840 0 0  
Webb & Co., Salisbury ..... 817 12 0  
C. Mitchell, Downton ..... 779 6 0  
G. Dolman, Salisbury ..... 775 6 0  
H. J. Kite, Salisbury ..... 770 0 0  
H. Ingram & Son, Woking ..... 740 19 24

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.				
Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Machine-making and Paving Works	Hammersmith Vestry	Official	October 12th	ii.
Image, Roads, and Fencing	Putney Burial Board	J. C. Radford	October 13th	xii.
Construction of Railway, &c.	Halifax Hch. Lry. & R.C.	J. Fraser & Sons	October 15th	ii.
King's Warehouse, Oldham	Shirley and Fremantle	Official	October 17th	xii.
Women's Institute, &c., York	L. & N. W. Rail. Co.	Official	October 18th	xii.
Engine House, &c.	North Eastern Rail. Co.	W. Bell	do.	ii.
Refractory Cell Block	Croydon Cor.	T. Walker	October 20th	ii.
Com. of Sewers	Com. of Sewers	Official	October 21st	ii.
do.	do.	do.	October 25th	ii.
do.	Admiralty	do.	do.	ii.
do.	Croydon Cor.	T. Walker	do.	ii.
do.	Uxbridge Local Board	G. E. Evans	October 21st	ii.
do.	Finsley Local Board	G. W. Brummell	October 31st	xii.
do.	do.	do.	Nov. 1st	ii.
PUBLIC APPOINTMENTS.				
Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Surveyor and Engineer	Tottenham Local Board	400l.	October 11th	xvi.
Surveyor and Engineer	Shirley and Fremantle	150l.	October 17th	xvi.
Surveyor and Engineer	Local Board of Health	4l. 4s. weekly	October 19th	xvi.
Surveyor and Engineer	Birmingham Town Cnd.	do.	do.	xvi.



**LEIGH (Bess).**—For alterations, additions, and improvements to the pottery buildings and managing director's house, for the Victoria Pottery Company, Limited. Mr. Alfred J. Hopkins, architect, 27, Mortimer-street, London. Quantities supplied:—  
J. Higgs, London.....£2,659 0 0  
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### The Milan Cathedral Competition.



OW far the fourteen architects\* who are to join issue in the final competition for the façade of Milan Cathedral will keep to the lines and character of their first sketches it is, of course, impossible to say; but we may presume

that the second series will not differ materially from the first, as most of the competitors will naturally reason with themselves that they were selected for certain qualities exhibited in their first designs, and that it will be, to say the least, prudent not to depart very far from these, lest in so doing they should unwittingly part with the very qualities which gained them the premium in the first instance. What it is proposed by the competitors to put in the place of the present jumble of a façade we can therefore pretty well guess; and it is of some interest to consider what has to be done, and which of several principles shown in the first designs is to be preferred.

According to the constant habit in Italy, Milan Cathedral, built late in the fourteenth and completed (except the façade) in the fifteenth century, was left without the façade in the hope that, by taking more time to think about it, something finer could eventually be achieved than was apparent at the moment. This habit of Italian architects, though it looks rather like being afraid of their job at the time, has had the advantage of leaving some splendid pieces of work to do for their successors, and providing a constant subject of architectural interest and excitement in the efforts made from time to time by this or that architect to produce a design worthy of the occasion, and to get it accepted and carried out. Florence has waited till the present day for the completion of its front; Milan is only just now in prospect of seeing the work carried out; and there are many lesser buildings in Italy still awaiting the addition of that architectural frontispiece which, in all probability, they are doomed to fall into decay without ever receiving. Milan, however, has the funds, or the greater part of them, in hand, through the munificence of a late citizen, and the completion is likely to turn out a solid thing, and not a mere affair on paper; so that the result becomes a matter of, we may hope, some immediate interest.

There have been various designs made for

the façade at different times. Pellegrini had a commission to complete it in the sixteenth century, and did actually produce a Classic façade somewhat of the style of Carlo Maderno's west front of St. Peter, with an enormous order and a *fronton* in the centre of it, of which Fergusson truly observes that "it was fortunate that it was not carried out." Apparently, however, his Classic doorways were built in the middle of the blank façade, because the design of Buzzi, made early in the seventeenth century, which in its general lines is evidently designed to match the features of the Gothic edifice in the rear, nevertheless shows purely Classic doorways and windows closely resembling those actually existing. The actual façade, completed in the early part of the present century by Amati, seems to have been partly suggested by Buzzi's; at all events, it represents the same general idea, imitation Gothic details built up around Classic doors and windows, in the attempt to connect together these two incongruous elements.

In both designs, massive Gothic buttresses or piers are run up between the ranks of the Classic window openings and pediments, but Buzzi's design differs in one important respect from the existing one, in that it terminates with a large tower and spire at each extremity or flank of the façade. The existing façade has only a large panelled pier,—architecturally speaking, a collection of buttresses and pinnacles, at the angles; massive enough, but nothing to call a tower. It is this very question, whether the new façade should or should not have flanking towers, which has been greatly debated at Milan; though this is only one of two or three crucial questions which suggest themselves in considering the subject.

It is an understood condition, specially named in the first conditions of competition, that the designs must conform to the style and the architectural arrangement of the building; and in all but one of the first designs there seems an obvious intention to do this. As to the general style of the building there is, of course, no difficulty in defining what that is, and in following it in the new design. There is of course the question, which some critics may raise, as to whether a façade may not be regarded as a separate work in itself, to be judged apart from the rest of the building, and erected in any style which the architect feels most in sympathy with, or which is the favoured style of his day. Of course this has been done in other instances, but we do not think precedent justifies it. With the exception of the front, Milan is homogeneous in style and built very nearly in one period. The addition of the façade should be the completion of the design, not a new feature, however

effective, in an incongruous style. This conclusion, we fear, condemns the design of the only English architect, Mr. Brade, who was fortunate enough to be numbered among the chosen fifteen. His design, the small illustration of which, reproduced from *L'Illustrazione Italiana*, gives a sufficient general idea of the treatment, is evidently a fine piece of modern Gothic, and it is probable that the complete drawings on a larger scale would quite justify the compliment that has been paid to his ability; but such a design is absolutely unsuited for the position, and would, in fact, be absurdly incongruous; and while we are glad that one English architect, at least, has been found worthy to be counted among the successful ones, we should be still more pleased if his design had been one which we could wish to see carried out, and which we could conscientiously support as one with a high claim to be chosen. This it is impossible, however, to do; the choice of a design in a school of Gothic so different from that of Milan would be a complete mistake, and would be felt to be so by Italian architects and critics generally, if we are not much mistaken; and Mr. Brade would do wisely, if he really wishes to have a chance of ultimate success, to modify his design in the second competition so as to harmonise with the environment.

It may be a question whether, as the general mass and proportion of the existing façade have become familiar to the eye, the new design should not more or less conform to its general outlines and proportions. Some of the competitors evidently have thought so, and have aimed at doing this, among them Signor Locati, of Milan, the small engraving of whose design we give from the Italian paper before named. The main arrangement of this has much similarity to that of the existing façade; the chief difference being that a circular window is substituted under the central gable, and that the raking lines of the front are made much lower and flatter in their slope. The slope of the existing façade follows the steep lines of Buzzi's design, and one or two other competitors also have followed this precedent, but it is not a good one. It is next to impossible to give monumental character to the front of a great cathedral with a gable termination with steeply-sloped lines. The thing becomes smaller and loses dignity at once. The design of Signor Locati avoids this defect, and is fairly monumental in style, and may be said to be one of the best and most suitable of those in which towers are not included; but one must admit that, though in good taste, it is rather mechanical in design, and does not show any stroke of genius.

The questions which concern the suitability of the new design to the architectural arrange-

\* The number is reduced to fourteen, as our readers may remember, by the lamented death of Tchagrin, the Russian architect, one of the fifteen selected competitors.



ment of the present buildings are principally the extent to which the sloping lines of the roofs should or should not be expressed in the lines of the front, and whether the doors should be arranged so as to indicate and form entrances to each of the five aisles. This latter point is also one which has been much discussed. The five-aisled plan is one of the prominent characteristics of the church, and should be distinctly expressed externally. A cathedral church with three aisles usually shows three doors in its façade, and on the same principle it would seem right that the five aisles should express themselves externally likewise. The selected competitors themselves show a majority in favour of this view: nine of them show five doors; MM. Hartel and Neckelmann show two centre doors and two side ones; Herr Becker, Signor Brentano, and Signor Beltrami show three; and Signor Azzolini shows an alternative elevation with three or five doors. There is something to be said in favour of the greater mass given to the outer portions of the façade by not cutting doors out of them; but the whole question depends somewhat on the general treatment of the design. The question is about the outer doors; there can be no doubt that the pair in the intermediate portion of the façade are desirable; and all the competitors are in agreement on that head. Where the outer pair are added they should at least be small ones, unless where there is a great mass of building placed at the extremity of the façade and accentuating it. Thus in M. Deperthes' design, where there are angle towers which overtop the central lantern, the large doors at the outward position are rightly placed. In such a design as that of Signor Locati it would, of course, have been a complete mistake to have placed large doors in this portion of the façade; though his range of doors, diminishing each way in a kind of arithmetical progression, has again, like the rest of his design, a somewhat mechanical appearance. Altogether, we may conclude that while most considerations are in favour of the five door arrangement, the point must be decided with reference to the general architectural treatment of each design.

The question of towers or no towers is a more difficult one. Fergusson was of opinion "that the want of some such features is greatly felt in the building as it stands," and we are disposed to agree with him. The question is whether they should be dominate or be subordinate to the central tower. Our opinion would be that the best result would be obtained by towers on a tolerably large scale, but just sufficiently subordinate to the central tower to group as subordinate. M. Deperthes, as will be seen from the small illustration of his design (also from a cut in *L'Illustrazione Italiana*), has thought this subordination unnecessary, and has carried up his new towers to almost exactly the same height as the central one; indeed, slightly overtopping it. We cannot think this kind of three-legged composition would be satisfactory, though M. Deperthes' front is a vigorous and spirited design in itself. The late M. Tschagin, whose design we also give (from *L'Illustrazione*), has shown a better sense of proportion and subordination in his treatment of the towers, which in this case, however, are placed over the ends of the intermediate and not of the outer aisles. The effect of this is good enough in the elevation of the façade, but how would it be in the view of the building seen from the opposite direction, with the ends of the outer aisles projecting beyond the towers?

On the whole, we may divide the selected designs into (1) those which employ a central mass and no flanking towers; (2) those which employ towers over the intermediate aisles; and (3) those which employ towers over the outer aisles or at the extreme ends of the façade.

Of those which treat the building with towers over the intermediate aisles and not at the extreme angles, is that of MM. Hartel and Neckelmann, of Leipzig, of which we are enabled to give a large-sized illustration from a photograph from their drawing, furnished by the authors. Here the western towers are

kept a little in subordination to the central tower, and the architects have been able, by keeping the towers towards the centre, to get sufficient appearance of height to harmonise with the general character of the rest of the building, without carrying their towers actually to such a height as to overpeer the central tower; and this is one of the advantages of the arrangement of keeping the towers towards the centre instead of at the extreme angles of the façade. The design by the late M. Tschagin places the towers, as we observed, in the same manner, but keeping them lower, and this appears to us to be one of the best compositions of the set. The question of indicating the rake of the roofs in the façade is very variously viewed by the competitors. In Tschagin's design, as will be seen, the centre portion is kept horizontal, and the side aisle terminations beyond the towers are shown with a slope. MM. Hartel and Neckelmann reverse this treatment, and keep the wings horizontal. Theirs is, perhaps, the preferable method, if the slope is not shown in both portions, but we do not like the strong horizontal band being left with nothing over it between the large towers and the angle turrets; it certainly wants a little filling in and connexion there; the tall angle turrets are too much cut off from the main mass of the façade. The method of keeping the large towers at the extremities of the façade is illustrated in the other lithograph, illustrating a design submitted by Messrs. Pugin & Pugin. The large drawing from which this was taken in pencil, washed with Indian ink, is very sketchy in execution, and has come out proportionately so in the lithograph, but it shows the general effect of the design. This design had the misfortune of being delayed several days on the road beyond what it should have been, and the authorities, keeping to the letter of the law, though they exhibited it with the others, refused to allow it to be included in the competition. Mr. Brade is one of those who has adopted the principle of having a very lofty and important central gable, the side towers being kept rather in subordination; the central feature is very finely treated in itself, though, as observed, quite out of keeping with the style of the main building. The design by M. Deperthes, the Parisian architect, though there is a great deal of vigour about it, strikes us as too wide; in the elevation the central tower seen in the rear fills it up, but when seen in perspective apart from this combination, it would appear rather abnormally high at the angles and wanting something in the centre of the skyline to connect the whole. In the design by Signor Moretti, of Milan, the central feature is strongly emphasised, the whole running very much on the lines of the existing façade, except that the angle portions are raised into richly-treated spires, which are, however, slightly subordinate to the central final in height. In general composition, Signor Moretti's is a very well thought out design, and entirely in keeping with the character of the building. Herr Dick, of Vienna, has had the "votive church" in his mind, and runs up two immense spires at the extreme angles on the same kind of lines as the famous Vienna spire, and far out-topping the central spire. We prefer to leave the latter predominant, though Herr Dick's design is a very impressive if rather a sensational one; Signor Brentano, of Milan, shows something of the same character of design and composition, but on a much smaller scale, and keeping the spires in subordination to the centre. The design by Signor Beltrami, of Milan, eschews towers altogether, having a centre mass with a low-pitched pinnacled gable, and dropping the side masses successively at the ends of the intermediate and outer aisles respectively. This is a design showing much fine detail, and, thanks to the author's courtesy in sending us photographs, we shall be able to illustrate it shortly. It has the merit of precisely expressing the composition of the building in the rear of the façade. A special point in this design is the proposition to build a campanile (as mentioned by Mr. Waterhouse in a communication to the *Builder* of June 11th of

this year), not in immediate connexion with the façade, but as a central object in the square in front of the cathedral, working into it the Renaissance details of the existing façade. Signor Azzolini, of Bologna, and Signor Nordio, of Trieste, adopt much the same principle of design as Signor Beltrami, but the raking line is too marked and too prominent in both their designs, giving a triangular or gabled effect which is by no means dignified in so large a structure. The design by Signor Ferrario, of Milan, is one with lofty spires at the extremities, and a comparatively low centre; that of Signor Bianchi, of Milan, much on the same lines, but the centre is kept higher, and so far it is better; in Signor Ferrario's there would be too great a gap between the towers. In both these last two a bad effect is produced, to our thinking, by the raking lines over the intermediate aisles dropping towards and butting against the towers; this has an awkward effect: it would have been better to connect the towers horizontally with the central mass. Herr Becker's design is another of the "triangular" fronts, the raking line being carried right down from the point of the central gable to the extreme end in a straight line, scarcely broken by the heads of buttresses running through it. That is certainly not the way to do it. Another Vienna architect, Herr Weber, adopts somewhat the same principle, only treating the outer aisles with horizontal cornices at a lower level. In both these designs the centre gable, running up to a mere point with nothing to give accentuation to it, has a poor and weak effect. In both of them, on the other hand, the principal portals are treated in a fine and bold manner.

There is none among the designs but has its fine points, and there are several among them which are unquestionably fine conceptions, and would form a not unworthy completion to the building; and nearly all of them appear to have been designed with a conscientious effort to produce something in keeping with the character of the cathedral.

#### PHOTOGRAPHY AND ART.



THE annual exhibition of the Photographic Society of Great Britain, at present open in the rooms of the Society of Water Colours, contains a good many things that are really worth looking at for their success of execution or for the beauty of the objects which they represent; and though the interest which this exhibition excites is cold indeed compared with that aroused by the class of exhibitions which we are accustomed to see in these rooms, the very contrast of feeling naturally suggests some reflections as to the contrast between these two methods of representation, the chemical and manual, and what photography can and cannot accomplish.

The days are long past when photography offered to us as representations of landscape only some half intelligible assortments of masses of dark and light. Comparatively speaking, the advance of late years is wonderful in this department of photographing; and a good many of the landscape photographs can be really enjoyed for their intrinsic beauty of representation. In almost all cases, indeed, it would seem that something is lost; one point is sacrificed to another, except where the scene offers special circumstances peculiarly suitable to be dealt with by photography. "A Frosty Walk" (31), for instance, by Mr. H. Tolley, represents a phase of nature, the ground whitened by hoar frost, which fills in admirably with the special powers and the characteristic tone of photography. In "At Ham, Derbyshire" (52), by the same exhibitor, the main point in the picture consists in the complex and delicate ramifications of the boughs and twigs of a bare tree, which form a network across nearly the whole surface of the picture, leaving the landscape to be seen through them. This anatomy of the tree, caught in every detail with the greatest sharpness, is an exquisite object in itself, and it is of real value in another sense, as a record of natural fact more elaborate than any painter



could emulate by the labour of the eye and hand. "Falcon Crag, Derwentwater" (235), again, by Mr. T. A. Green, is composed in this way of a foreground tree, a noble tree, and a distance retiring behind it; the distance is beautifully soft, but we fancy something of it has been lost and that the softness is really incompleteness; nevertheless, the result is beautiful in its way. Mr. Scamell's "Cottages at Stevenston" (557), with the minute elaboration of the foliage and the broad mass of white light on the houses, is a most effective little bit, and here, it will be observed, there is no distance at all, and this is just one of the scenes in which photography succeeds best. Mr. Green's "Head of Buttermere" (236) is very soft and aerial in effect, but as in many of these soft and rather misty views, the sky is lost, or only seen in faint and uncertain indications of cloud forms. One must expect also the water from the foreground of "Cottages at Stevenston,"—water appears to be in every case and under all circumstances a failure in photography. We have not found one successful example in this collection. Smooth water, giving much reflected light, becomes wough in texture and loses all hint of water; rough water looks only like a dry, wrinkled surface. Instantaneous renderings of breaking waves or surf, as in "A Ground Swell" (462), by Mr. W. P. Marsh, show the sensitiveness of the modern plate, which can catch a wave actually on the curl, but as a representation of water it is valueless, almost disagreeable to look at, except solely as a business record of facts of form, which a sea-painter may perhaps find useful to refer to. Among other landscape subjects which are successful may be mentioned the two platinumotype photographs "On the Thames" (425), exhibited by the School of Military Engineering, the lower plate especially: two by Mr. F. M. Sutcliffe (548, 549), the first a fine little scene carefully chosen for effect,—two trees on a ridge of down near the foreground, and a cloudy evening sky behind, a photograph into which something like poetic feeling has been conveyed; "View of Moel Wyn from Festiniog" (535), by Mr. C. E. Nesham, in which the large extent and aerial perspective of the hills is finely reproduced, though the sky seems to have been lost; "The Lea at Ware" (552), by Mr. Edgar Clifton, a carefully-chosen subject, with an old barge in the foreground,—artistic feeling is shown here in the choice of subject and point of view, at all events; "Dunluce Castle" (219), by Mr. Vernon Heath, of which the same may be said; and "Carolling" by Mr. H. P. Robinson (40), a landscape with two figures walking through fields, in which the landscape has really the softness and distance of a water-colour painting, but we imagine this has been touched upon and is not pure photographing work.

The figures in this last, however, jar upon the sentiment of the scene; they are supposed to be two rustic women singing as they go through the field. Mr. Thorne Waite or Mr. Tom Lloyd would have made a couple of expressive figures of them, in harmony with the feeling of the landscape; here we are brought down to the plain prose of commonplace everyday life, and the result is a total failure. The study of this and of a good many other photographic subjects compiled with similar aims is very instructive. It shows what we owe to art and artists in the production of the rustic idylls which form such a prominent and such a generally beautiful portion of our water-colour exhibitions. The photographers are very fond of trying to do the same thing, and the failure in most instances, where the picture is simply a direct chemical transcript from nature, is complete and in many cases almost ludicrous. "A Pretty Hop-picker" (63) seated on a stile is not pretty a bit; her face is a dead dull blank. Mr. J. Gale shows some cottage or rural scenes with figures,—the most successful being "Saturday Afternoon" (249), where he has been rather fortunate in his figures, and the broad mass of light on the white cottage is a good piece of effect. In others, such as "Too Wet for the Woods To-day" (245), the figures of an old woman leaning over the gate and a man coming up to it are simply vulgar. We can fancy what Mrs. Allingham would have

made of them; and the same thought occurs in reference to "St. Catharine's Hill, Guildford" (61), a charming nook of landscape with a little girl seated in the midst of it just in the spot where "the figure" is wanted,—it is all right so far; but the common, inexpressive countenance of the child spoils it; the artist's hand was wanting. So again in "The Secret" (553), by Mrs. Payne, a little girl and boy; a charming expression has been caught in the former, but the boy's face looks dull and sulky. Photography, in fact, gives in general the commonest and poorest expression of the countenance; the artist seeks out and gives the best expression; and there is the gulf between photography and art,—or at least a part of it; for the still greater and essential distinction lies in the delight we all find in creating ourselves, or in studying the creations of others. Photography merely copies; the artist,—even the most nominally realistic artist,—does far more than copy; and nowhere can this distinction be more clearly seen and more strongly felt than in studying the efforts of photographers to produce pictures of human life. "Home, sweet Home" (41), an interior by Mr. Lyddell Sawyer, is another, we might almost say flagrant, example; the little bunched-up figure of the child held up in its father's arms is capital, and would be worth the attention of a painter, but the figures and physiognomies of the parents reduce the whole thing to sheer vulgarity.

Among really successful figure scenes we may, however, mention the little sleeping child, "Tired out" (482), by Mr. R. W. Robinson, a perfect little picture just as it is.

In what has been with the public the great and popular function of photography, the taking of portraits pure and simple, there are some brilliant successes. Among these the three "Studies," by Mr. McLeish (292) are admirable; the photographer has been fortunate in his subjects, but he has also known how to light the profile portrait of the beautiful young girl on the right so as to give the most brilliant and striking effect to it. A medal has been awarded to another series of large portraits by Mr. W. J. Byrne (283), but from the artist's point of view these are not so good as No. 292, and in particular in the centre figure of the girl's head, nearly life-size, the modelling of the mouth has been quite lost.

As on former occasions, architecture, which of all classes of subject lends itself best to photography and loses least by any defects of the process, is the least represented of any class of subject. There is a fine and remarkably sharp view of St. Paul's Cathedral (20) by Mr. J. Bracebridge Hilditch, which, considering that it is an enlargement from the original negative, is a triumph of clear definition. It has been touched upon here and there with white for high lights, but so obviously as not to constitute any deception. Mr. Richard Keene shows some "Interiors of Osmaston Manor" (4); Mr. W. Webster some interiors of "Eaton Hall" (21), Mr. Salmon has some good photographs from St. Bartholomew's and other City churches, Mr. T. M. Browning gives a good view of the Ponte Vecchio at Florence, and Mr. Bedford Lemere has been successful in producing some very elaborate interior detail from rooms in "Beau Manor" (32). Perhaps the most remarkable of all the architectural photographs for sharpness of definition are the two by Mr. Mold of interiors of St. Mary's Church, Banbury (189 and 432), a Classic interior which appears to have undergone recent decoration. Considering the difficulties in regard to light in interiors these may be called extraordinarily successful. But we should recommend the Society to pay more attention to architectural photography, especially of ancient works, in their exhibitions: there is no class of subject in which their work can show to more advantage or be of more value.

Among the curiosities of the exhibition is an architectural curiosity also, a photograph of a real contemporary series of lake dwellings, in full occupation, at Tpuselai, in New Guinea (404). Any architect visiting the exhibition would find it worth while to look at this.

There are various photographs of flashes of lightning (but these are getting common now); photomicrographs of minute objects from plant and insect life by Mr. F. H. Evans, for which the exhibitor has received a medal; the photograph of the claws of the house-spider, magnified 240 times, is one of the most remarkable and successful of these. Mr. G. W. Webster has somehow succeeded in photographing a couple of skylarks and their nest, the one bird on the ground, the other just hovering down; how he managed to get so close to the birds as to secure the photograph without frightening them away is the marvel; but the bird in flight illustrates one of the weak points of instantaneous photography; the bird's wings seem stationary, just as in the case of the instantaneous photograph of an express train which we noticed on another occasion: all idea of motion is taken away, wheels and wings alike are stopped dead. Mr. Sidney Tebbutt shows a photograph taken on a moonlight night in Saxony,—full moon and cloudless sky, exposure three hours, from ten p.m. to one a.m.; but here again photography fails,—it conveys no idea of moonlight: the lens, in fact, sees more than the human eye can, and as we mentally refer to our experience from actual vision, the photographic result appears false, though in a scientific sense it may be true enough. On the whole, the more we study photography, the more we feel how far removed is real art from mere imitation of nature; how much of the pleasure we derive from painting springs really, unknown perhaps either to spectator or artist, from that expression of the artist's own mental mood, and that sympathetic response to it in the mind of the spectator, which mere photographic reproduction is powerless either to express for the one or to awaken in the other.

#### NOTES.



THE paintings by M. Verestchagin at the Grosvenor Gallery are somewhat of a disappointment, not from any want of power, for there is plenty of that, but from the prevalence of mere big realistic war pictures, mingled with what may be called stage effects. The latter element is certainly predominant in the three big canvases grouped under the title "The Forgotten Soldier," the first showing a cold snowy mountain range with a vulture hovering; the second the vulture in progress downwards through the intermediate mists; the third the dead soldier and the vultures in congress. The snow picture is fine, but there is nothing in it to compensate for the size of the canvas employed. The battle scenes are of genuine interest in their way, but it is the interest of realistic description, not of artistic treatment. Among these one of the best is "Before the Attack" on Plevna (79), with the unfortunate soldiers huddled on the ground on a wretched rainy morning, preparing to tramp through the mud and be shot on the way to the ramparts in the distance. This and various other works of the same kind give a vivid idea (or we should imagine so) of the gross realities of war with the tinsel taken off; and from M. Verestchagin's method of treating them, and from some stray remarks in the catalogue, we gather that this is his intention, and that he is in fact a kind of Erenkman-Chatrain in painting. In a kindred spirit he places alongside each other three large paintings of executions; in the centre one of crucifixion under the Romans, on the left a scene showing English troops blowing some Indian scoundrels from the guns after the mutiny, and on the right an execution by hanging in Russia, a thick snow falling and a row of gallows dimly seen through it. This is a double cut, we presume, at English and Russian barbarity. There may be various opinions on the *moral* of the subject, which it is not our business to go into; but it is not the kind of thing one goes to an art-gallery to see. Our remembrance of some earlier works of M. Verestchagin's led us to expect something different from this. Among the small paintings are some beautiful little things, especially some interiors of



Indian palaces, and two views of the Taj at Agra, from the gardens, in sunset and in early morning light, which are delightful. A large interior of "the private mosque of the Great Moguls at Delhi" (95), shows M. Verestchagin as an exceedingly fine draughtsman of architecture on a large scale; though here again the canvas seems on a much larger scale than the subject really requires. The exhibition is well worth seeing in its way, but one cannot help regretting that a painter of M. Verestchagin's talents should have devoted himself so much to this merely realistic illustration of painful scenes. He might have done higher things than these, with his powers.

THE interests of the Panama Canal Company will not be materially advanced by the advocacy of writers who are either hopelessly ignorant of the A B C of engineering, or presume on an equal amount of ignorance on the part of those whom they address. The well-known Paris correspondent of the *Times* leads the van of this kind of advocacy. He is good enough to explain that "what was done at Suez will be done at Panama. The canal at first will not be made either of its full depth or full width, but will be navigated by large vessels before it has been entirely completed." This sounds very plausible to those who think that one canal is as good as another. But the simplest calculation shows the absurdity of the statement. In the Suez Canal, over the course of which but one hill worth notice occurs, the excavation below the water-line, on the original section, was very nearly equal to the excavation above it. By halving the width a temporary reduction of about 22 per cent. was effected in the bulk of the excavation. The Panama Canal, according to its published section, has a bulk of 21 millions of cubic metres to be excavated below the water level, and of 110 millions of cubic metres above it. To halve the width of the canal would thus make a most insignificant reduction in its cubic contents, as the slopes must be the same whatever be the width of the water-way, and a mere vertical slice of 11 metres is all that would be for the moment left uncut. The great problems of the 360 ft. of cutting, and of the disposal of the 40 ft. floods of the Chagres, would remain unaffected by the reduction of width. The effect of leaving in one or two metres in depth at the bottom of the canal would be hardly appreciable in figures of such colossal magnitude. Matters must be in a bad way if advocacy of this kind is sanctioned by M. de Lesseps.

THE new number of the Statistical Society's *Journal* contains an excellent article on the Mortality of the Troops serving in the United Kingdom from Consumption, by Dr. Lawson, Inspector-General of Hospitals. Of course, on such a subject there is much that is retrospective; but it is very encouraging as showing us the great improvements between 1862, the date of the alteration, and now. Ventilation was at a particularly low ebb in barrack life in early days. In a report of 1861 upon 162 barracks containing in the aggregate 5,339 rooms, giving accommodation to 75,801 men, on the basis of 600 cubic feet for each man, the Commissioners recommended that the number of tenants should be reduced to 53,806 men. In 82 barracks, told off for 42,589 men, there were no means of ventilation provided; in 78 others the means were deficient, and what there were acted inefficiently; and in only one barrack was the ventilation as could be wished. Tommy Atkins, if he had known it, might well have founded a grievance, that he was not allowed that cheapest of all God's blessings, fresh air. Of course, improved ventilation was not the sole agent in lessening the mortality of phthisis, but it was a very important one, and one that was of particular interest to all those who were concerned in the erection of public buildings. The author also speaks well of what may be called rural barracks or camps, such as Aldershot, the Curragh, Shorncliffe, &c., in which the men get the advantage of country air to a much greater degree than those who are penned up in town barracks.

BY the death of Mr. Grierson, which occurred on Friday last, the Great Western Railway Company lose a most energetic officer, and the railway interest an able and powerful champion. The deceased gentleman had only been seriously ill for a very short time, and the announcement of his death caused general surprise and regret. The chief of the executive of a system which has, by the absorption of other lines, acquired a greater mileage than any other railway in this country, must necessarily be a man of varied attainments, and the late General Manager of the Great Western was eminently fitted for the position. He had, during the long period of his connexion with the Company, successfully overcome much opposition, and surmounted many obstacles; and he had no inconsiderable share in bringing the line to its present satisfactory position. His book on "Railway Rates, English and Foreign," which was published last December, is one of the most important that has appeared on this subject, and bears evidences of very careful research and far-extending inquiry. As its professed object was to refute some of the charges just then rather frequently made against railway companies, the work is naturally somewhat biased, and not altogether free from errors of detail and incorrect conclusions. At the same time the public are indebted to Mr. Grierson for a great deal of very useful information, and the railway interest for a fund of powerful and ingenious argument, and his loss will be felt on all hands.

IT is announced that an "apprentices' exhibition" will be held in the People's Palace in East London, the object being "to encourage the old apprenticeship system, which is generally admitted, to the detriment of English industry, to be gradually dying out." All boys and girls who are serving their time as bound apprentices within the metropolitan area of London will be qualified to exhibit, and the Committee will be prepared to consider any special cases of boys and girls who, though not legally indentured, are *bona fide* serving an employer for a fixed term of years, for the purpose of learning a trade, within the same area. Every exhibit must be the genuine handiwork of the exhibitor. The list of the Council includes the names of Professor Huxley, Sir Henry Roscoe, Sir W. Hart Dyke, and Sir Lyon Playfair. The exhibition will be opened on December 19th. It is an excellent move, and we hope it will be a success: it can hardly fail to be of considerable interest.

DR. ALFRED CARPENTER writes to the *Times* to call attention to the state of the River Cam. He says:—

"During the past four years it has been my privilege to assist at the examination of candidates for the diploma of public health which is now granted by the University. In each succeeding year I have seen unmistakable signs of an approaching catastrophe unless the local authorities do their manifest duty at an early date. The odours given off during the past week from the bed and borders of the stream between Trinity boathouse and Stourbridge-green, and even down to Fen Ditton, were very alarming to me, and had I sons at the University I should, for their sakes, positively prohibit boating on the river."

Dr. Carpenter goes on to warn the local authorities against trusting to disinfectants, and that the only safe course is to put the sewage on land instead of putting it into the river; but as it is supposed by the Board of Works that the sewage of London is to be successfully treated with disinfectants it is improbable that Dr. Carpenter's words will persuade the Cambridge authorities that their much smaller aggregate cannot be treated in the same manner. Dr. Carpenter assumes that the University authorities have no jurisdiction or cannot get their wishes attended to by the town authorities, and that otherwise this state of things could not possibly be allowed to continue; but he should not be too sure of that. Men may be very learned in the higher mathematics without understanding the simpler problem of sanitation, and possibly the Dons do not go on the river much. If it is in the state which Dr. Carpenter describes the rowing

men are certainly to be doubly pitied. It is bad enough to be condemned to row on a river about as wide as Bond-street and with no depth or weight of water, but if even this amount of water is largely mixed with sewage the Cambridge undergraduates might well felicitate those of Harvard on the superiority of their river accommodation, as they are reported by our friend *Punch* to have done in choice Latin: "Vos estis diabolice fortunati noster est bestia fluminis."

THE Milan correspondent of the *Courier de l'Art*, commenting on the conditions for the second competition for the new façade to Milan Cathedral, observes that no directions have been given and no opinion expressed in the conditions as to whether the façade should have five portals or only three, or whether there should be flanking towers at each side of it, "selon le système ultramontain"; but adds that, after the result of the first competition, every one seems to be of the mind that the towers are not necessary to the success or completeness of the project. He goes on to observe that one clause in the new conditions seems to imply that the premium will be withheld from any one who sends in a design out of keeping with the style and "organism" of the existing building; that this very proper restriction was, however, laid down in the conditions of the first competition, and was practically ignored by the jury, since they selected among the fifteen a design in the style of English Gothic of the thirteenth century, and have therefore no right to take up a new position in the matter now. It is certainly the case, as we noted at the time, that the first conditions required the competitors to conform to the style of the existing building, and in that case they certainly should not have selected a design "in the English style of the thirteenth century"; but if they selected the design referred to because it evinced genius, and if they at the same time make it clear to the designer of the same that he must modify his design into conformity with the style and period of the existing building, they will place themselves in the right for declining the premium if the architect neglects their intimation.

AS a rule the *Museo Italiano di Antichita Classica* concerns itself chiefly with questions of epigraphy and the like, interesting only to the specialist. In a recent number, however (ii. 1), the editor himself, the well-known scholar and archaeologist, Sig. Compagnotti, gives us a paper of very human interest. He has collected together all the known instances, six in number, of representations of Sappho in vase-painting. It is a familiar fact that vase-painters do not represent historical personages unless under very exceptional circumstances: we look in vain for Solon, or Pericles, or Demosthenes. If a historical person wants to be perpetuated on a vase he must contrive to gather round him a halo of mythological romance. So it was with Sappho. She was the tenth Muse, and as such was nowise out of place in the cycle of mythology. Ovid (if the epistle be genuine), among the purely mythological heroines he addressed, included Sappho. It would be impossible here even to enumerate all the interesting points as to literary tradition, artistic treatment, and notably epigraphy, to which, in connexion with these vases, Sig. Compagnotti calls attention. He gives plates of five out of the six. Three have been published before, and are here reproduced for comparison. Two appear for the first time. They each have special interest,—one, from the little known collection of the Countess Dzialinsky, is the earliest representation of Sappho we have: the design, though red figured, is quite archaic in manner. The other is indisputably the most interesting of all the Sappho vases. Sappho is seated, surrounded by three of her women disciples. She is reading intently from a roll, on which can clearly be made out a dactylic line of halting scansion from one of her own poems:—

ἑοὶ ἡρώων ἰπῶν ἀρχοῦν ἄλλων.  
A famous Cambridge scholar (of anti-archæo-



logical prejudice) was once heard to say he would give all the Greek pots that were ever discovered for one new fragment of Sappho." One of the despised "pots" has returned him good for evil. The existence of the vase has long been known; it is only surprising that a piece of such exceptional interest has so long escaped publication.

**MR. W. THOMPSON WATKIN** writes to us that the Roman tessellated pavement at Tockington, which last week we described (p. 487) as having first been found in 1884, was discovered as far back as 1785, and that in Seyer's "History of Bristol" (vol. 1, p. 203), published in 1821, it is thus referred to:—"We have one pavement of this kind nearer to Bristol, at a place now reduced to a farmhouse, now called Tockington Park, eight or nine miles distant on the right-hand as you go to Gloucester. It was discovered about A.D. 785 in the farm-yard, not more than a foot under ground, and a large quantity of dung lay over it, on removing which some part of it, about a yard square, was laid open. The tesserae were rather larger than they are generally found, formed into a pattern as usual. Very little notice was taken of it and it was soon forgotten; the number of foundation walls round it make it highly probable that this is the site of a Roman villa as yet unexplored." The discoveries in 1884 were some more fragments of tessellated pavement and the base of a column or pedestal." We shall have further information to give on the subject next week, after visiting the site.

**THE** collection of Greek and Roman sculpture now arranged in the old print-room is a place quite unsuitable and unworthy of the collection, and consisting, to a great extent, of funeral and monumental bas-reliefs and tablets, which have been long hidden out of sight in cellars, is a most interesting and valuable addition to the classic antiquities department. Among the Greek work are one or two very fine grave-reliefs, of the class to which we called some special attention a short time since; and there are some fragments in the collection which are interesting in an architectural point of view. One cannot help being struck by the remarkably "Renaissance" look of some of the Roman work, indicating that some of the early Renaissance sculptors were more direct imitators and reproducers of Roman work and Roman feeling than has been fully recognised. The reliefs of children in one or two examples are very like the work of Luca della Robbia, and the heads of Antistius and Antistia, a Consul and his wife, a high relief, beneath scalloped canopies, are things we should have expected to find in the Florentine Court at South Kensington. These heads are obviously portraits, and that of the consul, with his mean physiognomy and abnormally large ears, shows what a low type of man could succeed in securing this convenient and often lucrative post under the empire. We may have more to say about the collection.

**DR. FURTWÄGLER** thinks that he has identified as an original work from the hand of Praxiteles a beautiful marble head now at Athens. The head was found at Eleusis, and as published in two prototype reproductions in the *Εφημερίς Αρχαιολογική* (1886, pl. 10). It will now, of course, attract a great deal of attention and controversy. It represents a youth with long heavy hair, confined by a simple band, and the expression is certainly tinged with that gentle contemplative melancholy which we are accustomed to associate with Praxiteles. If Dr. Furtwängler's surmise be correct, we have a head not only of great interest, as coming from Praxiteles, but also one the subject of which is both novel and important. He thinks the statue, of which the head only remains, represents Eubouleus, a somewhat shadowy personality, of whom we should be glad to know more. Some mythologists make him the brother of the arch-Eleusinian plague-man, Triptolemus; others say he was the swine-herd whose swine were swallowed up in the earthquake that ac-

companied the rape of Persephone. Anyhow, he is a personality closely bound up with the worship of the two dread goddesses at Eleusis. The worship is authenticated by several inscriptions. It is known from an inscription on a Roman copy that Praxiteles made a statue of Eubouleus, and presumably it was executed for Eleusis. The paper, which is of great interest, is reported in the *Philologische Wochenschrift*, Oct. 8.

**THE** authorities of the Berlin Museum have just issued (for sevenpence) a little book which, though it is in intent a guide-book to the Pergamene marbles, should be of much service to all students of ancient art. It gives a brief but very complete account of the whole course of the excavations, and has two plans of the city of Pergamos as it is now laid bare. As few persons ever consult and still fewer possess the magnificent illustrated work which the Prussian Government is in course of publishing on the excavations, this little book supplies a real need for the general public.

**THE** birthplace and early home of Dr. Johnson, which is to be put up for sale at auction in the course of next week, stands over against the place of his baptism, St. Mary's Church,—since rebuilt in memory of Bishop Lonsdale,—and has a return frontage to the Market-place, Lichfield. Facing the house is his statue, by Lucas; whereof one piece of sculpture commemorates Johnson's penance in the market of Uttoxeter. The house was built, as his own freehold, by the father, Michael Johnson, a native of Cubley, Derbyshire, who for some while of his career as a bookseller enjoyed no mean repute among his fellow citizens. But suffering reverses of fortune he had nothing to leave at his death (December, 1731), except this house to his widow, and a few pounds for his sons, Nathaniel and Samuel. Here the latter was born on September 18 (new style), 1709. It formed his home, perhaps, until his unsuccessful venture in opening a school, in 1736, at Edial Hall, near to Lichfield. Meanwhile, he had been in residence for fourteen or fifteen months at Pembroke, Oxford, had served as usher at Market Bosworth (1732), and had sojourned a few months at Birmingham. In March, 1737, Johnson came up to London, and, after a return for three months to Lichfield, brought his wife to town in that same year. Michael Johnson had added to the house: this entry is made in the civic books:—"1708, July 13. Agreed, that Mr. Michael Johnson, bookseller, have a lease of his encroachments of his house in Sadler's Street for forty years, at 2s. 6d. per an." That lease was subsequently renewed to the son by the Corporation, and without fine, in token of their respect for his character and eminence. In the codicil dated December 9, 1784, to his will, Dr. Johnson devises, in trust, to his executors for sale or disposal "my message or tenement situate at Lichfield . . . with the appurtenances in the tenure and occupation of Mrs. Bond . . . or of Mr. Hinchman, her under-tenant." Edial Hall was pulled down about eighty years since. A view of it from a sketch by J. T. Smith, together with one of the Lichfield house by E. Finden, after Clarkson Stanfield, R.A., were reproduced for Croker's work.

**AT** the meeting of the Metropolitan Asylums Board last week, Sir E. Galsworthy, the Chairman, criticised the requirements of the Local Government Board as to the "temporary" character of the hospital buildings to be erected at Darenth or elsewhere. If, he said, the buildings were to be of brick, and the managers had approved of brick and rejected wood, as objectionable, dangerous, and, in the long run, as very expensive, they must necessarily be of some permanence. Dr. Bridges said that with regard to the alleged ambiguity as to "temporary" buildings, he meant by this that such buildings only should be erected as might be pulled down, and suggested that the one-storied brick huts at Hampstead might serve as a model of what could be done at Darenth. But why not try Lascelles's concrete cottages? Those seem just the kind of thing

for the purpose; inexpensive, capable of being made warm enough, easily put up at short notice, and easily removed. The discussion seems to have been carried on as if there were no way of building but with bricks.

**WHETHER** the Royal Institute of Water-Colour Painters will much advance the cause of art by their Art Union is somewhat doubtful. They will distribute a certain number of good drawings and engravings, which will fall into the possession of a large number of persons who will care very little more for art in consequence. The love of speculation rather than of art is the main motive which induces most persons to subscribe to a lottery of this kind. Those who desire to beautify their homes can already do so at a low cost by the purchase of the publications of the Autotype Company, and the numerous etchings and engravings which are within the reach of any one who can afford to spend a pound or two on art. The Institute would do much more to advance the love of art by having small exhibitions of really good water-colour drawings in some of the suburbs of the metropolis, and in small towns where there are no opportunities of studying art, than by the lottery which they have just established.

**A** CORRESPONDENT, who signs himself "A Victim," writes to the *Times* to tell how he and other persons at Gotham,—we beg pardon, Worthing,—have been cruelly taken in. A man calls at the houses, evidently selecting the time when the nurse is out, and there is no one to take proper care of the inmates, and begs to fix gas-burners, at 2s. each, which will save 50 per cent. of the gas. He is so persevering that they cannot resist his blandishments, and allow him to fix burners all over the house, which are discovered afterwards to be another number of the same class of burner that has been removed, by the same makers, and to be purchased at 3d. each, and which consume more gas than those removed. The "Victim" adds that it would be an interesting and profitable employment for the readers of the *Times* to calculate the amount of profit made by the traveller who thus takes in the unsophisticated inhabitants of Worthing. We do not see where their interest and profit will come in; but there is a certain kind of pathetic amusement to be derived from the contemplation of a person, apparently able to read and write, and therefore with some sort of education, allowing himself to be taken in by so transparent a hoax, and then solemnly warning the public through the newspapers, as if all the rest of the world were as silly as himself. Next time the "Victim" is taken in (we can hardly suppose that so suitable a subject for simple frauds will be long overlooked), and writes his account of it to the papers, he had better sign himself "A Simpleton"; and if any more bogey men with wonderful gas-burners call, he should ask nurse before he buys them.

#### NOTES AT THE EXHIBITION OF ECCLESIASTICAL ART AT WOLVERHAMPTON.

FROM the point of view of lovers of art and history it is very much to be regretted that the annual exhibitions connected with the Church Congress are so much better supported by manufacturers of church furniture, plate, and decorations than by those who possess ancient, beautiful, or curious objects which they might lend to swell the interest and importance of the "loan collection" that always forms one feature of the show. Manufacturers cannot be blamed if, seeing that the exhibition depends almost wholly upon them, they insist upon the best light and positions for their stalls, and force the ancient church plate and rare embroideries to take refuge in dark little back rooms, as last year, or in a poorly-lighted basement, as on this occasion. Surely, among the possessions of the multitude of highly-cultivated men,—chiefly clergymen,—who take part in these Congresses, enough of interest might be found to fill a moderate-sized room, such as was this year



devoted to the collection, without including what is but very remotely, if at all, connected with ecclesiastical art, and without finding it necessary to fill up with photographs and modern manufacturers' specimens which, however beautiful, are quite out of place in such a collection. We fear that the position which the objects on loan year after year occupy, and the smallness of their number and interest, must act and re-act on one another. Few care to take the trouble and risk of lending their treasures only to find them put in a dark corner of a cellar; yet, if the treasures are few and insignificant, their claims are overlooked or set aside. Who will be the first to put these loan collections on a better footing, their patrons or the management?

Among the most striking objects to be seen in the cases this year was a silver crucifix, fig. 1,



Fig. 1.

which appears to have once formed part of a processional cross. The thin silver plate which forms the background has evidently been fixed to woodwork, the holes for the nails or screws still showing. The extreme dimensions of the fragment are 11½ in. by 8 in. The figure, of rude workmanship, with long body and short legs, but expressive features, is in high relief, and has been much battered out of shape in parts,—it, with the cross on which it hangs, still bears traces of gilding. The nimbus is of cloisonné enamel, red and blue. The treatment suggests a very early origin. In the same case were a number of chalices and patens, most of them very skilful imitations of ancient originals; others, some of which appeared and were illus-

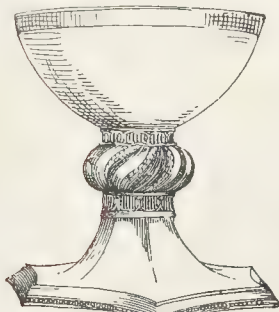


Fig. 2.

trated by us last year, were the originals themselves. Among the latter, No. 257 was an elaborate and rather large chalice, with some pretty fifteenth-century architectural detail, but poor in outline. The chalice and paten belonging to Hamstead Ridware Church, Staffordshire, figs. 2 and 3, are well-known specimens of pre-Reformation church plate, and the silver paten, No. 55, from Colton Hackett Church,

fig. 4, is one of the only two pre-Reformation patens to be found in the county of Worcester, the other being in Worcester Cathedral. It is 5½ in. across, very thin; and the workmanship, which is of the most primitive description, is beginning to be obliterated by constant polishing. In the same case was an old pewter flagon, fig. 5, formerly used in Whittington Chapel, Worcestershire; it measures exactly 8 in. in height to the lip, and is a good specimen of a number of similar vessels that once served to hold the sacramental wine in a large number



Fig. 3.

of churches, and still serve the same purpose in a few places. In another case are to be seen several ivory caskets and other objects of some interest, lent by Mr. David Jewell and other gentlemen, among which we noticed a brass Russian icon of the ordinary design, somewhat similar to a smaller silver one which

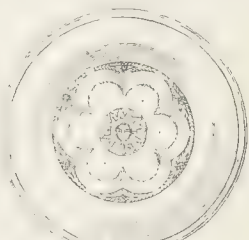


Fig. 4.

we illustrated last year. The largest of the ivory caskets was a good specimen of fifteenth-century German workmanship carved with several series of figures of saints. In the same case we noticed a small ivory diptych of fair workmanship, and six grotesque heads carved in ivory, said to be caricatures of the Popes,



Fig. 5.

full of genial humour. Conspicuous at one end of the room hangs an old Italian church banner, elaborately embroidered in gold and colours on white silk, it is now sadly faded and torn. In the centre is an Assumption of the Virgin, and at the foot a representation of a scene which is a little inexplicable: three flames or fires seem to be rising from a lake whereat a cow on the bank sinks on her knees, while the herd falls backwards in astonishment, and a town to the right of the picture collapses into ruins. The workmanship of the banner is very beautiful, but the design is wild and

coarse. At the side of the room, and lent to the same exhibitor, the Rev. A. R. Harrison, a beautiful piece of silk embroidery worked in delicate tones, on cream-coloured silk. It seems to be the centre portion of an Italian altar-cloth. The centre is occupied by a crown on a gilt ground, surrounded by an oval garland of flowers. The field is occupied by flying birds, and the upper border consists of swags of flowers supported by birds. The charm of the work lies in the delicacy of the drawing and colour. Close beside this exhibit hangs a beautiful drawing of Prior Crandon's Chapel Ely, by Mr. W. H. Bidlake, M.A.

Mr. Cecil Harcourt Smith has lent a number of Persian and Eastern fabrics of various kinds, carpets, shawls, and cloths, some of which are very lovely; the patterns are chiefly geometrical or arrangements of conventionalised foliage and flowers; in fact, what the patterns of Persia and Eastern stuffs generally are,—exquisitely designed, drawn, and coloured, but passing describing in detail. We particularly noticed No. 25, a large hanging or quilt of yellow silk embroidered with birds and flowers; Nos. 9 and 12, fabrics of cloth of gold, and No. 13, scarlet silk, with a small sprinkled flower pattern.

Messrs. Doulton have lent Mr. Tinworth's terra-cotta of "The Prodigal Son," and several smaller works by the same artist. In the former the prodigal is the centre figure, seated on a stool, his hair and beard unkempt, looking down and away from his father, who stands holding the hand on which he is about to place a ring which he is taking from a child who runs to him with it. On one side a kneeling slave places shoes upon the feet, which he has just washed and on the other a female brings the new robe. The elder son appears through the lattice from outside, pointing to the fattened calf which is being brought in at the door. The composition is completed by the introduction of figures gathering the grapes that hang from the lattice roof, children, and musicians.

Messrs. Jones & Willis have lent some very beautiful vestments and altar frontals.

Upstairs the most beautiful exhibit is that of the "Autotype Company," consisting of exquisite reproductions of their photographic process of pictures and drawings, among which are conspicuous the Sistine "Madonna," Da Vinci's "Last Supper" (from the engraving), Rubens's "Assumption," Francia's "Pieta," Reynolds's angels' heads, Sir Frederick Leighton's S. K. frescoes of "Manufacturing Art as applied to Peace and War." Near these are Messrs. West & Collier's church chairs, a varied collection of useful specimens. The largest room is chiefly devoted to church furniture, stained glass, &c. The chief stalls are occupied by Messrs. Jones & Willis and Messrs. Benham & Froud, Limited, who both show some good metal work in lecterns, lamps, altar furniture, &c., and some beautiful embroidered altar frontals. Messrs. Jones & Willis show several specimens of church furniture in oak, notably a pulpit of better design than is generally to be found in manufacturers' pattern-books. Messrs. George M. Hammer & Co. exhibit a large quantity of cheap church and school furniture and fittings, which will meet the demands of those who have little to spend. Messrs. Mayer, of Munich, have sent several specimens of stained glass, which, though it may tend to counteract the just prejudice of many persons against Munich glass, will probably still be too opaque for modern English taste. On the staircase are some beautiful cartoons for stained glass, and one fine specimen of such work by Messrs. Ward & Hughes.

In one top room are a wrought-iron chancel screen for a Lichfield church, and some wrought-iron panels, very well executed by Mr. Culwick, of Lichfield. Here that doubtless useful body, the Religious Tract Society, also has a stall, and here it visibly justifies its connexion with ecclesiastical art by hanging upon the walls the most atrocious coloured prints, illustrative of the second part of the Pilgrim's Progress, that were probably ever executed. In the same room Messrs. Beal & Co. show some specimens of altar furniture, embroidery, &c. In the large room the "East Grinstead School of Embroidery" have a collection of some of the best embroidery in the exhibition. We noticed particularly a gilt stole with a figure of St. George on one end and a white damask chasuble with gold embroidery. The Decorative Needlework Society also shows some very good embroidery, and the Arundel Society some of its finest plates.



## THE CONDITION OF THE THAMES.

MR. RAMSAY, Surveyor of the Twickenham Local Board, has prepared and submitted to local authority a detailed report on the present condition of the Thames between Teddington and Richmond. The causes of that condition and the suggested remedies are dealt with at considerable length by Mr. Ramsay. The removal of Old London Bridge, with its narrow arches, is regarded as one of the chief causes of the scarcity of water in these parts of the river. It appears that before the removal of that structure in 1823 the low-water mark at Richmond was 6 ft. 3 in. below Trinity high-water mark. In 1860, however, the low-water mark at Richmond had fallen to 7 ft. 7 in. below Trinity high-water mark, while in 1887 it has fallen to about 9 ft. 6 in. Even at Teddington the low-level water-mark has fallen from 2 ft. in 1823 to nearly 7 ft. in 1887 below high water at Trinity. The old bridge acted as a dam, and between that and Blackfriars Bridge the soil was silted up to such an extent that active dredging operations had to be constantly carried on between the two bridges. Dredging operations subsequently to the erection of the new bridge have also tended to lower the water-levels of the river from Teddington Weir to Westminster. By the removal of shoals which prevented the water from flowing freely down the incline or bed of the river, the motion of the water has been quickened, and it runs away in a shorter time. It is pointed out that the low-water level at London Bridge in 1823 was 14.40 ft. below Trinity high-water mark. It was reduced by the removal of the old bridge and dredging operations to 20 ft. in 1865. Mr. Ramsay lays considerable stress on the abstraction of the great quantity of water from the river by the various water companies as a circumstance contributing greatly to the scarcity of water in the upper reaches of the Thames. It is curious to note that the maximum aggregate quantity (10,000,000 gallons daily) which the several companies are permitted by their Acts to draw on the river, is about half the quantity which issues daily over Teddington Weir during the dry period of the summer season. Mr. Ramsay naturally enough argues that a further extension of power to the water companies in the direction of enabling them to draw a larger supply of water than they can obtain at present from this source would be an unwise proceeding. He asserts that the dredging operations in the Upper Thames recommended in 1873 by Sir John Lubbock and Captain Calver, have so far not been attended with the anticipated results. The object in view then was to deepen the channel between Teddington and Richmond Bridge, so as to give a uniform depth of 3 ft. 6 in. at low water of spring tides, and a bottom width of 10 ft.; the banks to slope uniformly to the extent of 4 ft. in one, and provision was made for making an even high-level mark, by topping the irregular banks with the gravel produced in the dredging. This uniform depth was planned on the assumption that the water companies abstracted daily their maximum quantity of water, namely, 110,000,000 gallons. But it is pointed out that the effect of the dredging to make the channel the prescribed width of 10 ft. has been to lower the water level within the Richmond and Twickenham district, hindering navigation, even for pleasure-boats, most impracticable at low tide, and exposing the unsightly muddy banks. It is admitted, however, that the formation of uniform slopes made from the banks of the river along the Surrey side is in itself a great improvement. They will when completed not only tend to improve the river for navigation purposes, but will materially reduce the large amount of sediment which is continually being washed from the ragged banks and deposited on the foreshores. Another cause assigned for the scarcity of water in the Upper Thames is the rapidity with which storm water, owing to the extension of modern systems of drainage, flows into and passes out of the river. In order to preserve this storm water for the benefit of the Upper Thames, Mr. Ramsay suggests that a number of reservoirs should be constructed at the mouth of the tributaries of the Thames, where the stored-up water could be let into the river when it was wanted. Mr. Ramsay is in favour of a lock and weir between Teddington and Isleworth as a means of restoring theavigable condition of the Upper Thames either for trade or pleasure. He deals at length with the

various objections, official and otherwise, which have been advanced against a lock and weir,—such as the depositing of mud in the region of the still waters created by the structure; the aggravation of this evil by the discharge of numerous sewers and drains into the river above the site of the proposed weir; the withdrawal of 15,181,000 cubic feet of tidal water, which at present operates in maintaining the channel by its scourage; and lastly, the delay to barges. The objections as to the withdrawal of the tidal water and possible flooding, can, Mr. Ramsay asserts, be met by dredging the river between Putney or Barnes and the proposed lock, where "some deposition of mud and silt would inevitably take place." As the proposed lock and weir would be half tidal, silting above the lock was not to be feared, as only a small proportion of the matter in suspension would pass over it after the waters had reached the height of half tide. Considerable scavenging powers may be arranged for and secured in the structural arrangements of the weir, by which the whole tidal column may be permitted to pass through on the ebb until it reached the half-tide level, when the weir would be closed. As to the discharge of sewers and drains into the basin above the weir, Mr. Ramsay thinks that the objection may be practically dispensed with, from the fact that the whole of the sewage in the district above the weir will, under schemes now approved or works already carried out, be intercepted from the river. The objection as to the delay which would be occasioned to the barges passing through the lock would be trifling compared to the delays which have to be undergone because of the impassable condition of the river, so far as barges are concerned, in the Richmond district. With a half-tidal lock the gates would be opened on the flood when the tide had risen 5 ft. on to the level of the top of the weir, and craft would then pass freely through the lock from that time until the tide had fallen to the corresponding level on the succeeding tide. Mr. Ramsay concludes his elaborate report by the observation that until the Metropolitan Board have fulfilled their duty as a sanitary authority, by intercepting the metropolitan sewer storm outfalls between London and other bridges, and improved the condition of their main sewer outfall at Barking, offensive sewage matter will always be deposited in the upper Thames.

ARCHITECTURAL ASSOCIATION  
CONVERSAZIONE.

THE Architectural Association commenced the session, as usual, with a *conversazione*, which was held at the Westminster Town Hall on Friday, the 7th inst.

The large hall, in which a reception was held by the President, Mr. John Slater, B.A., was devoted to an exhibition of art manufactures; and during the evening the band of the 2nd Life Guards played at intervals. Two chamber concerts were given in the Council Chamber, in which, under the direction of Mr. Malcolm Lawson, Miss Emily Lawson, Miss Isabel Tomalin, Miss Amy Hickling, Mr. D'Arcy Ferris, and Mr. Hubert Thorndike took part.

The prize drawings and the work done in the various classes were exhibited in four committee-rooms. During the evening the President announced the names of the prize-winners:—

*Architectural Association Medal* (Design for College Gateway).—Mr. G. G. Woodward.

*Architectural Union Company's Prize*.—1st, Mr. W. A. Webb; 2nd, Mr. H. P. B. Downing.

*Architectural Association Travelling Studentship*.—1st, Mr. A. H. Hart; 2nd, Mr. H. P. B. Downing.

*Aldwinckle Travelling Studentship*.—Mr. W. M. Duke.

*Ernest Turner Prize*.—Mr. H. C. A. Colville.

*Blackhill Prize*.—Mr. H. E. Mallet.

*Lectures on Architecture*.—1st, Not awarded;

2nd, Mr. F. L. Jones; 3rd, Mr. V. T. Jones.

*Lectures on Construction*.—1st, Mr. H. S. Wood; 2nd, Mr. H. G. Lidstone; 3rd, Mr. H. V. Lancaster.

*Honourable Mention*: Mr. A. B. Yeates, Mr. H. Ernrich, Mr. H. E. Mathews.

*Class of Colour Decoration*.—Prize, Mr. W. Dewes. Honourable Mention: Mr. H. V. Lancaster.

*Class of Design*.—1st, Mr. C. E. Bateman; 2nd, Mr. H. R. Applebee; 3rd, Mr. E. W. Monro.

*Elementary Class of Design*.—Section I.: 1st,

Mr. R. D. Warry; 2nd, Mr. A. W. Jarvis; 3rd, Mr. H. Woodington. Honourable Mention: Mr. A. B. Yeates. Section II.: 1st, Mr. A. W. Cleaver; 2nd, Mr. J. Ellwood. Honourable Mention: Mr. D. J. Blow, Mr. R. A. J. Bidwell.

*Advanced Class of Construction*.—Mr. J. C. Agutter.

*Class of Construction*.—1st, Mr. W. D. Gravell; 2nd, Mr. F. R. Oglesby.

*Elementary Class of Construction*.—1st, Mr. H. Ernrich; 2nd, Mr. A. W. Jervis and Mr. L. V. Hunt.

*Quantity Class*.—1st, Mr. W. J. Bamber; 2nd, Not awarded.

*Essay Prize*.—No competition.

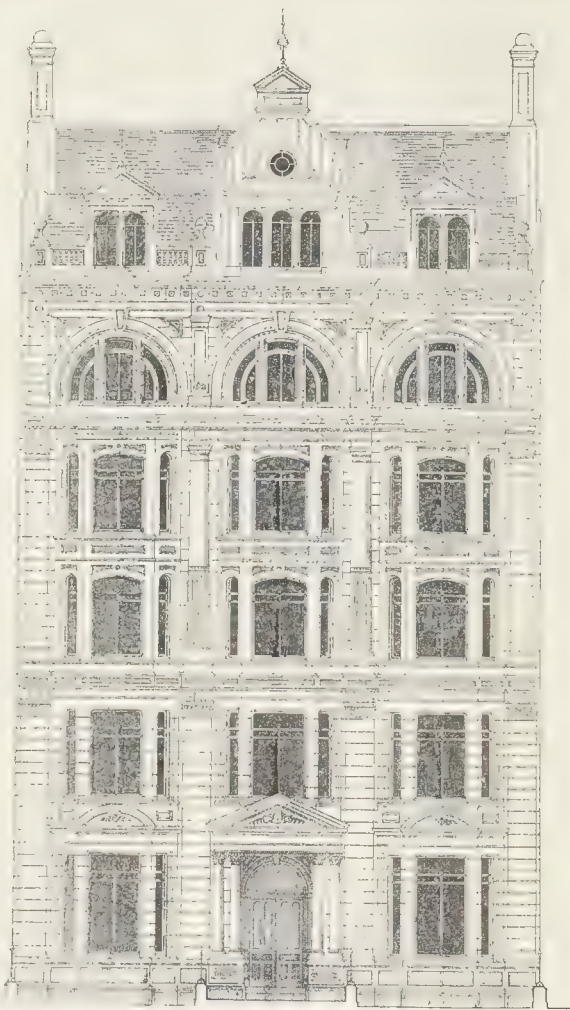
The Prize Committee reported that the work done in the Elementary Class of Design was of unusual merit.

Amongst the exhibitors were Messrs. Holland, who exhibited an unusually massive mahogany mantel-piece designed for a house in Sydney, and an interesting oak sideboard made up of old work from the design of Mr. J. H. Rushbrook, architect. Messrs. Hindley had an inglenook complete, with fire-screens to match, in white painted woodwork, and some quietly-designed pieces of furniture. Messrs. Morris showed some of their tapestries, and Messrs. Newman had a good collection of wrought-iron work. The Coalbrookdale Company exhibited some good specimens of their cast-iron work from designs by the late Alfred Stevens and Talbot. Messrs. G. Trollope & Son exhibited some large specimens of Mexican onyx in the form of pedestals and balustrades, and also some stained wood panels in imitation of inlay work. Mr. Longden exhibited some good dog-grates and tiles, and Messrs. Jeffries some wall papers. Messrs. Walker exhibited in one of the committee-rooms the grate designed by Mr. T. Pridgin Teale, M.A., which was the subject of a paper read by Mr. Teale at the Association. The stove was fixed and alight, and seemed to give very good results. An exhibition of electric lighting for domestic purposes was made by Mr. M. J. Scott, in the form of portable lamps and fixed lights, worked from small accumulators. Messrs. Jenks & Wood exhibited some good specimens of furniture. Messrs. George Wright & Sons had on view a statutory marble chimneypiece, of good design and workmanship, fitted with one of their patent "As you like it" grates.

## NEW HOSPITAL, KINGSLAND-ROAD.

THIS hospital, the first portion of which has just been erected in Kingsland-road, was opened on October 1st. The institution was originally named the Metropolitan Free Hospital, but the title has recently been changed, and the institution is now known as the Metropolitan Provident Hospital, patients, with the exception of accident cases, which will continue to be treated free, being required to make a small weekly contribution whilst inmates. The hospital has at present a frontage to Kingsland-road of 180 ft. in length, the administrative block being carried to a height of upwards of 80 ft., whilst the ward block is limited to 60 ft. height. From Kingsland-road the return frontage extends about 130 ft. in depth, the building covering a ground area of about 23,500 ft. The administrative block is at present at the south end of the general elevation, but on the completion of the entire scheme this portion will form the central feature, whilst the block containing the patients' wards, extending to the northern boundary, and comprising about three-fourths of the entire frontage, will have, on completion, a similar block extending to the southern boundary. The administrative block is faced with red brick and Portland stone. The adjoining block northwards, containing the patients' wards, has five floors, the elevation being faced with stock brick, relieved by red brick bands and string courses. The south end portion of this part of the frontage is formed by a series of bay windows, giving an octagonal plan, and is surmounted by a turret. At the rear of the administrative block is an open area, and immediately beyond it westward is another large block running parallel with the Kingsland-road blocks. The whole of the wards are connected with the administrative block by a series of covered corridors at each floor level. The administrative block contains the medical officers' apartments, clerks' and secretaries' offices, board-room, convalescent room, nurses' day-





Offices and Chambers, 3 and 4, Lincoln's Inn Fields.—Mr. J. Sawyer, Architect.

room, and also the matron's, doctors', nurses', and servants' apartments, and their bedrooms, and having on the topmost floor, in direct communication with a patients' lift, a large operating theatre, fitted with all requirements, and communicating direct with a chloroform and instrument room. The main wards are about 93 ft. in length and 24 ft. in width, each ward having accommodation for twenty-four beds. The wards are ventilated by flues and air boxes under each bed-head. The ventilating system has been carried out from the design of Mr. Collins, one of the architects of the building, the terra-cotta inlets having been supplied by Messrs. Doulton & Co. The culinary department is in the basement, and there are patients' and food lifts from the basement to each floor supplied by Mr. Goddard. The wards and other portions of the building are heated by Galton's stoves. Hot-water is supplied throughout the entire building by means of boilers and steam heaters, the arrangements having been carried out by Mr. Frazer. Protection in case of an outbreak from fire is afforded by hydrants placed on every floor, both internally and externally, in such positions as to command the entire frontages of the building, the system having been carried out by Messrs. Shand & Mason. Lightning conductors have been placed on every point likely to be in danger from lightning by Messrs. Cutting & Co. The gas-fitter's work throughout

has been executed by Mr. Cannon. The cost of the building, exclusive of the land, so far as completed, will be about 25,000*l.*, which will be increased to 40,000*l.* when the additional wing is built. Messrs. H. H. Collins and James Edmeston are the joint architects, and Mr. Shummr is the general contractor. Mr. Huxley has acted as clerk of the works.

#### Nos. 3 & 4, LINCOLN'S INN FIELDS.

THE accompanying cut shows the elevation of the original design of the above-named new building in Lincoln's Inn-fields, which in execution has been somewhat modified in the upper part, above the fourth story. The building, which stands on the northern side of Lincoln's Inn-fields, is used for offices and residential chambers. The front is faced with Portland stone. The work was carried out by Messrs. Chapman Bros., of Kennington, for Mr. T. Clarke. Mr. Joseph Sawyer, of London and Spalding, is the architect.

**Monument to Rossini.**—It has been decided by the inhabitants of Florence to erect a monument in honour of Rossini on his grave in the Cathedral of Santa Croce. It will be erected by the sculptor Passaglia, and will consist of a portrait statue in marble of the composer, on the base of which figures in bas relief symbolising some of his most celebrated works will be executed.

#### THE WALLS OF CHESTER.

SIR,—I will trouble you to correct a printer's error in the printing of my last letter. I did not write *Artois*, but *Arlon*. Arlon is the capital of the Duchy of Luxemburg, and is situated about fourteen miles from the town of Luxemburg. It is the modern representative of the Orleanum of the Itinerary of Antoninus. It is known as a *Vicus*, and therefore it may be supposed to have been walled at a comparatively late time, probably about the close of the third century. The walls were built, in the lower parts, with dislocated sculptures of monuments, chiefly sepulchral, laid without mortar, although the portions above were cemented. In this there is a great similarity to the walls of Chester, and to others to which I propose to refer ere long.

Mr. Sbrussole having obligingly sent me a photograph of the sculptured stone he and Mr. Watkin imagine to be Mediseval, I may remark that it in no way changes my view of Mr. Brock's sketch, only that I discern in the hands of the second personage, also a girl, the foreshortened figure of an animal, probably a pet cat, such as we find on one of the stones from the walls of Bordeaux previously referred to. On this I have just received from Mr. Robert Blair, F.S.A., the following opinions:—"I have seen the photograph of the Chester so-called Mediseval stone from the walls, at Dr. Bruce's. Both he and I agree that it is, beyond all doubt, Roman."

C. ROACH SMITH.  
Temple Place, by Strand, October 10th, 1887.

SIR,—In reply to Mr. Sbrussole's letter [p. 512] permit me to say that the mortared part of the wall, with small stones, and the unmortared lower part of massive ones, are fairly of the dimension I have given, and that they were taken with the City Surveyor.

In your correspondent referring to the same place? His mention of a cornice leads me to think that he is not doing so, for there is none at the point I named. Where the cornice does occur (it begins about 50 ft. east of the North Gate), the large Roman stones go quite from base to cornice, thus being their greatest height; but this is not the point I named. At other places along the wall they are lower than the height I gave, in some cases being only one or more courses high; in others they are not visible. The height I gave refers only to the point named. At other places the wall is much higher, in others rather less.

Mr. Sbrussole saw a man thrust in his arm "between the layers of stone, first removing the dry earth," and asks if this can be Roman work. I did something of the sort myself, but it was in places where the removal of inscribed stones made it possible to do so. I can but think that your correspondent has taken some of those gaps for what he reports, although I have already called attention to the fact that there is earth in the open joints. It is a peculiarity that these joints do not appear ever to have been filled in either with pebbles or broken stones. I think that few antiquaries will object to the removal of Roman stones from a later Roman wall, but many gaps have been made here which have to be filled in with modern masonry.

I saw none of the unmortared part formed of "loose" stones,—all is a compact mass. It might not be incorrect to say so of some of the poorly built mortared wall above it, particularly the inner face.

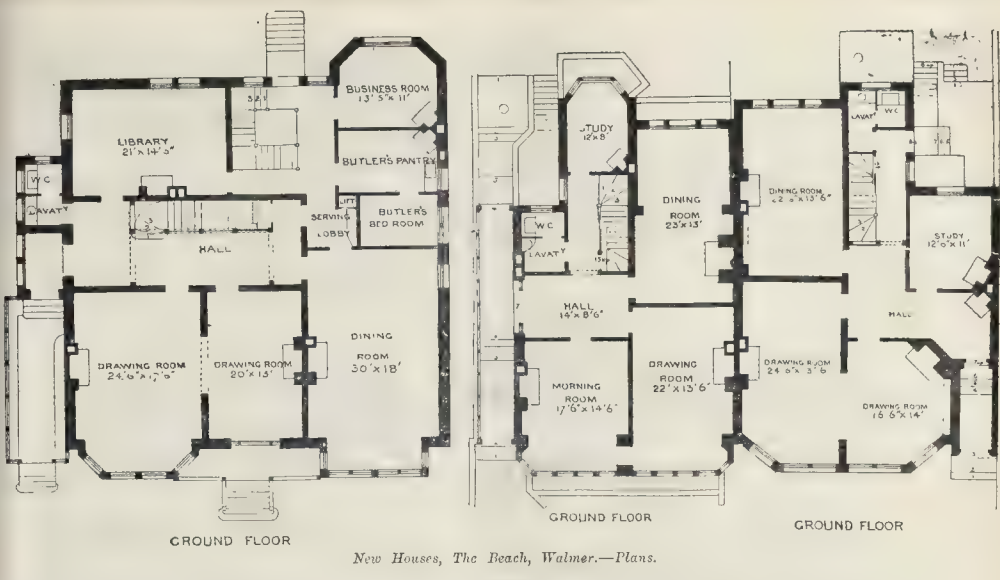
I will take this opportunity of correcting a mistake in my letter (p. 511). What I then said of North Gate applies to East Gate. There are so many diverse views of the latter that I took one to apply to the former, following the inscription on the gate itself relative to its Roman foundations, on being rebuilt in 1808. Mr. Thompson Watkin, whose "Roman Cheshire," I had not to hand at the moment, acknowledges, p. 106, that these foundations are of Roman date. This brings out the fact that, instead of there being but one Roman gate in line with the present walls, there were in reality two in existence until fairly recent times. Surely this must make it more difficult for Mr. Watkin to believe that the massive stones in the walls, which he acknowledges to be Roman, could ever have been shifted in position, as he asserts. Where they are, in line with the gates in both cases, there Roman walls must have been.

Into his interesting conjectures relative to what Eilfreda did at Chester, I need not enter, except to say that whatever was done must be regarded in relation to the Castle. There is there a grassy mound upon which the Normans did not erect their massive keep. No one who has studied an interesting series of articles in some past volumes of the *Builder*, under initials whereby we can readily recognise the name of an esteemed antiquary, can doubt the Saxon origin of such works. I am not an advocate for theorising without certain facts, but in this case it may be a safe supposition to consider this mound as the work of Eilfreda, and as the key of her fortifications, which, from analogy with other works, she should expect to have been ditched, and earthen banks with stockading, and not masonry.

E. P. LOFTUS BROCK.

No. 36, Great Russell-street, W.C.  
October 11th, 1887.





New Houses, The Beach, Walmer.—Plans.

SIR,—I asked Mr. C. Roach Smith in my last if he ever knew of the walls of a Roman *castrum* (not of buildings or aqueducts) having been built without mortar, and I added that I would not include the walls of the towns on the Continent which he named, as the date of their erection had been disputed. Mr. Smith does not answer the question; but evades it; and, while admitting that I am right in saying the date of the erection of these Continental walls has been disputed, says that it is "in vain he has referred me to them, i.e., to prove that the Chester wall is Roman. Certainly it is in vain that he has referred me to them, when the only instances he can refer to of so-called Roman walls of *castris* built without mortar are these disputed ones, and, like the portion just laid bare at Chester, they are composed of sculptured and inscribed stones. Therefore, at the outset, there is the same suspicion as to the origin of the Chester fragment, which seems more than ever confirmed by the opinions of many archaeologists concerning the walls similarly composed (though with the addition of mortar) in London.

Mr. Smith's comparison with Richborough, &c., does not hold good; for the newly-excavated portion at Chester is not, like Richborough, &c., built upon layers of boulders. In the only foundation of boulders laid bare at Chester (that of the destroyed *castrum* wall), the boulders are set in strong Roman concrete.

With regard to Mr. Smith's statement that the arguments as to the Continental walls he named, not being Roman, are "as illogical and futile as those adduced in favour of a Jacobean theory to explain the walls of Chester," I may say that I have neither started, advocated, nor discussed any "Jacobean" theory. My views are explained at length in my reply to Mr. Brock in your issue of September 24th.

Mr. Brock candidly admits that he does not know of any *castrum* in Britain, the walls of which were built without mortar, but refers to these doubtful Continental examples, and says they are a strong argument in favour of the Chester fragment being Roman. I should oppose it was just these discredited Continental examples that would help to increase the evidence against the Roman origin of the Chester fragment. He seems to be misinformed also as to the extent of the mortared portion of the latter. The only mortar is at the extreme upper part, and that is modern.

Next, Mr. Brock avers that Roman mortar has been "detected" on the Roodee stones. Certainly it has. It was "detected" during the recent excavations made in front of them three or four years since, fragments of it adhering to some of them; and this fact, with the nature of the tooling on some of the stones laid bare, helped me to see that the latter were Roman, brought from a large building. Mr. Brock will, however, find no layers of Roman mortar between the stones.

Mr. Brock states also that the evidence shows that the stones in the newly-excavated part of the north wall were not lifted into their places by means of the lewis-holes still existing in some of them, but they were rolled into position, that "labour was cheap, and that progress was slow." He asks whether any seventeenth-century builder would have done this, and if it is not fatal to any late date. Whether "any seventeenth-century builder" would have

done this is beside the question. The Parliamentary army (whom I have put down as the builders of this fragment) could do it, and labour would consequently be "cheap." With a strong force, I see no necessity for progress being "slow."

Mr. Brock's remarks as to the number of stones from "the ruined suburbs" lying about after the siege that would be available for rebuilding the wall instead of searching for Roman stones, to my mind contradict what he has just before stated. If the stones were "rolled into position," would they be carted or rolled all the way from the suburbs? Numerous ruined Roman buildings were close at hand (and also the building of doubtful date lying parallel with the north wall, opposite the Deanery, laid bare in 1884), and there need be no "searching," unless taking up visible foundations, &c., be deemed "searching," whilst the tombstones turned up in Lady Barrow's Hay and elsewhere, when the numerous entrenchments were made, would be ready to hand. Many (or most) of the stones of the former wall (probably of Edwardian date) would be lying about also, close to their former positions, and Mr. Brock should bear this in mind, in his formidable calculation of the amount of stone required, and also in his calculation of cost.

Coming to the "battering wall," Mr. Brock remarks that I am speaking of the south face of the north wall. He is mistaken. The "battering wall" is on the northern face, whilst as to the North Gate existing as a double Roman archway until the middle of the last century, he is still more strangely mistaken. No Roman archway existed at any of the Chester gates until the last century, but it is the East Gate that Pennant describes and engraves, as mentioned by Mr. Brock, who cannot have read the singular and varied accounts of it which I have collected and given in "Roman Cheshire."

Ormerod ("Hist. of Cheshire," vol. i., p. 281) says:—"The (North) gate at the period of its demolition, consisted of a dark, narrow, and inconvenient passage under a pointed arch, over which was a mean and ruinous gable, equally inconvenient, and varying little in appearance from the delineation of it given by Randle Holme in Harl. MSS., 2073."

This gate was pulled down in 1808, but, as I have said ("Rom. Chesh.," p. 106), it was probably built upon Roman foundations, which may still be felt undisturbed beneath the present structure. If a Roman arch had existed here in the last century, we might, as Mr. Brock suggests, go into the question of Roman work near it. But no one has ever advanced the least claim to the old North Gate (which was remembered by many who have been dead within the last fifteen years) having been Roman.

Whether any further excavation is to be made near these walls (though Roman inscribed stones are in sight, and only wait to be dislodged) I cannot say. Canon Raine, in last Saturday's *Academy*, advocates every Roman inscribed stone which has been detected, being taken out, on the ground of the wall being of comparatively modern construction.

W. THOMPSON WATKIN.

Liverpool, October 10th, 1887.

## Illustrations.

### DESIGNS FOR MILAN CATHEDRAL FAÇADE.

WE give this week a lithograph of MM. Hartel & Neckelmann's design, accepted in the first competition for the new façade of Milan Cathedral, from a photograph of their drawing forwarded to us by the architects; and another of a design by Messrs. Pugin & Pugin, exhibited with the others, but excluded from the competition on account of delay in delivery, the fault, we understand, of one of the railway companies. Further remarks on the subject will be found on another page.

The *Illustrazione Italiana* published small woodcuts, in a recent number, of all the designs, from which we have reproduced four, which may be useful as giving a general idea of some of the designs, though, of course, they cannot represent the detail in any adequate manner.

### NEW HOUSES, THE BEACH, WALMER, KENT.

The drawing from which our illustration is taken was exhibited in this year's Academy exhibition. The buildings have been erected by day work by Mr. A. Tod, from the designs and under the personal superintendence of Mr. James Neale, F.S.A. The three larger houses on the right are finished and occupied, but the other house shown on the drawing is not yet erected.

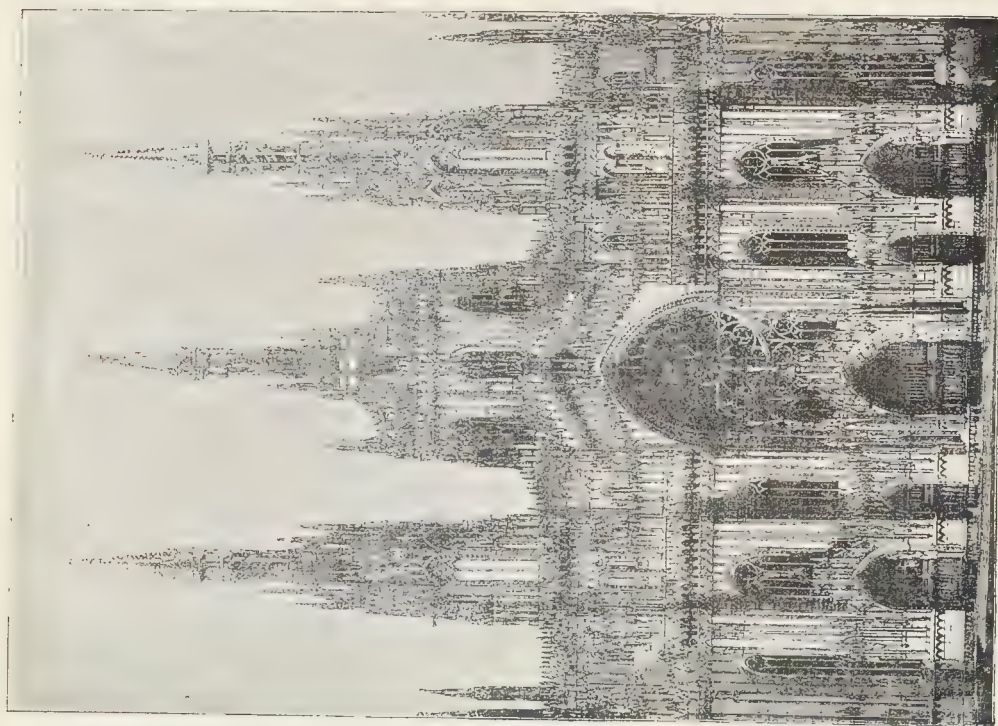
### A COUNTRY HOUSE.

This house, of which we give a plan and perspective sketch, is to be built of red bricks, with stone mullioned windows and dressings; the half-timber work is in oak; tiles of an orange-red colour are to be used for the roofs and weather tiling. The estimated cost is £2,750. Mr. Langton Dennis is the architect.

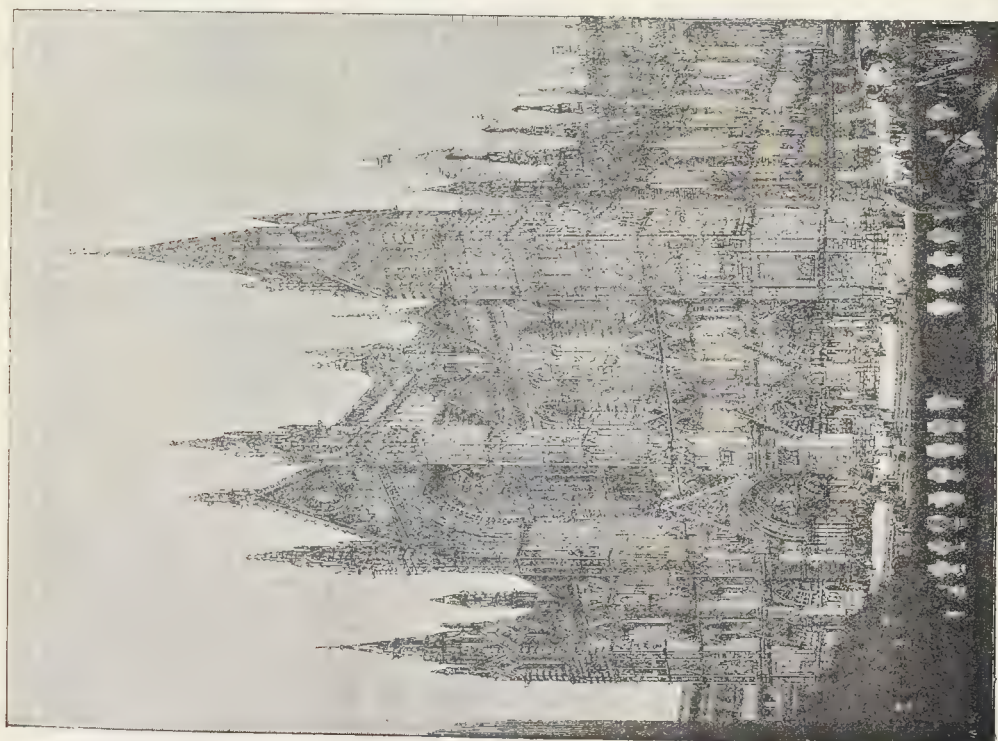
### ENTRANCE LODGE, WALMER, KENT.

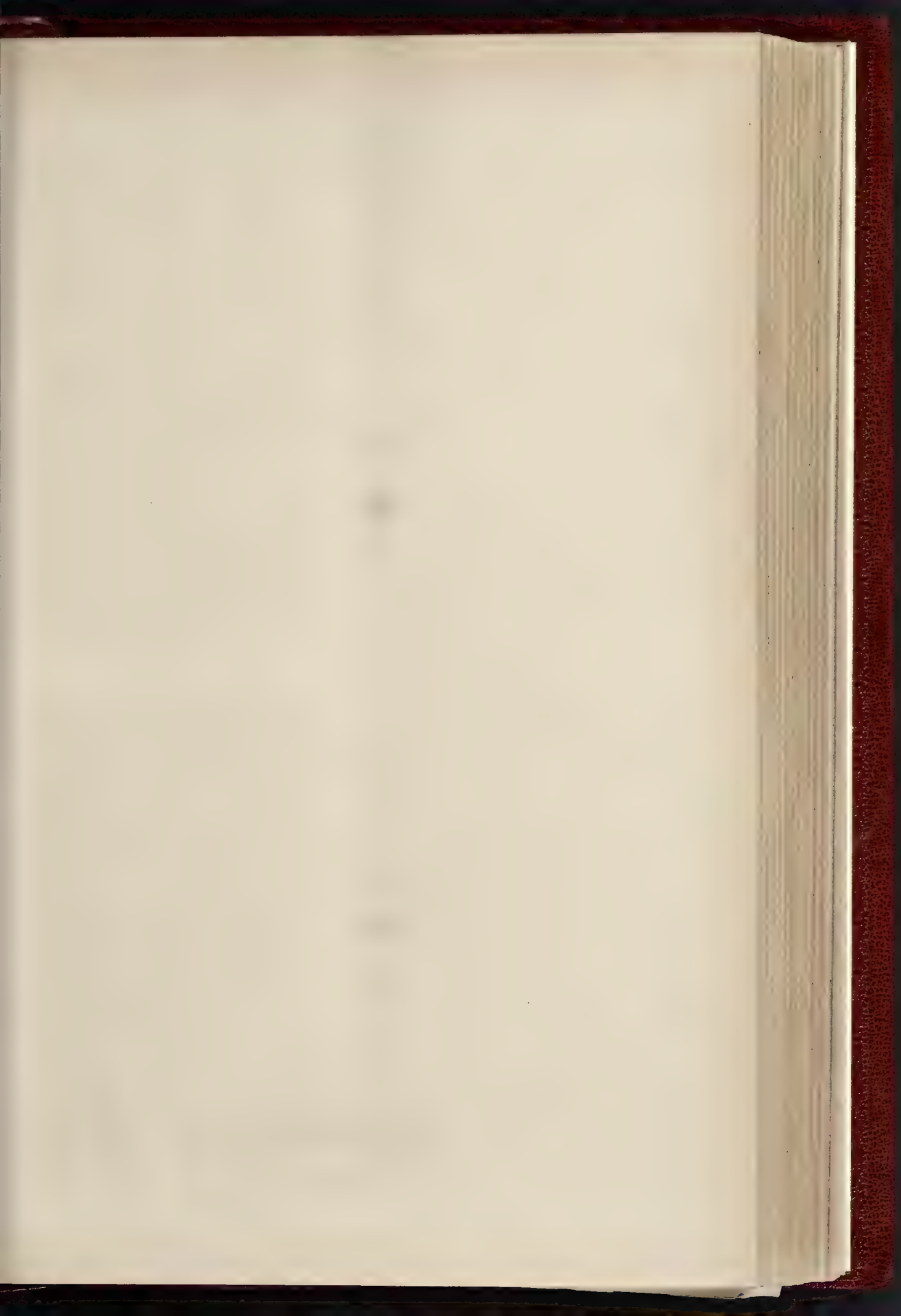
The illustration is taken from a drawing exhibited at the Royal Academy. The Lodge has been erected by Mr. Tod, from the designs and under the personal supervision of the architect, Mr. James Neale, F.S.A. There were no contracts excepting for the following works: Messrs. Frost Bros., of Deal, for the gas and plumbing; and Messrs. Potter & Son, of London, for the ornamental ironwork. The lower walls of the Lodge are hollow, being faced with Kentish rag, worked in courses and backed with brickwork, with quoins of red Teynham bricks. The upper story is of timber and pebble-dashing; the roofs are covered with Collier's Reading tiles. The sweep of the gates was arranged so as to preserve the two large trees, as shown on the drawing.



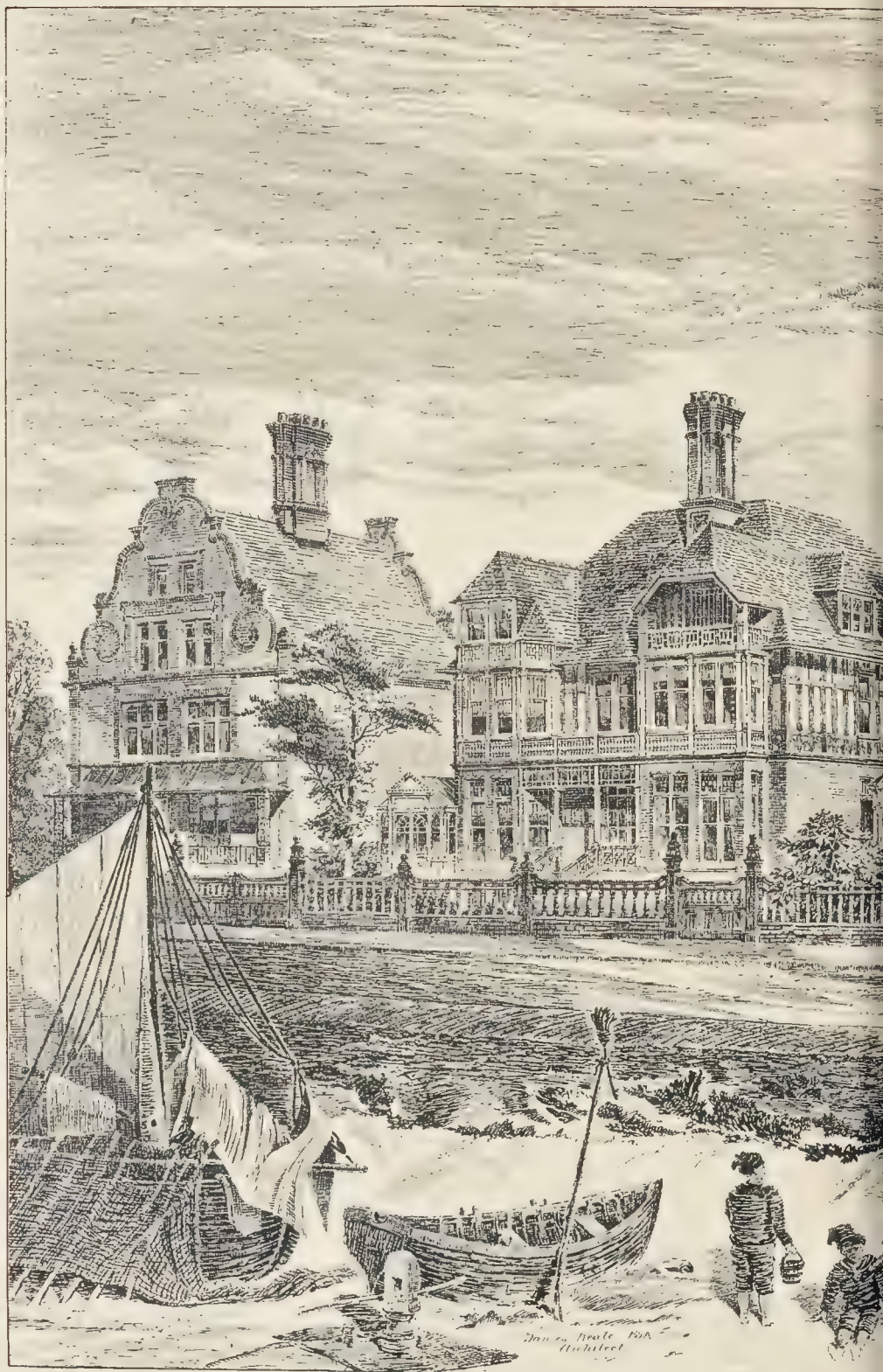


DESIGN BY M. DEFERTES

DESIGN BY MR. D. BRADY.  
DESIGNS FOR MILAN CATHEDRAL FACADE







NEW HOUSES, THE BEACH, WADSWORTH



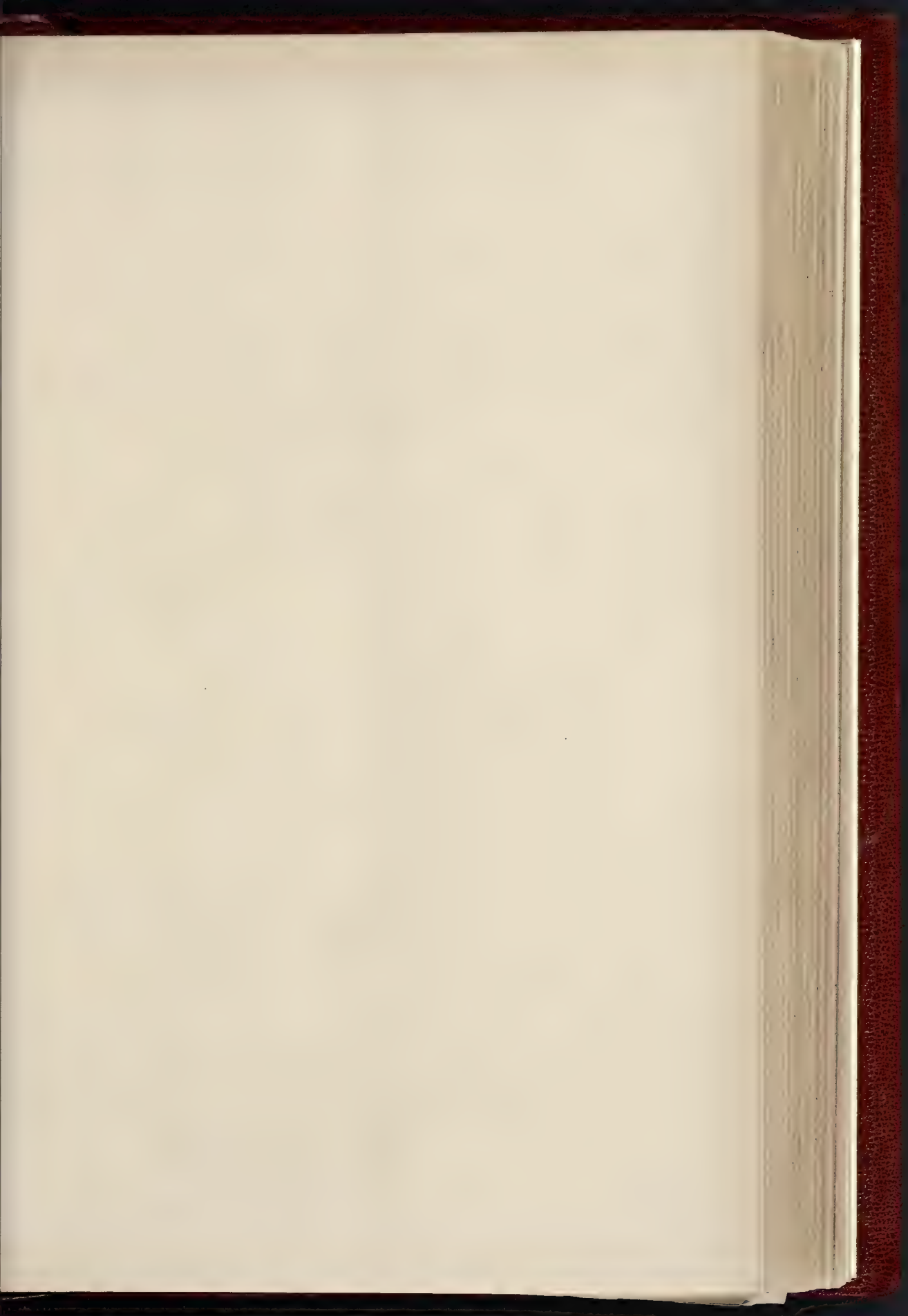


T.—MR. JAMES NEALE, F.S.A., ARCHITECT.

\* Pictorial, 27, Holborn, London, E.C.



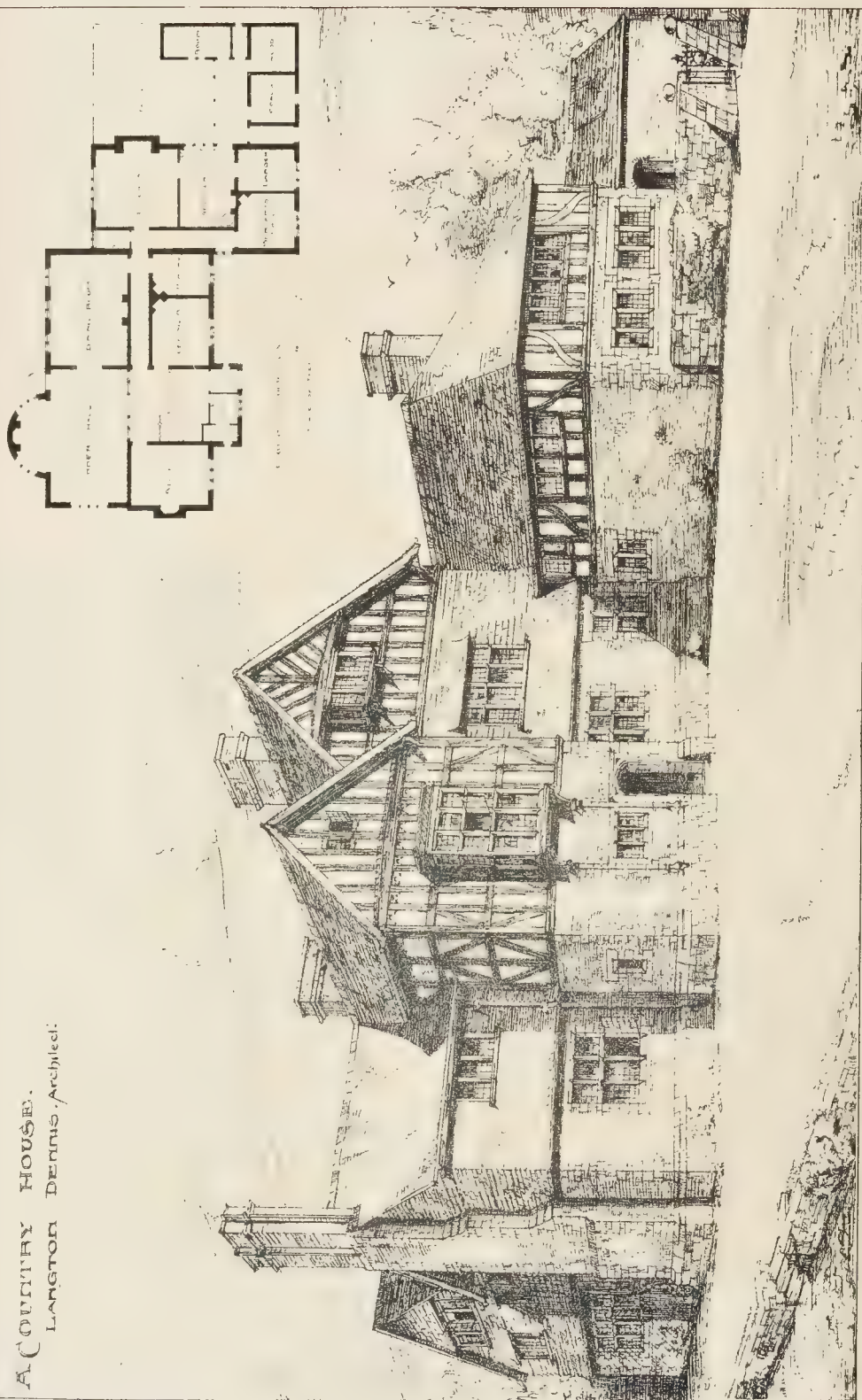




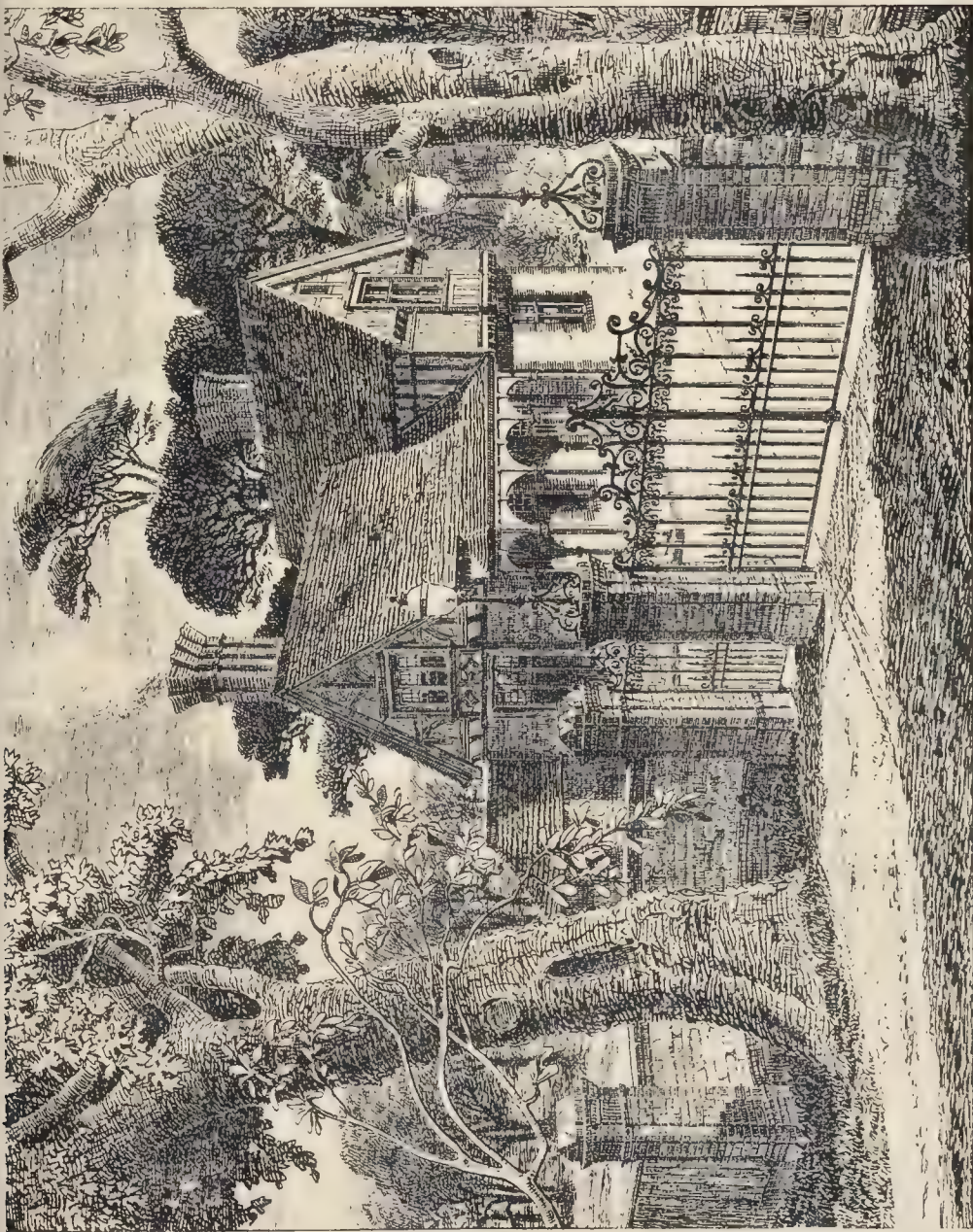


THE BUILDER, OCTOBER 15, 1887.

A COUNTRY HOUSE.  
LANGTON DENNIS, Architect.

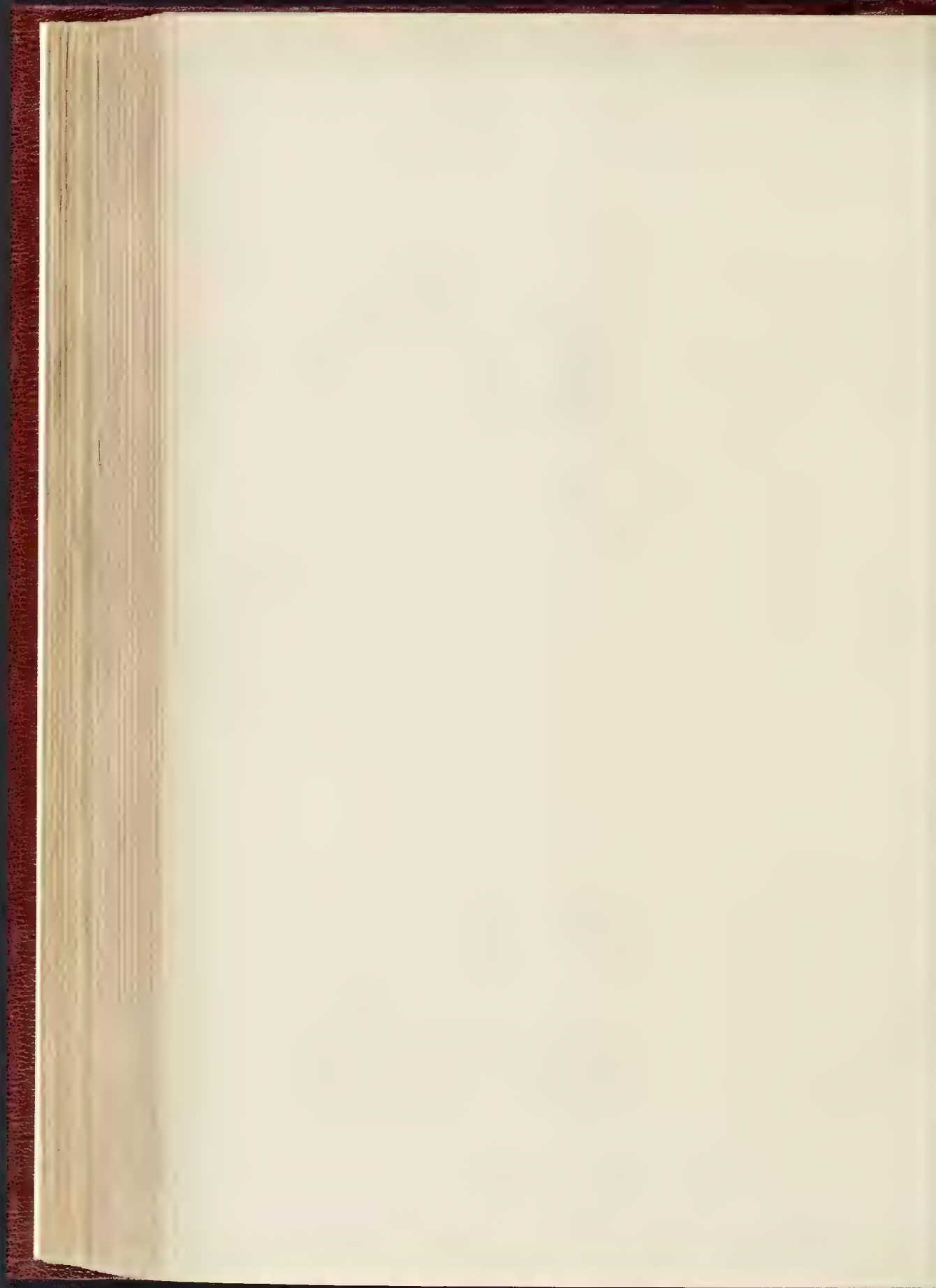


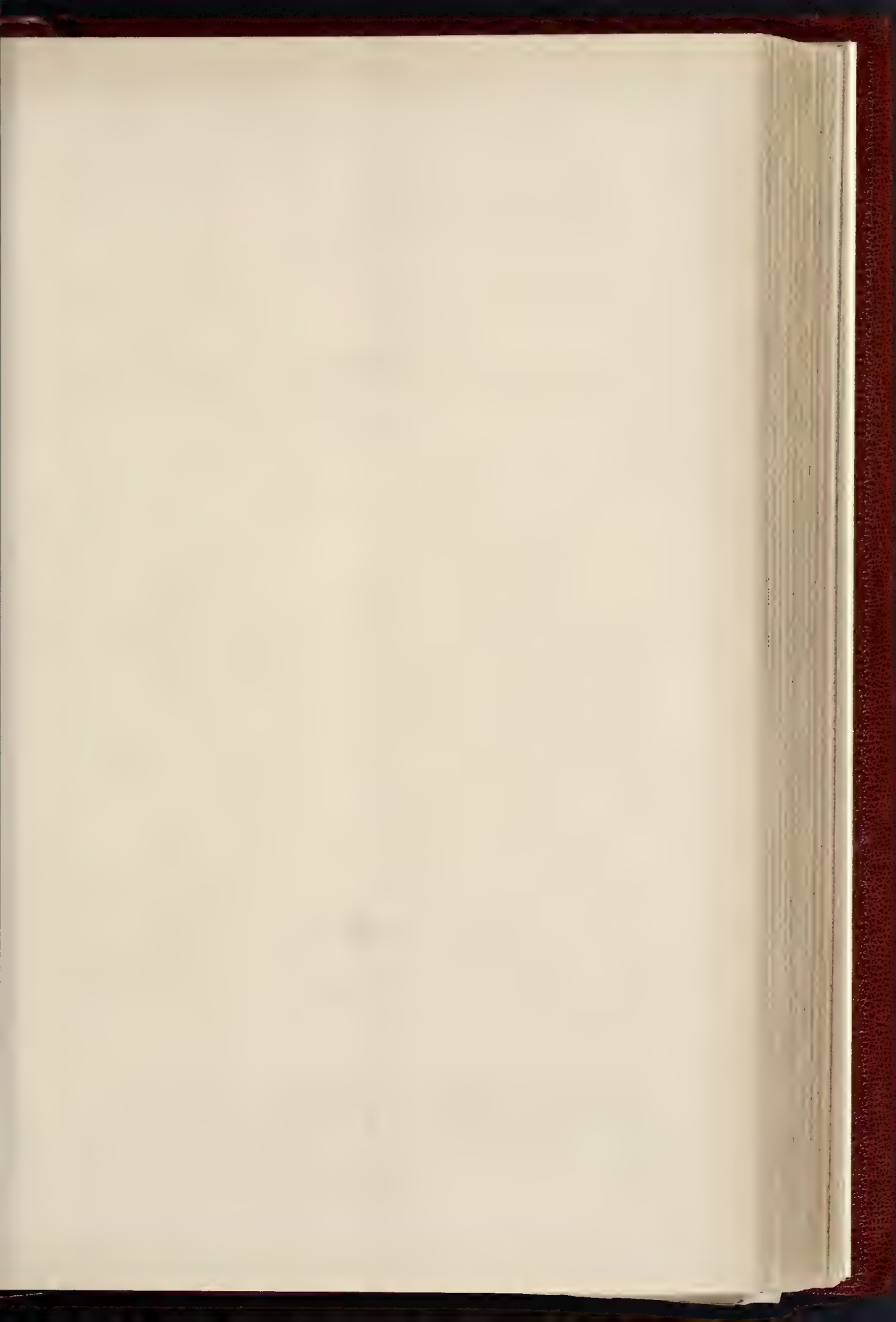




ENTRANCE LODGE AT WALMER, KENT.—MR. JAS. NEALE, F.S.A., ARCHITECT



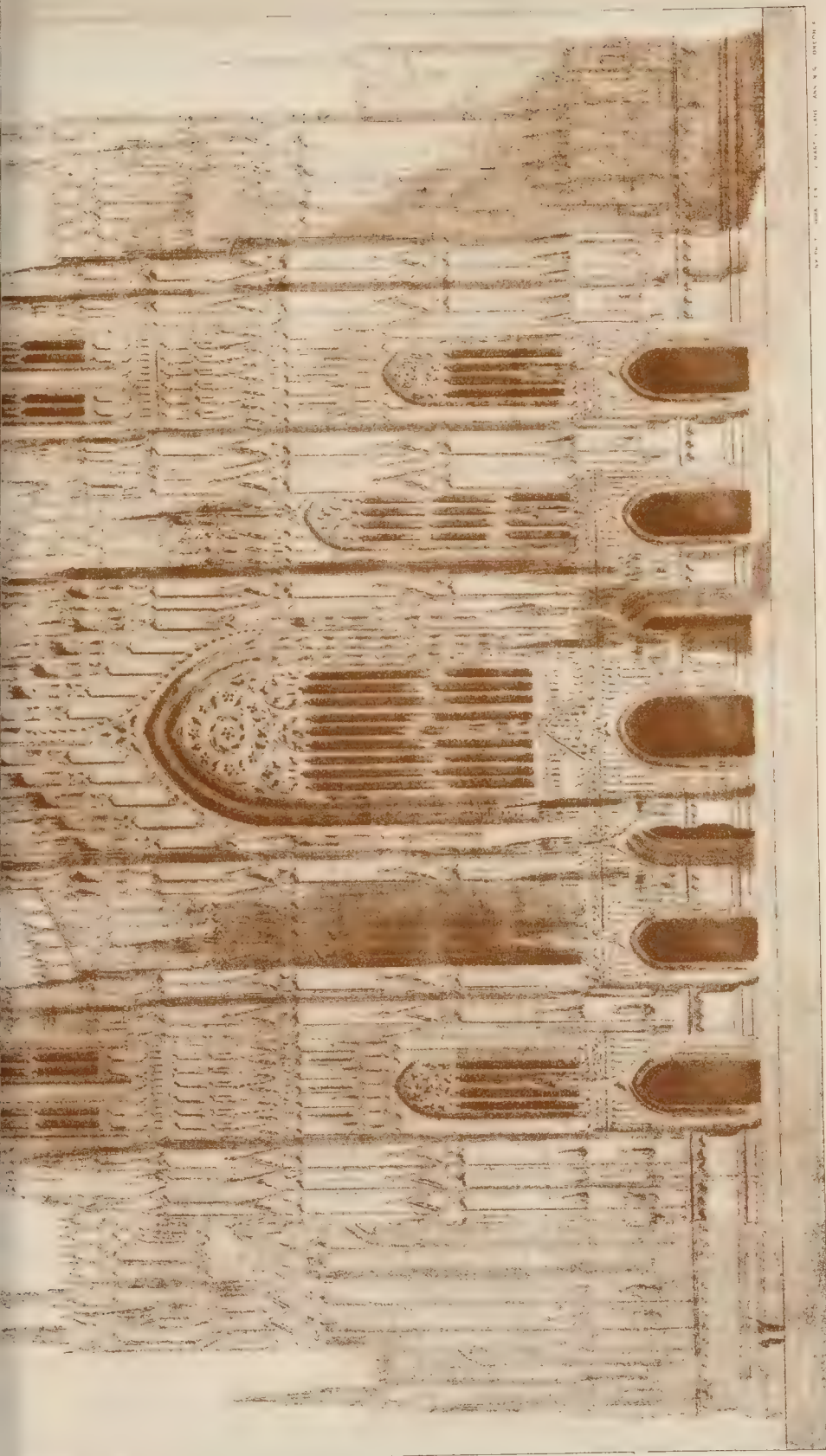






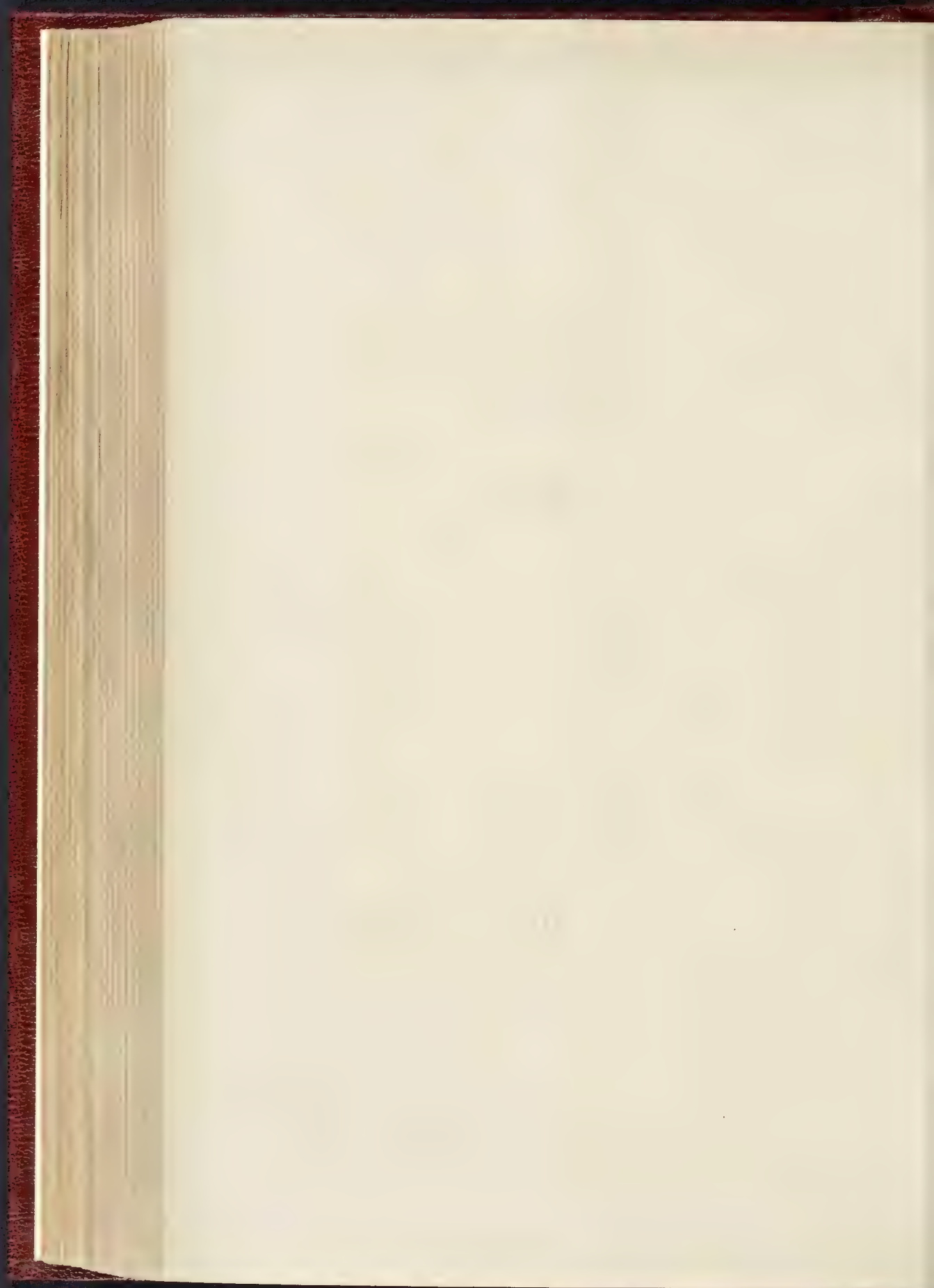
THE BUILDER OCTOBER 15 1887

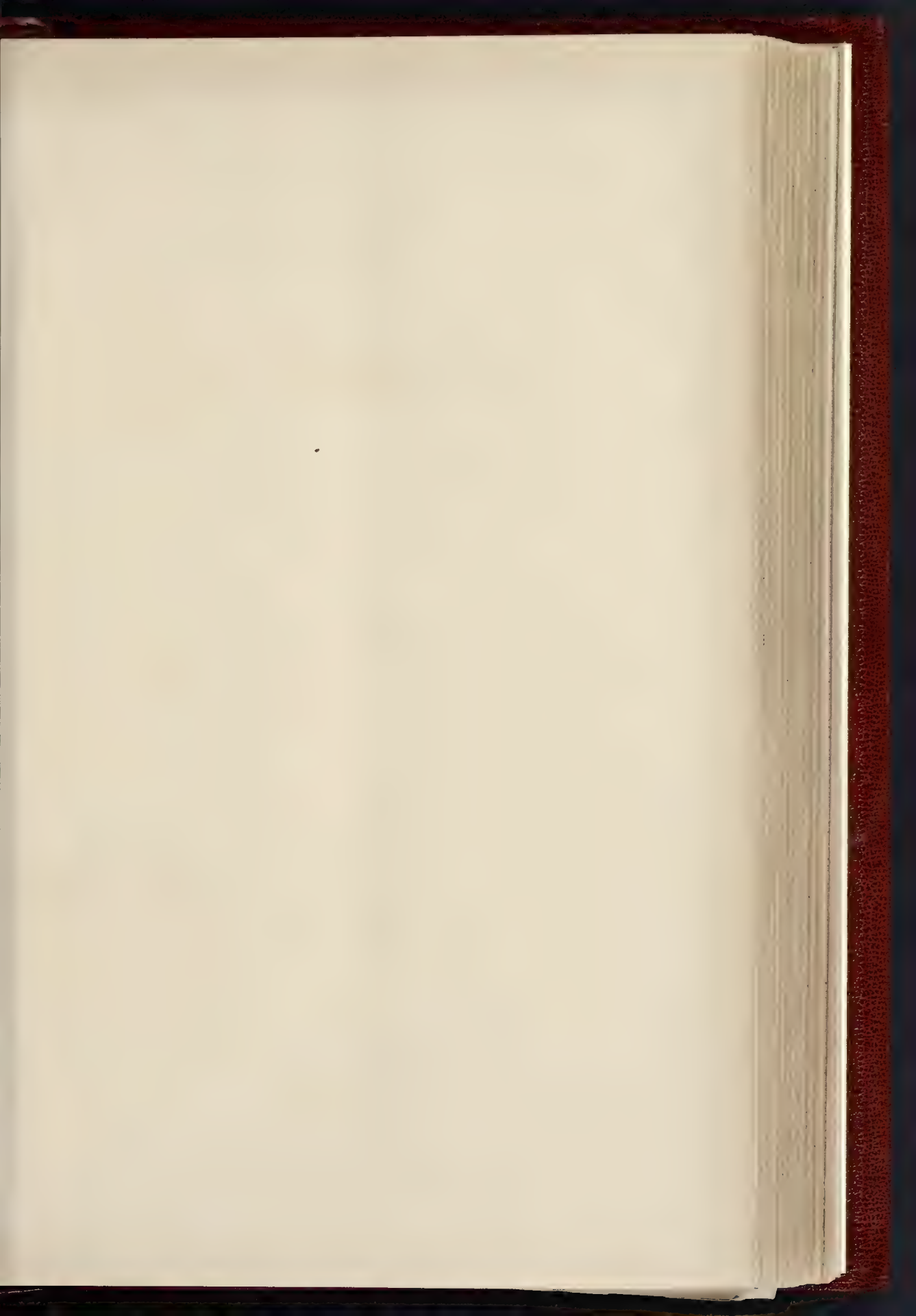




DESIGN FOR FAÇADE, MILAN CATHEDRAL.—By MESSRS PUGGIN AND PUGGIN.

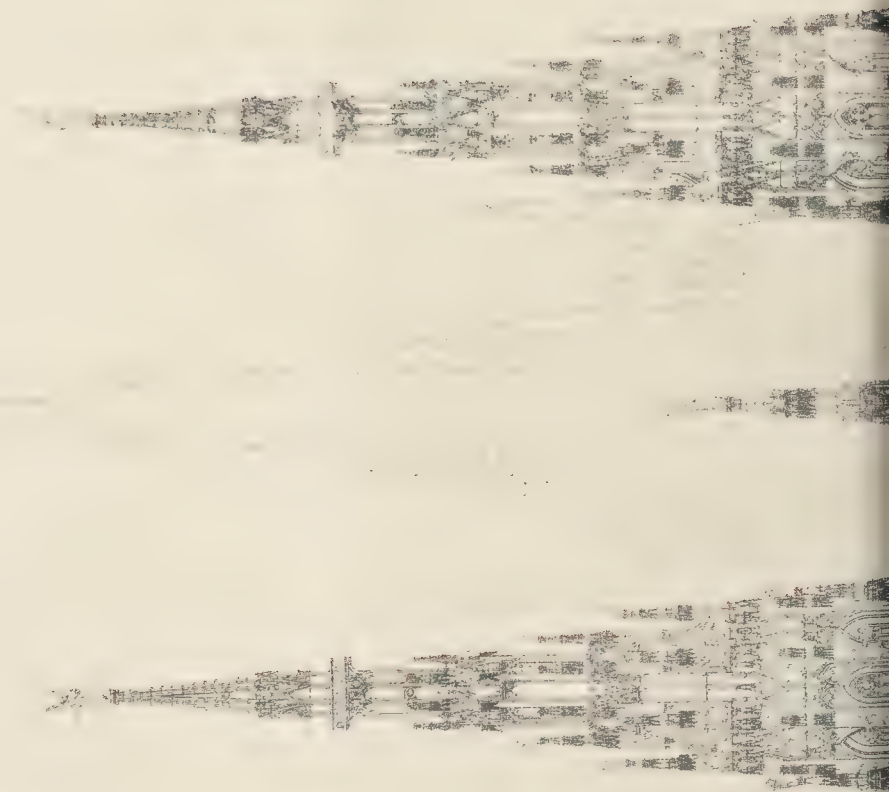


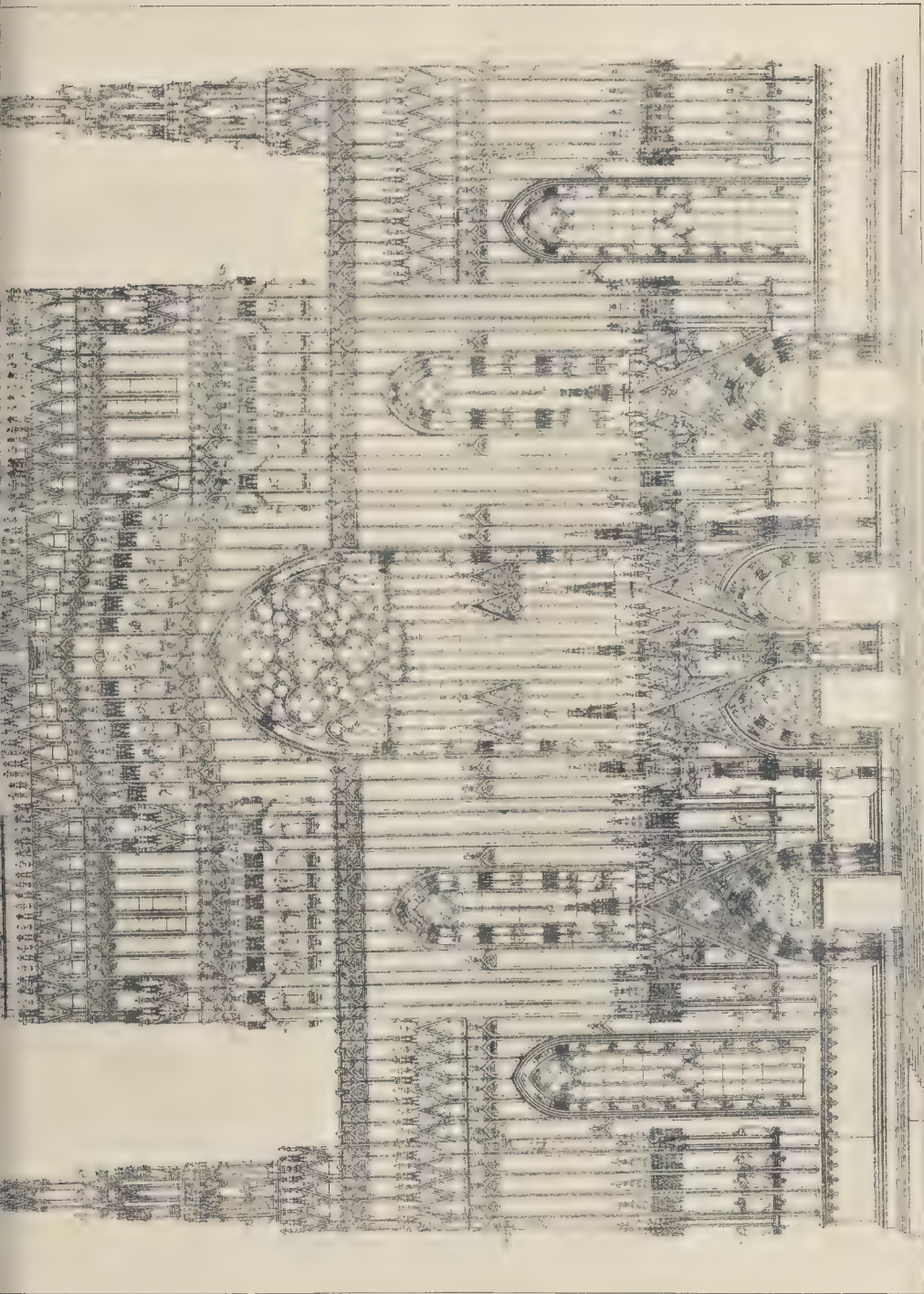






THE BUILDER, OCTOBER 15, 1897.

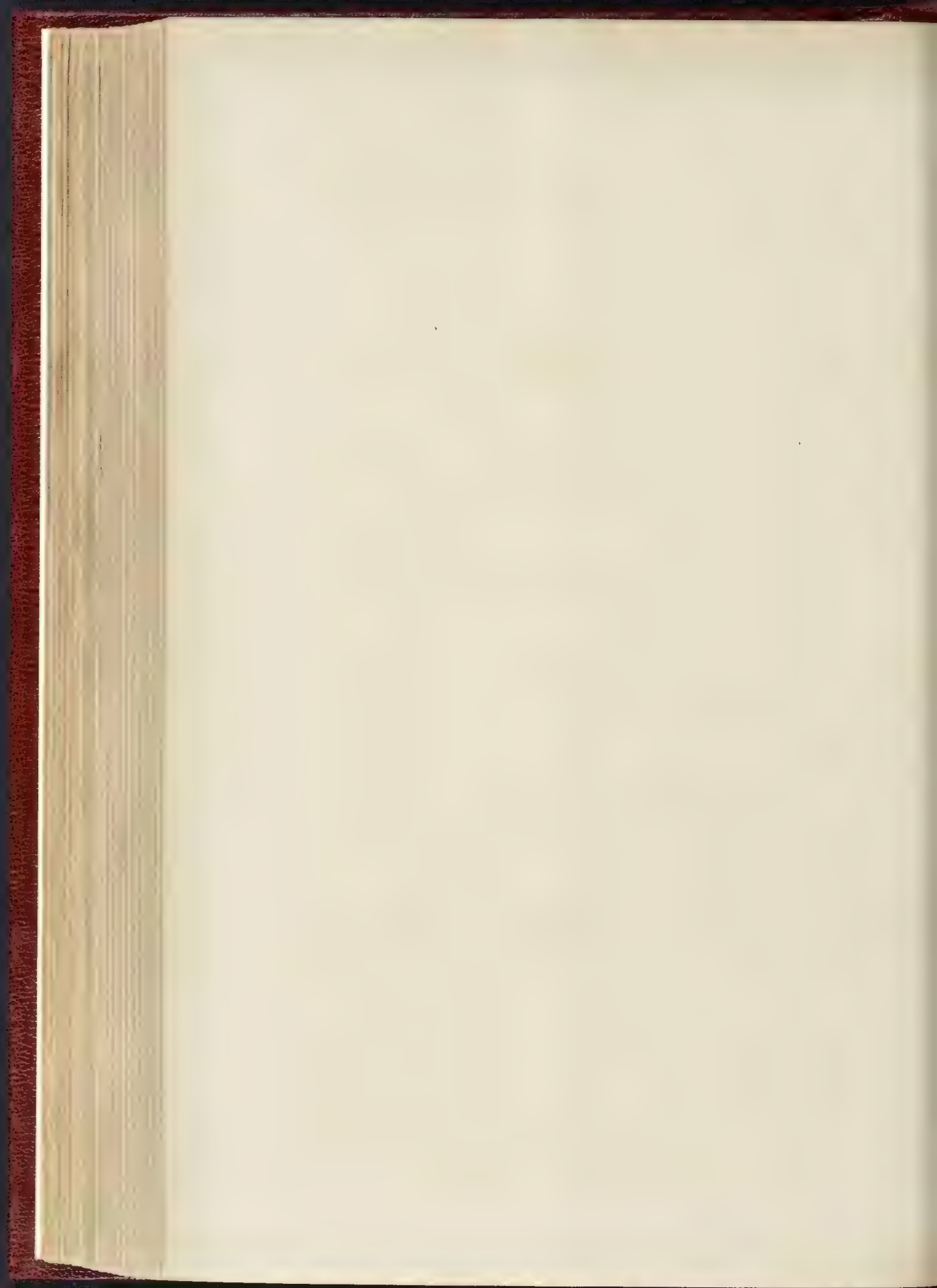


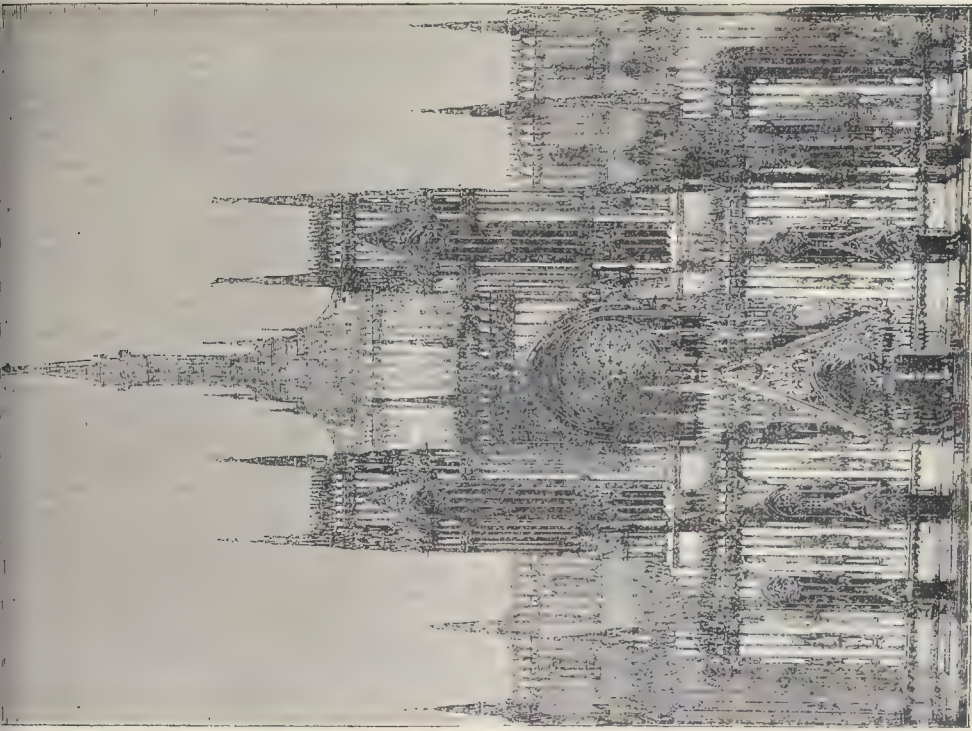


THE PHOTO SURMOUNT & CO. 20, MARK LANE, LONDON, E.C.

MILAN CATHEDRAL FAÇADE COMPETITION.—DESIGN BY MESSRS. HARTL AND NECKELMANN.

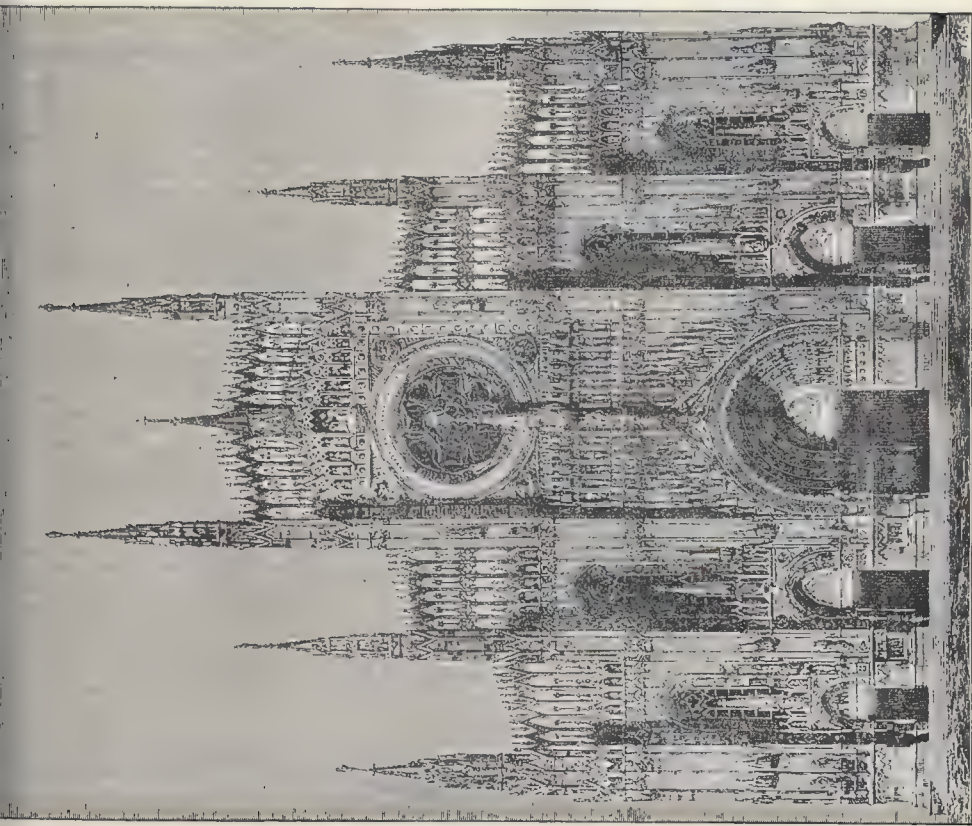






DESIGN BY THE LATE M. TULLAGHI.

(From woodcuts published in "Illustrazione Italiana.")



DESIGN BY SIG. LOCATI.

DESIGNS FOR MILAN CATHEDRAL FACADE.



# "SHONE'S EJECTORS IN THE RECENT RAINSTORMS."

SIR.—The defenders of the Shone system of raising liquids would have a very good brief, so far as low lifts are concerned, if the assumptions on which the theoretical calculations of efficiency are based could be relied upon, viz., that the losses due to leakage and fall of temperature are practically inappreciable. The excessive value of the ratio of power to work, which Mr. Shone after about ten years' experience has found it necessary to adopt, proves conclusively that he has found from actual practical results that the losses due to these causes are very heavy. Demolition of the arguments of the "clique" will further the objects he has in view much more effectively than insinuations of improper motives. Statements and arguments either fenced with or passed over in silence are *ipso facto* admitted to be correct.

In claiming to have discharged his duty as engineer by providing engine power capable of pumping a large volume of sewage than the committee authorised him to provide for, Mr. Shone virtually disclaims having acted as chief engineer responsible for designing and carrying out an installation capable of dealing with the whole discharge from the Palace sewers. Who, then, was the responsible engineer? I certainly thought that Mr. Shone had designed the whole of the works as they are now carried out. Were the plans counter-signed by some higher authority? Mr. Shone says that he has provided pumping power capable of dealing with more than three times the volume the committee authorised him to provide for. By whose authority did he make this additional outlay? Clearly, if he was not the responsible engineer, he had no right, *proprio motu*, to deviate from the instructions of the committee.

I agree *to* *to* with Sir Robert Rawlinson in fixing upon 400 gallons a minute as the maximum volume necessary to be provided for by pumping. Provision for dealing with a larger volume by this means involves a useless waste of public money. The excess storm-water ought to be discharged through a storm-water outlet. There is in the existing installation a 12-in. pipe connecting the sump with the metropolitan sewers, provided with a reflux valve, so that whenever the surface of the sewage in the sump is higher than that of the sewage in the metropolitan sewers, the sewage will flow by gravitation from the sump to the sewer. Mr. Ault, the partner of Mr. Shone in the paper which he read at the meeting of the Society of Engineers, suggested that this outlet might be used in dry weather to let the Palace sewage flow into the city sewers by gravitation. If that plan were adopted, whenever the pipe was not full, there would be established a free communication, by which the sewer gas of the city sewers in its hot weather concentrated state, would flow back into the subway, and the main object of the huge installation would be frustrated. Mr. Shone, however, in his pamphlet, presented to the members, states that it will act automatically as a storm-water overflow, when the pumping power is overcome. Mr. Shone, therefore, or whoever may be the engineer responsible for the success of the work, has not made the mistake of supposing a storm-water outlet to be unnecessary, but the mistake of designing one of insufficient capacity.

I am quite sure that none of the "clique" have the least desire to deny Mr. Shone and Mr. Phillips the gratification due to success. Those gentlemen must, however, prove the validity of their claim. I emphatically assert that time will prove the installation to be a failure, not only as a means of discharging the sewage, but in a sanitary point of view. I am sure you will grant me space to repeat the reasons which cause me to hold these views, and to state them in such a way that silence on Mr. Shone's part must convince your readers of their truth.

Mr. Phillips has not answered either of the crucial questions I asked, viz., How did he ascertain the height of the sewage in the metropolitan sewers, and (I admit indirectly) the depth of the sewage in the subway close to the pump? The bottom is flat, 3 ft. wide, and laid at a gradient of 1 in 225, so that the depth of 12 in. above the concrete close to the sump would correspond with a storage of 2,000 gallons. The 6 in. above the pipe in my last letter is a clerical error; it should be 16 in. I also ask Mr. Shone to state what is the maximum air pressure used since the commencement.

Mr. Phillips has stated that with an air pressure of 10 lb. per square inch the four gas engines were able to discharge in an hour the whole of the rainfall on ten acres at the rate of .59 in. per hour, with the exception of 2,000 gallons against a head of 20 ft. I think Mr. Phillips has overstated the acreage, but he has committed himself to the statement that the whole of the sewage discharged by the Palace sewers was dealt with in the way described. Mr. Phillips seems to think that for an interval of two minutes the rate of fall may have been double, .59 in. per hour, but I presume neither he nor Mr. Shone questions the accuracy of the Westminster gauge as to the total rainfall in the hour. In the printed report, I did not see Mr. Shone's verbal statement that the pipes are 6 in., and concluded he had found he was mistaken. I find they are 6 in. For argument, I will also take the minimum

area, viz., eight acres. This will correspond with 1,782 gallons per minute, of which, according to Mr. Phillips, 34 gallons per minute were stored, leaving 1,748 gallons per minute to be otherwise disposed of. If the whole was pumped each ejector must have discharged 583 gallons in thirty seconds, or at the rate of 194 gallons per second. The corresponding velocity in the 6-in. pipe would be 16 ft., and the theoretical head due to this velocity 4 ft., which corresponds with an air pressure of 1.8 lb. The pressure due to the dead lift of 20 ft. is 8.8 lb., so that without any allowance for friction or valve resistance, the air pressure cannot have been less than 10.6 lb. Adding, as before, 3 lb. to overcome these resistances, we get the minimum necessary pressure of 13.6 lb. to the square inch. The area of the valve passages is rarely equal to two-thirds of the pipes. In the case of the Palace ejectors I feel sure it is not equal to this, but if equal to it, the velocity in the valve passages would be  $\frac{2}{3}$  times that in the pipes, or 37 ft. per second. This corresponds to a theoretical head of 20 ft., the corresponding air pressure being 8.8 lb., or the minimum pressure 17.6 lb., without any allowance for heads due to friction and contraction. A discharge of 300 gallons per minute from each ejector would only require half the pipe velocity, and the 8.8 lb. would be reduced to 2.2, or the minimum pressure necessary to discharge 900 gallons a minute against a 20 ft. head, 11 lb. It is possible, therefore, that the pressure of 17.6 lb. to the square inch would be sufficient to discharge 1,000 gallons a minute. As a matter of fact, I know from actual observation that the ejectors cannot discharge 300 gallons a minute against a 20 ft. head with 10 lb. air pressure. Mr. Shone has utterly misrepresented what I said at the meeting of the Society of Engineers about the discharging capacity of the ejectors. I never stated that the ejectors could discharge 1,000 gallons a minute against a 20 ft. head with an air pressure of 10 lb., and I emphatically deny stating that the estimate I did give was based on theoretical calculations. As a matter of fact, I gave the details of the three observations of the time of discharge of the 500-gallon ejector, the times in each case being as nearly as possible equal and a little under forty-five seconds. If the ejector discharged 500 gallons, the rate of discharge was about 330 gallons a minute. As the diameter of the pipes of the 300-gallon ejector is the same as that of the 500-gallon ejector, the discharging capacity of each ejector is the same, and I now ask Mr. Shone the question, which Mr. Phillips has declined to answer for him, Why did he specify the 500-gallon ejector? On the day of the installation there had been a little rain in the morning, sufficient to necessitate the use of two gas-engines, but it had ceased about two hours before my visit, and one engine was doing the work with ease. It is therefore quite certain that the sewage in the metropolitan sewers cannot have differed much in depth from its normal eleven or twelve level, so that the maximum lift cannot have exceeded 14 ft. The engines are calculated to exert only 4-h.p. at the brake, where the air-pressure is 10 lb., and as they can exert 5-h.p. brake-power, they would be able to supply air compressed to 12 lb. per square inch, and at this pressure I estimated that the three ejectors might be able to discharge 1,000 gallons against a 20 ft. head. Mr. Shone has evidently not entitled to claim the reserve power provided to meet accidents to machinery, in estimating the discharging capacity of his installation. As there are three ejectors, he is entitled to claim two-thirds. The discharging capacity, therefore, with 10 lb. air-pressure would not exceed 500 (five hundred), and with 12 lb. air-pressure 200 (two hundred), gallons per minute against a 20 ft. head.

Taking 1,000 gallons as the maximum volume, which the ejectors can discharge in a minute against a 20 ft. head, with 12 lb. air-pressure, the work estimated in weight of water raised will be 6-h.p., and the necessary engine brake power 20-h.p., which is certainly equal to fully 27-h.p. indicated, or the ratio of indicated horse-power to the horse-power in work done  $\frac{4}{3}$  to 1. I know that Mr. Shone bases his calculation on a discharge of once a minute; in other words, in fixing his engine-power, he estimated for a discharge of 900 gallons a minute, since the 500-gallon ejector cannot discharge more than the 300-gallon. This he thought could be raised 20 ft. high with 10 lb. air-pressure, corresponding to 16-h.p. brake horse-power of gas-engines equal to at least 21-h.p. indicated. As the work in weight of water raised is only  $\frac{4}{3}$  h.p., the ratio of horse-power indicated to horse-power in actual work estimated to be necessary by Mr. Shone himself is nearly 4:1. Experience has shown that it is not sufficient.

I do not in the least doubt Mr. Phillips's veracity, but he is labouring under a misapprehension as to the actual facts of the case, which will be effectively removed when he prepares his answers to the two crucial questions I have had to ask him a second time.

That Mr. Shone should have provided, as he deliberately states that he has done, a reservoir for diluted sewage extending the whole length of the Houses of Parliament, is simply incomprehensible. Ever since he took up the sewage question his whole efforts have been directed to procure the condemnation of large sewers laid at flat gradients, whether or not intended to be used as reservoirs. He has always described them as elongated cesspools. They

are, however, cesspools which can be periodically flushed. The reservoir he has provided at the Houses of Parliament is an elongated cesspool in a much worse state than those sewers, because its contents will be stagnant and the sewage sediment spread over a flat concrete bottom 3 ft. wide. No rainfall goes directly into this "subway" reservoir. All has to pass through the 12-in. sewer so that the contents of the reservoir must necessarily be very foul. The fact that the whole discharge flows through this 12-in. pipe makes the flooding of the Victoria Tower quadrangle inevitable long before the sewage in the sump rises to the maximum height attained by the sewage in the city sewers, because the head necessary to force the 3,000 gallons a minute corresponding to a rainfall of 1 in. cannot be less than 12 ft. In other words, the surface of the sewage at the Victoria Tower will be 12 ft. higher than the surface at Speaker's Green.

There are several large pockets in the crown of the subway which, until recently, were simply reservoirs of foul air. In the printed report of Mr. Ault's paper it is stated that these are now ventilated by gratings. No wonder there are foul smells in the court-yard.

The remedy for these defects is, however, simple. Separate collecting sewers should be provided for the rainfall discharging directly into the subway, the brickwork block between the city and Palace sewers replaced by a reflux valve the full size of the sewer, and the communication between the sump and the subway stopped.

Mr. Shone has not challenged the accuracy of the rest of the statements I made at the meeting; his silence, therefore, must be taken as an acknowledgment of their truth.

As I have been compelled to contradict two statements made by Mr. Shone, I feel that I ought no longer to use a "nom de plume." I therefore, subscribe my name and address,

WILLIAM DONALDSON.

2, Westminster Chambers.

## "NEW METHOD OF VENTILATION."

SIR.—We have read the description in your current issue [p. 493] of what the patentees, in a circular issued by them, term a "new method of ventilation"; but far from being new, it is really a very old method, we having applied it to fireplaces as far back as fifteen years ago at our old offices at Mansion House Buildings. Instead of a cylinder the bottom of the shaft brought down from the ceiling level terminated at the floor-level in an air-tight casing, made of mica, enclosing the fire-place, so that the fire was made to draw its supply of air down through the ventilating tubes, and no draught was experienced by any one sitting in front of the fire, as is the case with the ordinary fire-grate.

We later on discovered that the idea of carrying a tube down from the ceiling, and connecting it with the throat of the chimney, was not original, a Mr. Hooy, of Glasgow, having used this arrangement about five years before, but without the air-tight casing.

About nine years ago we applied this principle to large sugar works at Greenock, there being six shafts employed altogether for the ventilation of the char-room, the shafts being led down from the ceiling, and communicating with the shafts of the furnaces, which were otherwise made air-tight below the furnace-bars. Many years ago we took out a patent for the application of this principle for the ventilation of steamships, pipes being led from the different parts of the vessel down to the furnaces, which were made to draw their supply of air through these channels.

We are not surprised that the patentees are, as you say, in some doubt as to the function of "the cylinder." We have carefully studied this part of the arrangement, but fail to see what possible advantage can arise from its use. The inventors say that in the event of a reversal of the current in the chimney it will prevent back draught in the ventilating tube, but even allowing that it did so, which we doubt, a simple valve placed in the shaft would effect the same thing at considerably less cost and trouble. Our experience of this principle, as applied to buildings, is that there is no advantage whatever in bringing a shaft down from the ceiling and connecting it with the chimney, as an ordinary mica pipe ventilator fixed in the chimney-breast at the ceiling level answers the purpose equally well, if not better, and the cost of the mica ventilator with the other is a mere trifle, amounting to only a few shillings, whilst, with regard to the trouble and labour involved in the fixing, there is no comparison. Both plans depend for their action upon whatever updraught there may exist in the flue; in many flues, even without a fire, there is to be found a strong natural updraught, which would create an exhaust through either the mica ventilator or the vertical tube, though in the latter there would be the increased friction to contend with and the resistance offered by drawing down the highly rarified air usually found at the ceiling level, especially when the gas is lighted, and the natural tendency of which is to ascend and not descend. It is simply going contrary to the laws of nature to try and ventilate a room by drawing the hot-air downwards.

We observe that the patentees recommend where there is a defective draught in the flue that a gas



et or blast fan be employed to create an exhaust. We presume they do not contend that such an application is novel, and if they consider the use of either a gas jet or a fan as necessary before ventilation can be secured, for what are we indebted to their vertical tube and cylinder, which of themselves cannot possibly affect the draught one way or the other, they being admittedly inoperative and therefore useless unless an updraught either already existing is created in the upcast flue by other means independent of and outside their arrangement, and which must certainly be credited with whatever current that may be found in the vertical pipe?

ROBERT A. BOYLE & SON (LIMITED).

64, Holborn Viaduct, October 11th, 1887.

SIR,—This system I have used years ago, and found it successful. It was known as Dr. Chowne's system. Dr. Chowne was also in the field before Tobin, as he brought in the fresh air upon the same principle as Tobin.

C. B. A.

SIR,—May I be allowed to explain that as to the main function of the cylinder there can be no doubt. The cylinder or chamber, being in many cases in actual contact with the fire, becomes heated, the rarefaction that ensues causes a rapid displacement of air without (or, better, combined with) the draught of the chimney acting on the end of the exit-pipe. It is exactly the same thing as heating a room and opening a window, the cooler air (because of its greater density) immediately displaces the warmer and rushes into the room. The interposition of the cylinder is absolutely necessary as a disconnector, otherwise the downward and upward pipes, being continuous, are liable to become heated by conduction, and then a reverse action is at once set up, or its efficiency is greatly impaired, as we have frequently proved by experiment.

G. B. MOSS.

\* \* Our correspondent, nevertheless, told us when we were examining the model that he did not know why the upcast draught should refuse to act without the cylinder, and suggested two or three theories without adopting any one of them.

#### ORDNANCE MAP SCALES.

SIR,—I notice that in your article on the Ordnance Survey in last week's *Builder*, one of the arguments put forth by the advocates for the  $\frac{1}{25000}$  scale is that a square inch on a map drawn to that proportion equals exactly one English acre. I beg to state that this is not quite correct, as one square inch equals only 4822.63 square yards, and I fail to see that this is an acre. Although perhaps near enough for ordinary agricultural purposes, it would not answer if applied to town work.

In the case of the  $\frac{1}{5000}$  scale, one square inch will be found to contain 192.9 square yards.

F. C. WILLIAMS.

\* \* The word "exactly" should not certainly have been employed *sans phrase*; "practically" would have been more correct; but it is "exactly" to the eye; it would require a magnifying glass to detect the difference of the square inch and the acre on the  $\frac{1}{25000}$  scale, and that was all that was intended.

#### FIRES IN THEATRES.

SIR,—I read Mr. Campbell's letter in your last week's issue, suggesting the engraving of the plan of every theatre on the back of the programme. Now, if everybody understood a plan the issue would be an excellent one; but my experience convinces me that not one in a hundred does.

On one occasion I was retained upon an "ancient lights" case, before a special jury, and, notwithstanding the plans, sections, and photographs which were put in, the jury could not comprehend it, and ultimately a model had to be made in cardboard.

It has struck me that if a red light were placed over every door of exit, and a finger painted on glass (with a gas-jet behind), directing the way would be quickly seen by the audience.

WILLIAM ADAMS.

#### COOKING STOVES.

SIR,—Can you or any of your readers inform me of a really good cooking-stove? It should be able to accomplish the following objects:—

1. Roast in front of fire as well as roast and bake in ovens.
2. Grill on top of fire as well as fry, and have a hot-plate for stews and sauces, boiling, &c.
3. Heat a boiler sufficient to give water for a bath when required.
4. Above all, it should ventilate so that the smell of the cooking should be carried away instead of permeating the kitchen, as is usual now.
5. I need hardly say it should be economical in coals.

I have had several stoves in my kitchen, and they are all faulty, and will not effect the operations of a really efficient stove ought to accomplish. I would not mind the cost if I could find a stove that would effect the above objects.

PATRICIAMILLAS.

Oct. 6th, 1887.

\* We have already expressed the same opinion.—ED.

#### PROVINCIAL NEWS.

**Birmingham.**—The *Birmingham Gazette* states that some Mediæval remains have been discovered in clearing the ground for new premises in that city. A new building is about to be erected in the Priory, and in the excavations for the foundations a massive red sandstone wall has been revealed, which is supposed to be a part of the hospital or priory of St. Thomas, founded in 1285. Arrangements have been made for the remains of the wall to be photographed and sketched.

**Bournemouth.**—The new mission hall in connexion with St. Michael's Church, Bournemouth, was opened by a special service on Michaelmas Day, at which workmen employed on the building, as well as the congregation of St. Michael's Church, attended. Mr. R. Pinder was the architect of the new building, and Messrs. E. Jones & Son the contractors. The cost was about 600*l*.

**Bridgwater.**—On the 6th inst., the formal opening of premises for the Young Men's Christian Association, to be known as the "George Williams" Memorial Hall, took place at Bridgwater. The hall has been built to commemorate the fact of Mr. Williams being founder of the organisation. The building has frontages to Eastover of 45 ft. and 83 ft. to Salmon-parade, and is designed in the Classic style of architecture. It has been executed with local red brick, relieved with Ham Hill stone dressings and white brick in the pier, the moulded string-courses being in moulded bricks. At the front of the building, on the ground-floor, a large reading-room and library, with secretary's room attached, has been placed. Behind the reading-room there is a meeting or lecture room, with accommodation for 130 adults. Attached to this room is the junior club-room. A gymnasium has also been fitted up with gymnastic appliances. The floor has been formed with solid wood blocks to deaden the sound. The large hall is 50 ft. in length by 30 ft. in width, and has a height of 24 ft., the total accommodation being for 460 adults. Towards the front, a large room intended as a young men's parlour has been placed. On the floor above are two other commodious rooms. The sanitary appliances are said to be arranged on the most approved scientific principles. Including the furniture, the entire outlay amounted to 3,600*l*. Messrs. W. G. Habershon & Fawcner, of London, Newport, and Cardiff, gratuitously prepared plans and specifications. Mr. H. W. Pollard, of Eastover, whose tender amounted to 2,490*l*., was the builder.

**Kingston-on-Thames.**—The Corporation of Kingston-on-Thames, in a Bill which they propose to promote in Parliament next session will apply, among other privileges, for powers to provide additional wharf accommodation. The estimated expenditure of the improvement is from 1,000*l*. to 1,200*l*. This includes the cost of a concrete wall, with granite coping, necessary to give an additional frontage of 470 ft., with mooring rings or posts, and granite pitching, with stone steps 100 ft. wide for boats. The gross annual amount of tonnage unloaded at the public wharf at present is 26,000 tons, and it is estimated that about 1,500 tons more are carried by barges that are driven elsewhere to unload in consequence of the poor accommodation. Should the powers sought be granted, advertisements would probably be issued inviting tenders from contractors.

**Newcastle.**—At a meeting of the Town Council last week the Deputy Town Clerk (Mr. W. E. Cartwright) read the letter from the Lords of the Treasury, which has been already published, agreeing to a loan of 10,000*l*. for the purpose of executing the scheme of the public buildings, which comprises a free library, assembly room, council chamber, school of art, &c. The Public Buildings Committee recommended the Council to accept the tender sent in by Mr. John Gallimore, in April, 1886, for the erection of the buildings in accordance with the plans and specifications, at a cost of 12,000*l*. This was agreed to, and the Corporation seal affixed to the contract, the work to be completed by June 24th, 1889. It appears that the highest tender, by Messrs. Lucas, of London, was for 18,628*l*. It is to be hoped Mr. Gallimore may be able to carry out the work for less than two-thirds of that amount with satisfaction both to himself and the Corporation.

**Redcar.**—Major-General C. Phipps Carey held an inquiry at Redcar on the 6th inst. in response to an application from the Local Board to borrow

1,500*l*. for laying out pleasure-gardens. Mr. James Howcroft, their surveyor, presented the plans which he had prepared, and explained the mode of carrying out the proposed work.

**Royston.**—At a recent meeting of the Royston Local Board, the plans prepared by Mr. R. Vawser, C.E., Manchester, for the main drainage of the district, and the treatment of the sewage thereof at an estimated cost of about 27,000*l*., were unanimously adopted, and the clerk was instructed to submit the same to the Local Government Board for their approval.

#### CHURCH-BUILDING NEWS.

**Dewsbury.**—The consecration of the newly-built portion of Dewsbury Parish Church, took place on the 30th ult., the Bishop of Ripon officiating. The new part consists in the enlargement of the nave by 31 ft. in length and 24 ft. in width, this extension making the nave 98 ft. long. The north and south transept have been each increased 27 ft. by 30 ft., the chancel 46 ft. by 24 ft., the morning chapel 30 ft. by 19 ft., organ-chamber 30 ft. by 19 ft., clergy vestry 14 ft. by 12 ft., and choir-vestry 20 ft. by 13 ft. The length of nave and chancel together make a total length of 144 ft., the average height being 34 ft. Each transept has two three-light windows of varied designs. Several stained-glass windows have been added. The new east window, which is in seven lights, has also been filled with stained glass. On the south side of the chancel is a lofty double three-light stained-glass window, in memory of the Rev. Thomas Allbutt, M.A., for many years vicar of Dewsbury. On the same side of the chancel there are sedilia in three bays, with piscina adjoining. The screens on either side of the chancel, near the morning chapel, are of stone, with tracery heads and moulded cornices.

Two porches, one on the north and one on the south side, have been added; the south porch has a stained-glass window. The walls of the new building have been built of ashlar, from Netherton quarries, Huddersfield. All the woodwork is of oak, and the roof of each transept is supported only on oak columns, from which rise circular ribs, and the roofs to the nave, chancel, and other parts of the new building, have richly-moulded principals, with elaborate oak tracery. The roofing is covered with lead and felt, on oak boards. The floors are for the most part of redwood blocks, by Messrs. Thomas Gregory & Co., of London, laid in pitch, on a bed of cement concrete. The floor of the chancel is covered with encaustic tiles, and the aisles with plain red and black, all by Messrs. Godwin & Sons, of Hereford. The seats are of oak, as also are the choir stalls; the latter being finely moulded, and having open fronts with tracery heads. The church is ventilated by inlet tubes and grates placed at the lower part of the window and outlet siding casements fixed in the windows. The church will be warmed by hot water on the low-pressure system, the pipes running under each aisle, and covered with perforated iron grates. The ground plan of this church was left by the late G. E. Street, R.A., but the whole of the elevations, with the exception of the chancel arcade, and all the details and fittings, are by Mr. A. E. Street. Mr. A. H. Kirk, a local architect, has superintended the whole of the works; the clerk of works being Mr. W. H. Williams. The heating apparatus have been gratuitously fixed by Messrs. M. Newsome, Sons, & Spedding, and the gas supply has been undertaken by Mr. H. Blackburn. The contract for the eastward extension was taken by Messrs. J. & W. Bealand, of Bradford, for the sum of 14,000*l*. It is proposed to make further alterations and additions at a future date.

**Southport.**—The new church of St. Philip's, Southport, was consecrated by the Bishop of Liverpool, on the 11th inst. The church consists of nave, north and south aisles, transepts, and chancel: on the south side of the latter are the vestries for clergy and choir, with moveable screens. The total length of the church internally is 131 ft., and across the transepts 77 ft.; the width of the chancel is 23 ft. The height of the nave from floor to wall-plate is 36 ft., and to apex of ridge 61 ft. The nave is divided by stone columns into five bays. The nave is lighted on each side with ten clearstory windows, in the west front of which is a large traceried five-light window; the transepts showing externally as



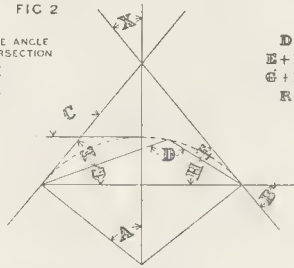
## CIRCULAR CURVES

RELATIVE VALUE OF USEFUL ANGLES TO ANGLE OF INTERSECTION

FIG 2

LET  $X$  = HALF THE ANGLE  
OF INTERSECTION  
THEN  $A = 90^\circ - X$   
 $B = 90^\circ - X$   
 $C = 90^\circ + X$

$D = 90^\circ + X$   
 $E + F = 90^\circ - X$   
 $G + H = 90^\circ - X$   
 $R = T \tan X$



## SETTING OUT WITH TWO THEODOLITES

IF ANY TWO LINES BE SET OUT FROM THE STARTING POINTS OF THE CURVE HAVING THE SUM OF THEIR TANGENTIAL ANGLES  $(E + F) = 90^\circ - X$ , THE INTERSECTION OF THESE TWO LINES WILL BE A POINT IN THE CURVE—BY A SERIES OF SUCH POINTS THE WHOLE CURVE MAY BE SET OUT IF THE COUNTRY BE SUFFICIENTLY OPEN TO ALLOW OF IT—WHEN THE COUNTRY IS UNLEVEL THE METHOD SHOWN IN FIG 1 BY SHIFTING AND RE-SETTING UP THE THEODOLITE WHERE NECESSARY IS MORE APPLICABLE—

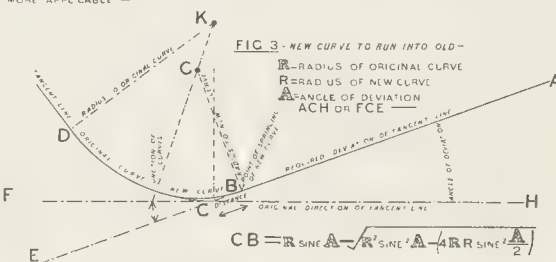
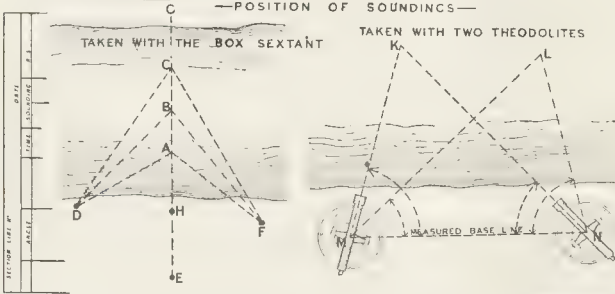


FIG 3—NEW CURVE TO RUN INTO OLD—

$R$ —RADIUS OF ORIGINAL CURVE  
 $R'$ —RADIUS OF NEW CURVE  
 $A$ —ANGLE OF DEVIATION  
ACH OR FCE—

$$CB = R \sin A - R' \sin A' - R'' \sin A''$$

## MARINE SURVEYING



coupled gables, with a four-light window in the centre of each gable; and the east end of the chancel has a five-light tracery window, with trefoil terminals to the main cusings. At the west end of the south aisle rises a tower to the height of 110 ft. In the tower a bell by Messrs. John Taylor & Co., of Loughborough, is fitted, and provision is made for a peal of eight bells. The pulpit and font, in alabaster, are the work of Messrs. Norbury, Paterson, & Co., sculptors, of Liverpool, the carved oak communion-table being by the same firm. The chancel-floor has been laid with mosaic, by Messrs. Elliot, Olsten, Olney, & Co., of Manchester. The decoration of the nave and chancel with light and simple tints, with stencil patterns laid on, has been carried out by Mr. Renben Bennett, of Manchester. The reredos is in oak, with carved panels, by a local carver, Mr. R. A. Macfeather. The church was designed by Mr. R. F. Tolson, of Manchester, the style being known as Geometrical Gothic of an Early English type. Messrs. W. Brown & Son, of Stafford, were the general contractors for the undertaking.

**Surveyorship Appointment.**—Mr. Peter Dodd, who has for six years held the post of Assistant Surveyor to the Tunbridge Wells Local Board, has been appointed to the Town Surveyorship of Southend-on-Sea.

**Tile Works.**—Messrs. Malkin, Edge, & Co., of Burslem, have opened a London House, at Sandringham-buildings, Charing Cross-road.

## The Student's Column.

## LAND SURVEYING AND LEVELLING.

## XVI. SETTING OUT CURVES.

THE poles shown in the direction of the chord lines A B, A C, A D, fig. 1 (*Builder*, Oct. 8, p. 514), are not generally necessary. The usual method is for one man to hold one end of the chain at the last point determined, taking care, if the curve be flat, to place his body upon the outside of the curve, so as not to impede the line of sight when the theodolite is set for fixing the next point in the curve. The other assistant pulls out the chain or the tape to the given length, and holds up a peg or lath, which he keeps vertical at the correct distance, moving it about as directed by the surveyor, to the right or left hand, until it accurately appears in the required direction. Should any obstacle render it necessary to remove and re-set up the theodolite over a new point in the curve, the direction of a new tangent line must be found by the method shown in fig. 1 (Case 5), and the same process of setting-out by means of tangential angles re-commenced. The use of the tangential angles, which are calculated from the formula proved by Case 1 (*Builder*, Sept. 17, p. 412), enables the curve to be set out to the right-hand side of the tangent line, when the theodolite is placed over the beginning of the curve, as the primary scale of divisions upon the horizontal circle of

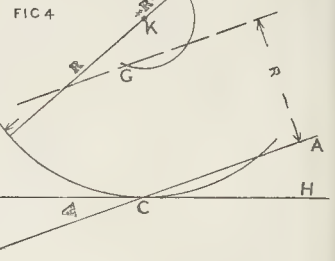
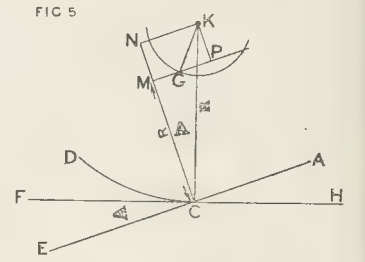


FIG 4



the instrument is numbered to read in the direction of the hands of a watch; hence when the curve is to be set out to the left-hand side of a tangent line, the column upon the card containing the differences of the tangential angles must be adopted. Thus with a radius of 20 chains, if  $1^\circ 25' 57''$  be the tangential angle for a chord of one chain in length, and an angle of  $2^\circ 51' 54''$  be the tangential angle for the intersection of a second chord of one chain's length round the arc, when the curve is to be set out to the right-hand side of the tangent line; then the tangential angles to be employed for setting out two points at the same distances for a curve to the left-hand side of the tangent line will be  $358^\circ 34' 3''$  and  $357^\circ 8' 6''$  respectively.

Fig. 2 illustrates a method of setting out curves with the use of two theodolites, each set up respectively over points at the beginning and the end of a curve, when the angle of intersection between the tangent lines which pass through those points is known.

In road work curves may be set out by offsets from lines drawn upon a plan, and afterwards be checked by means of offsets from the tangent lines. In railway work it is always well to have a length of straight line between two curves. When in road-work it is desirable to accurately set out one curve running into another, the formula given in fig. 3 may be employed. The proof is given in figs. 4 and 5.

$$CB = R \sin A - \sqrt{R^2 \sin^2 A - 4(R' \sin \frac{A}{2})}$$

If  $R = 7$  and  $r = 5$  when  $A = 20^\circ$

$$\sin A = \sin 20^\circ = .342$$

$$R \sin A = 7 \times .342 = 2.394$$

$$\sin^2 A = .116964$$

$$R' \sin^2 A = 5 \times .116964 = .58482$$

$$\text{And } \sin \frac{A}{2} = \sin 10^\circ = .173$$

$$\sin^2 \frac{A}{2} = .029929$$

$$4 R' \sin^2 \frac{A}{2} = 4 \times .029929 = .119716$$

The square root of the difference between  $.58482$  and  $.119716$  equals  $1.241$ .

And  $(2.394 - 1.241) = 1.153 = CB$ , the distance required.

In Marine Surveying, the use of two theodolites upon the shore can be employed for recording the position of a sounding by the intersection of lines making known angles with a given base-line. When the box sextant is used

by the surveyor out in a boat, the position is fixed by taking simultaneously the bearings of three known objects on shore, such as D, E, F, or in the case of a river section to be plotted on the line E G, the bearings of two objects, D and F, situated respectively to the right and left of that line. The station pointer (see *Builder*, Sept. 3, p. 349) is used for recording upon the plan the position of the soundings has taken.

# STAINED GLASS.

**Horstead.**—A two-light painted Jubilee window, with subjects from St. Matthew and St. Paul introduced, has recently been erected in this parish church. The artists are Messrs. Charles Evans & Co., of London.

**Leeds.**—A stained-glass window has been presented to the church of the Holy Trinity, Leeds. The subject is the Raising of Jairus's daughter, and it is in memory of some of the teachers in the Sunday School. It is from the studio of Messrs. Powell Brothers, of Leeds.

**Merton Abbey.**—Messrs. Chas. Evans & Co. have lately erected two painted windows, with subjects taken from "The Poor are the Lord's" and "He called them unto Him," at Christ Church, Mitcham, the gifts of Mr. M. J. Harris and Mr. H. Stevens.

**Wednesbury.**—The painted window, with subjects taken from the texts, "I was a stranger," and "Sick and ye visited me," subscribed for by the parishioners to perpetuate the memory of the Vicar's late wife, Mrs. Fanny Maher Tuthill, has just been erected by the artists, Messrs. Chas. Evans & Co., who also supplied the ornamental brass, with inscription, at foot.

# RECENT PATENTS.

## ABSTRACTS OF SPECIFICATIONS.

13,616, Brickmaking Machinery. R. Scholefield.

The improvements in brickmaking machinery of the rotary type are in the direction of so regulating and adapting the apparatus that as the mould in one cylinder is being filled with clay, the contents of another mould in the same cylinder is being discharged and forced into the mould of a second cylinder; the same operation also ejecting a completely pressed form from a second or opposite mould in the same second cylinder. The cylinders, moulds, and rollers are all mounted on the same framework.

13,898, Step Ladders. J. T. Bower.

Two flaps of the ladder are connected by means of a rule or knuckle-jointed hinge, so that when the ladder is open the flaps or sides of the steps are kept apart. A self-acting catch is also affixed to the sides to keep the parts of the ladder together when closed. An additional leg is also fitted, and this, combined with the two pairs of the steps, makes a kind of tripod, which gives great firmness to the ladder.

14,322, Water-closets. J. Smeaton.

Suitable improvements in the flushing apparatus and delivery ring are the subjects of this specification, which also relates to the masking of the ordinary appearance of a "rapid flush" or "flush-out" by a kind of vase. The distinctive name of "Amphora" is given to this description of basin in this last account.

14,448, Lock-bolt for Windows, Doors, &c. I. Johnson.

A small push bolt having an extra slit made in the catch socket so that when the bolt is pushed forward and turned a pin in the bolt engages therewith forms the lock-bolt claimed in this patent.

14,538, Circular Glass Ventilators. W. Argent.

Instead of the circular ventilator moved with a top, a spindle is arranged to a flange with an oval cone, underneath is another movable flange with a similar oval boss upon which the circular glass cover is placed, a double stop is fixed which only allows the cover to revolve a quarter of a turn. When necessary a spiral spring is fitted so that the ventilator may be moved backward and forward with a single cord.

15,642, Safes and Strong Rooms. G. Allen.

The improvement consists in hardening the rivets which hold together the different parts of safes, &c., so as to be as impregnable to a drilling instrument as the plate itself.

8,755, Flushing and Trapping Overflows to Water-Closets. H. Emmanuel.

Four or more indentations or channels are sunk into the basin from the top flushing rim directly connecting with the overflow holes which are recessed on the top side; the bottom outer edge being level with the outline of the basin. The inside

of the holes are cut away at an angle, so that the water conveyed by the indentations or channels is conveyed directly into the overflow, thus thoroughly flushing and trapping it.

## NEW APPLICATIONS FOR PATENTS.

Sept. 30.—13,230, H. Marle, Drawing-boards.—13,240, W. Scott, Heating and Ventilating Public and Private Buildings.—13,258, W. Dutton, Revolving Door-posts, &c., for Public Buildings and Theatres.

Oct. 1.—13,322, E. Solvay, Lime-kilns.—13,329, D. Ratcliff, Safes and Strong-rooms.

Oct. 3.—13,342, R. Platt, Window-sash Fastener.—13,376, B. Harrass, Artificial Compounds in Imitation of Wood.—13,389, D. Lang, Pipe Joint.

Oct. 4.—13,396, A. Wells, Revolving Wood Shutters.—13,421, R. Burditt and G. Green, Combined Lifting Latch and Bolt.—13,434, R. Bradshaw, Fireproof Curtains or Partitions for Theatres.—13,444, W. Webb, Sewer Ventilation.

Oct. 5.—13,467, W. Smith, Manufacture of Cement.—13,472, J. Coppard, Closing or Opening Doors, Windows, &c.—13,497, H. Smith, Swing Doors.—13,508, W. Ballantine and E. Blackie, Flushing Cisterns for Water-closets.

Oct. 6.—13,524, W. Hearn, Fastening Windows.—13,528, J. Thrush, Traps for Drains.—13,537, T. Fawcett, Brick Making and Drying Machinery.

## PROVISIONAL SPECIFICATIONS ACCEPTED.

11,966, J. Petter, Stoves and Fireplaces.—12,271, J. Davies, Brick Kilns.—12,624, 12,625, and 12,626, G. Snelus and Others, Manufacture of Cements.—11,591, R. Harrison, Flush Bolts for Doors.—11,752, J. Goodman, Bricks for the better Fixing of Woodwork and other Materials.—11,993, G. Woodcroft, Sash Fasteners.—12,133, T. Robinson, Cross-cut Saw-benches.—12,264, C. Mackey and E. Bailey, Securing Knobs to Doors.—12,771, W. Lake, Facilitating Escape from Burning Buildings.

## COMPLETE SPECIFICATIONS ACCEPTED.

### Open to Opposition for Two Months.

15,759, R. de Ridder and W. Bennett, Heating Public Buildings and Houses.—3,256, G. Jeffery Covering for Roofs.—7,846, J. Anderson, Dove-tailing Machines for Open Doretails.—11,787, E. Bailey, Cupboard Turn.—14,557, C. Friedrich, Shop Counters.—15,542, J. Fisher, Latch for Doors, Windows, Gates, &c.—12,023, C. Hayes, Bars for Glazed Sashes.—12,031, H. Allison, Paints and Paint Compounds.

## RECENT SALES OF PROPERTY.

### ESTATE EXCHANGE REPORT.

#### OCTOBER 3.

By E. Woods.

Wandsworth—88 and 90, Putney Bridge-road, freehold ..... £700  
Camberwell New-road No. 234, term 24 years, ground-rent 6s. .... 400  
Lambeth—37 to 41, and 44, 45, and 46, King-street, 22 years, ground-rent 32s. .... 645  
Stratford—2 and 10, Cruikshank-road, and 2, 4, and 6, Buckingham-road, 86 years, ground-rent 21s. 10s. .... 750  
Hendon—1 and 2, Milton-road, 95 years, ground-rent 10s. .... 280

#### OCTOBER 4.

By SHERRIN & COLTMAN.

Kentish Town—8 and 10, Kelly-street, 50 years, ground-rent 8s. .... 610  
New Cross—110, Malpas-road, 78 years, ground-rent 4s. .... 245

By H. RUTLEY.

Barnsbury—65, Bride-street, 72 years, ground-rent 6s. .... 300  
Isleworth—3, Tolson-road, freehold ..... 190

By BEAN, BURNETT, & ELDRIDGE.

Wimbledon—The freehold residence, Ty Clyd ..... 2,300

#### OCTOBER 5.

By M. H. MONTAGUE.

Stepney—1, John-street, copyhold ..... 107  
By FAIRBROTHERS, ELLIS, & CO.  
Little Bagnor, Sussex, the residences, Broadland and The Holts, about 6 acres, freehold ..... 5,100

By COOPER & GOULDING.

Islington—Improved ground-rents of 70s., term 32 years, ..... 880  
A rental of 47s. a year, term 17 years, ..... 300

By TEMPLE & MOORE.

Homerton—119, 2, 3, 204, and 206, Wick-road, freehold ..... 1,125  
Forest Lane—1 and 2, Sarah's-villas, freehold ..... 395

By DALE & SON.

Bromley—85 to 101, odd, Swaton-road, 75 years, ground-rent 14s. .... 800  
Bethnal Green—3-7, Cambridge-road, 59 years, ground-rent 10s. .... 450

#### OCTOBER 6.

By NEWBORN & HARDING.

Islington—82, Prebend-street, 40 years, ground-rent 4s. 4s. .... 316  
13, Union-square, 40 years, ground-rent 8s. 6s. .... 460  
Peninsular—28, Baker-street, 21 years, ground-rent 16s. .... 180  
New North-road—11, Arlington-square, 40 years, ground-rent 6s. 6s. .... 535

By C. WILSON.

Portland Estate—5 and 63, Eoley-street, 17 years, ground-rent 46s. .... 1,050

## MEETINGS.

### TUESDAY, OCTOBER 19.

Parkes Museum (Lectures for Sanitary Inspectors).—Mr. C. K. Cassal, F.C.S., F.I.C., on "Food (including Milk), Sale of Food and Drugs Act." 8 p.m.  
Glasgow Architectural Association.—Visit to the Athenaeum Buildings. 5.15 p.m.  
Manchester Architectural Association.—Concerts. 7.30 p.m.

### WEDNESDAY, OCTOBER 19.

Liverpool Engineering Society.—Mr. O. Harrison Townsend on "Ornament and Design; their Relation and Subordination in Engineering Works."  
Builder's Foremen and Clerks of Works' Institution.—Quarterly meeting. 8.30 p.m.

### FRIDAY, OCTOBER 21.

Parkes Museum (Lectures for Sanitary Inspectors).—Paper on "Infectious Diseases and Methods of Disinfection." 8 p.m.

## Miscellaneous.

**Money Value of Human Life.**—Sir Spencer Wells writing to the Times to correct a statement about a speech at the Hygienic Congress, says his estimate of the gain to the State of the increased numbers of human lives during the last fifty years, which may fairly be calculated as the fruit of medical and sanitary work, is "at least 300,000,000. Any one who will refer to the invaluable work of the late Dr. W. Farr on 'Vital Statistics' may see the grounds upon which he has calculated that 'the minimum value of the population of the United Kingdom, men, women, and children, is 159l. a head; that is, the value inherent in them as a productive, money-earning race (page 61). Our population has increased in less than fifty years fully eight millions. Each individual of these eight millions was worth to the State 159l. It surely must be a very moderate estimate to regard two of these eight millions of increasing numbers of more healthy subjects as a clear gain due to sanitation, and the simple multiplication of two millions by 159l. gives the result 318,000,000l."

**The Imperial Institute.**—The Building Committee having made a selection from a list of forty-six applicants to tender for the first portion of the foundations contract, received offers from the following firms:—J. & J. Greenwood, Brass & Sons, Thompson (Peterborough), Lovatt (Wolverhampton), Dover Bros., Lucas Bros., Macey & Son, Barnsley (Birmingham), Kirk & Randall, Munday & Sons, Higgs & Hill, Trollope & Sons, and Mowlem & Co. The tender of Messrs. Mowlem & Co. being the lowest, and their schedule of prices for extras comparing favourably with those of the other firms, their tender has been accepted by the committee, and the works will commence very shortly. Mr. G. Wallis, who was formerly Chief Clerk of the Works in the construction of the Royal Courts of Justice, has been appointed clerk of the works for this contract.

**City Commission of Sewers.**—At a meeting on the 11th, Mr. Graham King presiding, the Finance and Improvement Committee brought up a report on the memorial of inhabitants and ratepayers for widening the southern end of Milk-street in Cheapside. The committee were of opinion that the proposed improvement was a very desirable one, and they recommended that notices should be served to take the necessary property to carry it out. Mr. Green, in moving the adoption of the report, said there was no street between Wood-street and King-street sufficiently wide to allow of two vehicles passing abreast. The improvement would cost about 30,000l. Mr. Treloar thought the widening of Ludgate-hill, which had been twenty years in progress, ought to be completed before any fresh scheme was undertaken, while Mr. Deputy Bedford and other members advocated the widening of Fenchurch-street in preference. Ultimately the committee's report was adopted.

**Birmingham Art Work for Australia.**—There is just completed at the studio of the late John Radcliffe, Aston-road, a pulpit and font for a new church at East Maitland, N.S.W. The pulpit is supported by Devonshire marble columns, resting upon polished alabaster bases and surmounted by carved capitals. Above the floor line other marble shafts carry a number of canopied niches. In the centre compartment, which is larger than the others, Our Lord is represented seated on a throne with lambs lying at His feet, and His Apostles kneeling and standing around Him. In the recesses on either side are figures of Peter and Paul. Two other niches are occupied by Moses and Elias. The font is of Caen stone, with marble shafts.



**The Lancashire and Cheshire Antiquarian Society** held their first meeting of the session at Chetham College on the 7th inst. Professor Boyd-Dawkins, who presided, spoke of the important addition to archaeological knowledge that had been obtained by the researches of General Pitt-Rivers, who, during the last three years, had been working out the Roman remains in the district of Wiltshire. General Pitt-Rivers had worked out in the neighbourhood of his house in Wiltshire a very remarkable series of Roman villages. Up to the present time the great Roman palaces in this country had been traced out, but they were not absolutely certain as to the condition of the country villages. General Pitt-Rivers had, however, explored in the neighbourhood of his house a whole set of villages, the date of which went back, according to the coins that were found, as far as A.D. 252. This discovery, he maintained, was of great importance, because it threw light on a period of history of which little was known.

**Obituary.**—We regret to announce the decease, on the 5th inst., of Mr. J. S. Edmeston, the eldest son of Mr. James Edmeston. Mr. J. S. Edmeston assisted his father in the carrying out of many of his works, one of the most recent being the large building known as Olympia, adjoining Addison-road Station, Kensington, which was designed by Mr. Cole, but completed under the superintendence of Mr. Jas. Edmeston. Mr. J. S. Edmeston was appointed early this year District Surveyor for Charlton, Lee, and Kidbrook.

**Competition.**—No less than sixty sets of plans have been sent in for the Gloucester Public Baths Competition, besides two others sent too late to be admitted. It is to be hoped the Gloucester Corporation, upon whose scheme all this labour has been expended, will feel it incumbent on them to make every effort towards discovering and adopting the best plans, apart from all partial considerations, so that the great number whose labour must be thrown away may at least have the satisfaction of feeling that they have been fairly treated.

**Glasgow Artists and the International Exhibition.**—As a result of the agitation by Glasgow artists for larger representation on the Fine Arts Committee of the International Exhibition, it has been agreed that five additional artists should be invited to join the committee. Mr. James Guthrie, Mr. A. K. Brown, and Mr. P. Macgregor Wilson were chosen from among the Glasgow artists; Mr. Robert Herdman, R.S.A., as representing the Royal Scottish Academy, and Mr. Colin Hunter, A.R.A., the Royal Academy.—*Scotsman.*

**Bridge of Allan Museum.**—The new Macfarlane Museum, which has been in course of erection for about two years, has just been formally opened. The founder was the late Mr. Macfarlane, who, after a very successful career in Manchester, returned to settle down in Bridge of Allan, spending his well-earned leisure in forming a collection of natural history objects. The building is of the Early French Gothic style of the thirteenth century.

**New Art Museum at Kiel.**—The Corporation of the city of Kiel has decided on erecting a new museum of art. The German Government has promised a grant of 5,000*l.* towards this object, provided that the cost of the building does not exceed 12,000*l.* Towards the balance, 7,000*l.*, the province of Holstein will contribute 5,000*l.*, the city of Kiel 1,500*l.*, and private persons 500*l.* A free site for the building will be granted by the town.

**The New Palace of Christiansborg.**—During the last few weeks the designs submitted for the new Palace of Christiansborg at Copenhagen, which was destroyed by fire some years ago, have been exhibited in the Arts Exhibition building in that city, but as yet none has been accepted by the committee of selection. The new building will accommodate the Court as well as the Houses of Parliament, but entirely separated from each other.

**Paisley.**—A new Congregational Church, erected from designs by Mr. John B. Wilson, of Glasgow, has just been opened at Paisley. The church is in Early Gothic style and has a tower and spire 100 ft. high.ittings are provided for about 500 persons, and there are also a hall seating 200, class-rooms, vestry, ladies' room, &c. The total cost is under 3,000*l.*

**A Correction.**—We are asked to state that the slates used for the Church of Holy Trinity, Belle Vue, Shrewsbury, were not Sedan Green, but "Ashton & Green's Permanent Green."

**Glasgow.**—The Liberal Club in Buchanan-street was formally opened last week by Mr. James Campbell, of Tullichewan. The main entrance opens into a spacious hall with Corinthian columns and floor laid with mosaic tiles. In front is the grand staircase, lighted with large windows with stained glass. A dining-room, 60 ft. by 34 ft., the ceiling of which is treated in moulded panels, occupies the main portion of this floor. A recess at the side of the dining-room enclosed with stained glass screen forms a service-room, having a hoist, &c., in communication with the kitchen department on the basement floor. The semicircular heads of the windows and their lower portions are filled with rich-coloured stained glass, having appropriate figure subjects and ornamental designs. To the right of the entrance hall is the porter's desk and luggage-room, a writing-room with telephone, the clubmaster's business-room in communication with rooms upstairs, and a servants' stair, which extends from the basement floor to the attic, and thus isolates the servants entirely from the main portion of the house. This stair also communicates with the entrance from the court at the north end of the building for the reception of goods, and is overlooked from the clubmaster's office. Behind the stair on this floor are placed the cloak-room and spacious lavatory accommodation. On the principal floor are the reading and writing rooms, separated from each other by a glass screen; the lesser dining-room or smoking-room,—with service-room in communication with the kitchen,—adjoining; while the billiard and card rooms, having convenient lavatory accommodation attached, are placed on the mid-landing of the stair. The work has been carried out under the superintendence of Mr. Alexander Skirving. The following are the names of contractors and others employed on the building: Messrs. A. & R. Anderson, builders; Messrs. Archibald McFarlan & Son, joiners; Mr. R. S. Bathgate, plasterer; Messrs. Fulton & Walker, plumbers; Messrs. Buchan & McIntyre, gas-fitters; Messrs. James Combe & Son, heating; Mr. John Orr & Co., painting; Messrs. McCulloch & Gow, stained glass; Mr. Mair, inspector; Messrs. Shields & Walker, measurers. The furniture is being supplied by Messrs. Alex. Cree & Co. for the reading and writing rooms; Messrs. Cumming & Smith, the dining-rooms; Messrs. F. & G. Smith, the members' bed-rooms; Messrs. Moir & Kemp, the ironmongery; and Messrs. Norval & Wilson, the billiard-tables.

**The Safety of Public Buildings.**—At the Leamington Petty Sessions, the other day, the Mayor announced that, in consequence of the Exeter disaster, they had had all the local licensed buildings inspected by the Borough Surveyor, with the object of ensuring the safety of the public; and the magistrates had also visited the buildings themselves. At the Theatre Royal the only change necessary to make it absolutely safe was that there should be an additional door leading into the street from the orchestra stalls and the reserve pit. At the music-hall a new stone staircase, 6 ft. wide, was to be constructed from the ante-room into the street, and an additional hydrant placed on the stage. They suggested that Local Authorities should have additional powers conferred upon them to inspect other important buildings,—such as churches, chapels, places of amusement, and schools, and to require, where necessary, any alterations to be made to ensure the public safety in case of fire or panic. The Reading magistrates decided the other day to adjourn the application for a licence for the theatre for a month to give time to provide a better exit from the gallery, and to make other structural alterations. A similar course was taken with regard to the Town-hall and another building in order to provide better exits. At the request of the Justices of the borough of Middlesbrough, Mr. G. G. Hoskins, architect, of Darlington, has during the last fortnight inspected the Theatre Royal, Prince of Wales Theatre, Oxford Music-hall, Oddfellows' Hall, Cleveland Hall, Temperance Hall, and the Music-hall at the Albert Park Hotel, and made reports on the means of egress from the several places. The licence to the Oddfellows' Hall was renewed, and, after hearing the report, the Justices granted a provisional licence for one month to the Cleveland and Temperance Halls, during which period the suggestions of Mr. Hoskins are to be carried out. The question of renewing the licences of the two theatres, music-hall, &c., has not yet been considered.

**Tree Planting and Drainage.**—It is not merely an æsthetic fancy, but equally a prudent regard for the health of the community, which has led civic authorities to plant with bordering trees many of the greater thoroughfares in towns and cities. By this arrangement the advantages of a purer air and of shade in warm weather are gained for the townsman, besides the implied increase of space and the amenity conferred by thus practically transporting a strip of country into town. It is one of the happiest features in the development of cities now so rapid, that in their outer and growing zone the hard lines of road, wall, and railing are interrupted at frequent intervals by spaces of green sward and by the luxuriant foliage of climbing shrub and spreading tree. In so far we have learnt the lesson of experience, and, in thus preserving round our homes a healthy atmosphere and some degree of rustic beauty, are wiser for ourselves than the town dwellers of a former generation. Still, we are not always duly careful even in our wisdom, as the sequel shows. This very custom of tree-planting in streets is open to a danger fortunately not common, but still grave enough to counteract, where it exists, the best effects of rural surroundings. It has happened repeatedly, as we are reminded by the letter of a recent writer on this subject, that the roots of trees in their growth have sought out the crevices of drain-pipes adjacent, and penetrating these, have grown with such vigour on the nourishment which they found there as completely to choke the pipes and prevent the exit of sewage. We have here, of course, no argument against the continuance of the boulevard system, but certainly a caution, enjoining first the more perfect adaptation of drain segments, and secondly, a kind of care not always observed in the relative arrangement of way-side shrubs and trees. *Lancet.*

**Ravenscourt Park.**—We are informed that the Metropolitan Board of Works and the Hammersmith Vestry have at last secured to the public for ever the thirty odd acres of meadow and foliage which form the beautiful demesne of Ravenscourt Park. For some considerable time it was very doubtful whether it would be given up to building purposes or devoted to public use, as, after accepting the offer of the Local Authorities, the owners placed the estate in Chancery, when a higher bid was made for it by a Nottingham gentleman, which the Court of Chancery was bound to accept; meanwhile, the Board had obtained Parliamentary powers to borrow the required purchase money. The purchaser then offered to sell the property to the Board at a profit, reserving to himself the mansion and gardens around it. This being declined, other terms were arranged, and the park and house were obtained at a cost of 58,000*l.* It is expected that the park will be thrown open early in the ensuing spring. A library and museum are proposed to be located in the house, which is a quaint old place, having many panelled rooms and a handsome old oak staircase. The acquisition of the park will manifestly be of great benefit to the surrounding neighbourhood, which will now probably come more under the attentive notice of the enterprising builder.

**A Technical School for Preston.**—The Harris Trustees, Preston, have granted out of the funds at their disposal 30,000*l.* towards the furnishing and endowing of a technical school for Preston. Of this, 10,000*l.* only can be spent upon the building and furnishing. After consulting with members of the Royal Commission and others, the Council of the Harris Institute, the present technical school, have decided to apply to the Preston Corporation for a grant of 10,000*l.* towards the erection of the new school, it being felt that 20,000*l.* will be required to build and furnish an efficient school, which will contribute largely to the improvement of the operatives and artisans and to the commercial development of the district. The Preston Corporation have already consented to provide a central site.

**New Law Court for the City.**—The works have been commenced in connexion with the new City of London Court, and the foundation-stone is very shortly to be laid by Mr. Bridgman, chairman of the Law and City Courts Committee of the Corporation. The site is in Guildhall-buildings, Basinghall-street, near the old Bankruptcy Court. The building will be erected from the design of Mr. Andrew Murray, and the contract has been taken by Mr. Morter, of Stratford, for 13,637*l.*



**Metropolitan Board of Works Improvement.**—On Tuesday afternoon Mr. George wards, deputy-chairman of the Metropolitan Board of Works (who was accompanied by Mr. Rider Cook, J.P., and Mr. J. Lenanton, representatives of the Poplar district at Springdons), opened the new street between (ton-street and Prestons-road, Poplar, connected at a cost of about 15,000*l.*, a moiety of which was paid by the Metropolitan Board, no recognised the improvement as a metropolitan one. The new street will enable the heavy traffic from the east side of the South-East India Dock and from the large factories at Mill-Town to pass into the East India-road, without making, as hitherto, an awkward and dangerous detour through a very narrow part of Mill-street, Poplar.

PRICES CURRENT OF MATERIALS.

TIMBER.	£.	s.	d.	£.	s.	d.
Heart, B.G. ....	ton	6	5	0	7	10
Heart, U.S. ....	load	8	0	0	12	10
Heart, U.S. ....	foot cube	0	2	3	0	3
Heart, Canada ....	load	3	0	0	4	10
Heart, Canada ....	foot cube	2	0	0	3	10
Heart, Canada ....	load	3	10	0	4	10
Heart, Canada ....	foot cube	2	0	0	4	10
Heart, Canada ....	load	1	10	0	4	0
Heart, Canada ....	foot cube	2	0	0	4	10
Heart, Canada ....	load	3	0	0	6	0
Heart, Canada ....	foot cube	2	0	0	3	10
Heart, Canada ....	load	2	0	0	4	0
Heart, Canada ....	foot cube	7	0	0	8	0
Heart, Canada ....	load	4	0	0	5	10
Heart, Canada ....	foot cube	0	0	0	0	0
Heart, Canada ....	load	2	10	0	3	0
Heart, Canada ....	foot cube	5	10	0	6	0
Heart, Canada ....	load	5	10	0	7	0
Heart, Canada ....	foot cube	8	10	0	13	0
Heart, Canada ....	load	8	10	0	13	0
Heart, Canada ....	foot cube	6	10	0	8	10
Heart, Canada ....	load	0	0	0	14	0
Heart, Canada ....	foot cube	18	0	24	0	0
Heart, Canada ....	load	10	0	15	0	0
Heart, Canada ....	foot cube	6	0	9	0	0
Heart, Canada ....	load	8	0	9	0	0
Heart, Canada ....	foot cube	6	0	7	0	0
Heart, Canada ....	load	5	0	10	0	0
Heart, Canada ....	foot cube	4	0	10	0	0

CONTRACTS AND PUBLIC APPOINTMENTS.

Extraneous of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Construction of Railway, &c.	Halifax High Lvl. & R.C.	J. Fraser & Sons	October 15th	ii.
Room to Workhouse	Edmonton Union	T. E. Knightley	October 15th	ii.
Vans	Mile End Vestry	J. M. Knight	October 15th	ii.
Construction of Lavatory Buildings	Lambeth Guardians	Official	do.	ix.
Recreation Institute, &c., York	North Eastern Rail Co.	W. Bell	do.	ii.
Groundwork of Sewers	Com. of Sewers	Official	October 21st	ix.
Construction of Shed for Steam-Roller	Hendon Local Board	S. S. Grimley	October 24th	ix.
Iron Road-Roller and Water-Cart	do.	do.	do.	ix.
Upstairs Mortuary	do.	do.	do.	ix.
Painting and Painting Pier, &c.	Met. Asylums Board	Official	do.	ix.
Police-Station at Shodland	Kent Justices	do.	do.	ix.
Building up P.O. at Redditch	Com. of H.M. Works	do.	October 26th	ii.
Iron Work	Com. of Sewers	do.	do.	ix.
Station, Isle of Wight	Admiralty	do.	do.	ii.
Boiler	Uxbridge Local Board	G. Eves	do.	ix.
Bought-Iron Roof, &c.	Canterbury Cor.	Official	October 26th	ix.
Construction of Works	Hackney Board of Works	J. Lovings	do.	ix.
King-up Roads, &c.	Bromley U. St. R. S. A.	Official	October 27th	ix.
White and Ballast	Walthamstow Local Bd	H. S. Ridings	October 28th	ix.
Water-Supply Office, Highgate	Com. of H.M. Works	Official	do.	ix.
Rooms, W.C.'s, & Extension of Kitchen	Bromley Union	G. W.	do.	ix.
Granite and Pitt Gravel, &c.	Fitchley Local Board	G. W. Brumell	October 31st	ix.
King-up Roads, &c.	Bromley Local Board	H. S. Creggan	Nov. 1st	ix.
Chen, Scullery, &c., at Workhouse	Barnet Union	Official	Nov. 3rd	ix.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Work-Roller and Engine Driver	Hendon Local Board	3 <i>l.</i> 3 <i>s.</i> weekly	October 24th	xiv.
Man of Paviors and Sowermen	St. Olave Bd. of Wks.	Not stated	do.	xiv.
		2 <i>s.</i> 6 <i>d.</i> weekly	do.	xiv.

TENDERS.

**DISCOMB (Surrey).**—For proposed extension to Church of St. Mary Magdalene. Mr. Dan. R. Dale, H.B.A., architect:—  
Hoare & Son ..... £1,500 0 0  
[No competition.]

**MILWICH.**—For the erection of a gamekeeper's cottage on the Marquis of Anglesey's Estate at Amlich. W. B. Jones, architect, Menai Bridge:—  
Owen Thomas, Amlich (accepted) ..... £170 0 0

**ROMLEY (Kent).**—For the erection of two shops, miter, Kent, for Mr. Harris, Mr. W. A. Williams, miter, 51, High-street, Bromley. Quantities by Mr. J. & J. Greenwood, 17, Duke-street, London, E.C. T. Crossley ..... £1,950 0 0  
W. A. Grubb ..... 1,875 0 0  
J. C. Arnaud & Son ..... 1,830 0 0  
J. B. Payne (accepted) ..... 1,725 0 0  
C. Satchell ..... 1,673 0 0

**CHICHESTER.**—For alterations and repair to Rancote House, near Chichester. Mr. T. S. Archer, F.R.I.B.A., architect:—  
Holt ..... £1,260 0 0  
Dearle ..... 1,095 0 0  
Rodgers ..... 1,025 15 0  
Evans, Southsea ..... 935 0 0  
Budden ..... 900 0 0

**CLERKENWELL.**—For erecting premises in Clerkenwell-cloze, E.C., for Mr. William Pys. Messrs. Iron & Higgins, architects, 9, Buckingham-street, Adelphi. Quantities by Mr. A. J. Beasley:—  
G. F. Williams ..... £1,479 0 0  
W. Stubbs ..... 1,433 0 0  
Brass & Son ..... 1,386 0 0  
J. & J. Greenwood ..... 1,386 0 0  
J. Hunt ..... 1,386 0 0  
Twyford & Carter ..... 1,349 15 10  
Grover & Son ..... 1,334 0 0  
S. R. Lemble (accepted) ..... 1,287 0 0  
W. Buckridge (withdrawn) ..... 1,120 0 0

TIMBER (continued).	£.	s.	d.	£.	s.	d.
Flooring Boards, sq., 1 in., prepared, first	0	8	0	0	11	0
Second	0	8	0	0	7	6
Other quantities	0	4	0	0	6	0
Cedar, Cuba	0	4	0	0	3	4
Roadways, &c.	0	2	0	0	0	3
Australian	0	2	0	0	3	0
Mahogany, Cuba	0	0	4	0	0	6
St. Domingo, cargo average	0	0	4	0	0	5
Mexican	0	0	3	0	0	0
Tobacco	0	0	3	0	0	5
Honduras	0	0	3	0	0	5
Maple, Bird's-eye	8	0	0	0	0	7
Rose, Rio	8	0	0	11	0	0
Bahia	7	0	0	9	0	0
Box, Turkey	6	0	0	12	0	0
Satin, St. Domingo	0	0	5	0	0	9
Porto Rico	0	0	5	0	0	10
Walnut, Italian	0	0	3	0	0	5

METALS.

Iron—Bar, Welsh, in London	4	15	0	5	0	0
“ “ in Wales	4	2	6	4	10	0
“ “ Staffordshire, London	5	10	0	6	0	0
Copper	43	10	0	44	0	0
British, cake and ingot	43	10	0	45	0	0
Best selected	43	10	0	46	0	0
Sheets, strong	60	0	0	0	0	0
Chilled, best	38	15	0	40	0	0
YELLOW METAL	0	0	4	0	0	4
LEAD	12	0	0	0	0	0
Pig, Spanish	12	0	0	0	0	0
English, common brands	12	3	0	0	0	0
Sheet, English	13	5	0	0	0	0
SPRITZER	15	15	0	15	17	8
Silesian, special	15	15	0	15	17	8
Ordinary brands	16	12	6	0	0	0
TIN	105	15	0	0	0	0
Straits	108	10	0	0	0	0
Australian	108	10	0	0	0	0
English ingots	108	10	0	0	0	0

OILS.

Linseed	10	12	6	19	15	0
Cocoonut, Ceylon	30	0	0	32	0	0
Ceylon	23	15	0	24	0	0
Palm, Lagos	22	0	0	0	0	0
Rapeseed, English pale	25	5	0	26	10	0
“ “ brown	24	0	0	0	0	0
Cottonseed, refined	20	15	0	0	0	0
Tallow and Olive	25	0	0	46	0	0
Lubricating, U.S.S.	5	0	0	6	0	0
“ “ refined	5	0	0	12	0	0

TURKISH.

American, in casks	1	4	9	0	0	0
Stockholm	0	14	0	0	14	6
Archangel	0	9	8	0	9	9

**LONDON.**—For the extension of the offices in Old Broad-street, E.C., for the Managers of the Stock Exchange. Mr. J. J. Cole, architect, 24, Finsbury-circus, E.C. Quantities by Mr. James Barnett, 90, Cannon-street, E.C.:—  
Kilby & Gayford ..... £13,420 0 0  
Ashby Bros. .... 12,967 0 0  
J. T. Chappell ..... 12,622 0 0  
Colls & Sons ..... 12,440 0 0  
A. Bush ..... 12,139 0 0  
Lawrence & Sons ..... 11,985 0 0  
W. Brass & Son (accepted) ..... 11,777 0 0

**LONDON.**—For alterations and additions to Nos. 87 and 89, Cadogan-place, S.W., for Mr. Barker. Mr. W. M. L. Seaman, architect:—  
Lacelles ..... £2,500 0 0  
Martin ..... 2,288 19 7  
Drew & Cadman ..... 2,254 0 0  
Green & Lane ..... 2,222 0 0  
Garlick ..... 2,198 0 0  
Rhodes ..... 2,175 0 0  
Schierke ..... 2,097 0 0  
Stimpson ..... 2,090 0 0  
Robson ..... 2,022 0 0  
Oxenden ..... 1,997 0 0  
Rymer ..... 1,907 0 0  
White ..... 1,891 17 8  
Smith ..... 1,844 0 0  
Ingram ..... 1,788 0 0  
Ashford ..... 1,770 0 0  
Brady ..... 1,692 0 0  
Bowl & Lightfoot ..... 1,600 0 0  
Hewitt ..... 1,381 0 0  
Groomer ..... 790 0 0

**LONDON.**—For works at St. Mary's Church, Spital-square, for the Rev. Morris Thomas. Mr. Dan. R. Dale, F.R.I.B.A., architect:—  
Fritchard & Son (accepted) ..... £240 0 0  
[No competition.]

**LONDON.**—For alterations at the Golden East tavern, Cannon-street, E.C. Mr. R. A. Lewcock, 88, Bishopsgate-street Within, E.C., architect:—  
J. Walker ..... £1,300 0 0  
Salt ..... 1,231 0 0  
J. Anley ..... 963 0 0  
Jackson & Todd ..... 889 0 0  
J. Ivory ..... 945 0 0  
Spenn & Co. .... 940 0 0  
Steel Bros. .... 875 0 0  
Stephenson ..... 858 0 0

**LONDON.**—For an improvement at the Carpenters' Arms, James-street, Oxford-street. Mr. R. A. Lewcock, architect, 88, Bishopsgate-street Within, E.C.:—  
J. Walker ..... £1,300 0 0  
Barrett & Power ..... 123 0 0  
Spenn & Co. .... 110 0 0  
Goodall ..... 102 0 0  
Steel Bros. .... 83 0 0  
Stephenson ..... 55 0 0

**LONDON.**—For the rebuilding of shop and premises, No. 18, Great Turnstile, for Mr. H. B. Road, under the superintendence of Mr. William Eve, 10, Union-court, Old Broad-street, E.C.:—  
Baxter ..... £809 0 0  
Harris & Wardrop ..... 795 0 0  
Stables ..... 776 0 0  
Johnson ..... 741 0 0  
Pattman & Folbrougham ..... 738 0 0  
Dabbs ..... 721 0 0  
Godfrey & Son ..... 720 0 0  
Holland ..... 719 0 0  
J. & H. P. Higgs, Loughboro' (accepted) ..... 695 0 0  
\* Accepted.

**LONDON.**—For the extension of the offices in Old Broad-street, E.C., for the Managers of the Stock Exchange. Mr. J. J. Cole, architect, 24, Finsbury-circus, E.C. Quantities by Mr. James Barnett, 90, Cannon-street, E.C.:—  
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Ashby Bros. .... 12,967 0 0  
J. T. Chappell ..... 12,622 0 0  
Colls & Sons ..... 12,440 0 0  
A. Bush ..... 12,139 0 0  
Lawrence & Sons ..... 11,985 0 0  
W. Brass & Son (accepted) ..... 11,777 0 0





# The Builder.

VOL. LIII. No. 233.

SATURDAY, OCTOBER 22, 1897.

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### The Roman Villa at Tockington.



have already called attention to the Roman villa at Tockington. We are now able to render some detailed particulars of what is, in fact, a remarkable discovery. Not only does the building prove to be of large extent, but already many pavements of really great beauty and purity of design have been met with.

The site is Tockington Park Farm, a home-stead which stands back at some considerable distance from the ridge-way, the main Roman road from Gloucester going south-west into Somerset. It is also close to the line of the market-street, which led westwardly to Aust, an old passage, across the Severn, thus connecting the roadway from Caerleon and Caerwent direct with the Fosse-way leading to Cirencester. The villa was, therefore, in close proximity with many important centres of population in Roman times, by direct communication. The locality is also rich in other relics of the conquerors of the world, there being a great number of fortified posts on the adjacent hills, as well as sites of other villas. In fact, there is abundant evidence that the county of Gloucester must have been a very favourite portion of the country to the Romans, who were not slow to render it of easy access from end to end of Britain.

The best way of reaching Tockington is by train from Bristol to Patchway Station, and thence now connecting South Wales and Monmouthshire direct with the West of England by means of the new Severn Tunnel. A pleasant walk or drive along the course of the old ridge-way, still used as the main road from Bristol to Gloucester, leads past the site of the villa. The village of Almondsbury has to be passed through, and the Swan Inn will have to be noted by the traveller, for no refreshment can be had on the site. The village stands on elevated ground, and Almondsbury Green, a charming spot, of rough undulating ground, covered with a rich profusion of ferns and wild flowers, commands a magnificent panorama over the surrounding country, across the estuary of the Severn, to the high hills of Monmouthshire, and over the site of Caerwent, hidden in a valley. On the green are distinct traces of a small earthwork, showing that here, evidently, was a fortified post to guard the roadway which rises up the side of the hill. A passing glance may be given at the parish church, the quaint leaded spire of which is

lost in the foliage growing on the side of the hill, although it stands on high ground overlooking the valley of the Severn. Good scenery awaits the traveller on every side until the path to the right leading to the villa is reached, just before coming to the eighth milestone out from Bristol. "To Roman Villa," in the newest of letters, on a post, gives clear direction, and the site is accordingly reached without difficulty.

Tockington Farmhouse is a plain, comfortable homestead, having its small piece of garden before it, a stock-yard to the left, a series of other farm-buildings in the rear, and a rick-yard nearly in front. The site, quite up to the garden, including the road to the buildings in the rear, and generally the whole of the area, is now the scene of all the confusion that excavation works bring in their train. Small trenches have been cut across and across the ground, revealing long foundations of walls, which only remain about 1 ft. 6 in. or 2 ft. high, traces of rooms, elaborate pavements, and all the outline of the villa, which is, in fact, on the site of the farmhouse itself. A cursory examination of the modern buildings shows that they are all arranged in parallel lines one to another.

They face south. This arrangement at right angles was hardly usual in the planning of such buildings, which generally grew up much as they were wanted, without regard to their relation one to another.

More careful examination shows that the somewhat modern buildings contain traces of ancient woodwork and masonry, and also the fact that some of the walls are actually on the foundations of those of the Roman villa. This explains their arrangement at right angles, for since the axis of the villa is all but exactly north and south, it follows that the ancient and the modern lines coincide. The former have regulated the latter, and this can be traced by abundant evidence, especially in relation to the continuance of occupation of the site, perhaps from very ancient times. It is certain, at any rate, that the ground has been occupied from Mediæval times.

The plan of the villa, as far as it has been at present opened, shows some points of resemblance to similar buildings, with many others of difference. It appears to have consisted of two long lines of rooms going north and south.

The size is not small, the length being about 208 ft. from north to south, by 115 ft. from west to east; but these figures only represent the general size of the block already excavated. The buildings are arranged in a series of small rooms, which doubtless opened from a corridor 7 ft. wide, facing west. There are traces of a second line of buildings parallel with this main

wing, to the east, while a series of rooms, only partially opened, appears to have connected the two blocks on the north.

There is certainly a southern block of buildings, for many rooms have actually been opened, together with a corridor, about 9 ft. wide, which has been followed for 50 ft. without its termination being reached. At the south-west is an extension of the line, out of axis, for the rooms are brought more to the west. Such, in brief outline, is the plan of the villa. The rooms already opened are twenty-three in number, and of these no less than six have tessellated pavements, mostly of considerable beauty. Commencing at the extreme north end of the excavations, we find a room of moderate dimensions, the walls of which are about 3 ft. high. Here are traces of a masonry seat all round the room, the walls of which are covered with white plaster.

The floor is paved, as is also that of the adjacent room. Careful examination will show that these two apartments were originally one, the division wall being clearly an after-insertion, since it is built up against the plastered wall surface. Still going south, the next room is one of much interest, for it contains one of the most beautiful, although not the largest, of the tessellated pavements. The room is 13 ft. 10 in. by 10 ft. 1 in. The pattern consists of a circular centre containing an arrangement of lobed leaves set diagonally. This is inclosed in a guilloche border. Beyond are some lozenge panels, set diagonally within a square, the four central triangular panels between the diagonal figures being filled in with small triangles alternately black and white. Each diagonal figure is subdivided, and nearer to the main circle than the outer lozenge panels are patterns not unlike inverted vases, the handles of which terminate in scrolls. The composition is completed to the size of the room by varying borders right and left, and finally by a large border of Greek fret forming fylfot crosses. The groundwork is white, and the colours are red and blue-black. One corner of the pavement has been repaired with coarser tesserae, evidently in Roman times, to make good some wear or accident,—the work being laid without regard to the completion of the pattern. This fine pavement is, unfortunately, in poor condition, owing to the falling in of some flues beneath it, which brought heat from a hypocaust close at hand. This room was opened about fifty-five years ago, when it was discovered by accident, and the pavement uncovered. It was subsequently filled in again, and all knowledge of its existence had passed away. After the recent discovery of the villa, the tenant, Mr. Smith, received an anonymous letter in which the writer spoke of this pavement and its



position. Search was accordingly made for it in a portion of the grounds away from the other excavations, and it was found, as were also the rooms already described, together with a fourth room to the south of it. It is of interest to note that the west wall of these four rooms forms the base of the present old building, formerly used as a granary.

At the south-east angle of the fourth room the excavators found a curious square pit-like chamber, 4 ft. 5 in. by 4 ft. 3 in., and 3 ft. 4 in. deep. It gave access by an opening 2 ft. wide, over which is a well-trenched segmental arch, into the hypocaust already referred to. Entrance to this is closed by a slab of red local stone, set diagonally and mortared in at the back. It has been broken in the attempt to force an entrance, which has not yet been effected.

The continuation of these apartments, to complete the eastern wing, has not been traced further, but foundations have been met with on the other side of the Farm House as if in continuation. Proceeding along the northern buildings a small portion of one room, in front of the southern wall of the granary, has been formed. It has a pavement with a simple guilloche pattern. Commencing now with the principal, or western group of buildings, we come to the most northerly room, which has a pavement formed of a large double Greek fret, much the same as has been already described, blue-black on a white ground. Next to this, going south, is a room which has had a very good pavement, now in very poor condition. One part of it is beneath a shed, the other is in the open path, and, since it is only about 8 in. beneath the modern level, it has suffered very badly. Fortunately, two of the angles remain, and part of the centre, sufficient for the whole of the pattern to be made out. It consisted of a central panel, a parallelogram filled with lobed leaves set diagonally, surrounded by a guilloche. There is then a band of plain groundwork and another guilloche. Next to this is the largest pavement, forming the floor of a room 18 ft. by 18 ft. This is still a fine work, although it is in very poor condition, owing to its small depth beneath the present surface. Its groundwork being decayed, it is bent and furrowed badly, but the colours are still bright and the pattern can be well made out. It consists of a circle surrounded by a guilloche enclosing a smaller circle containing a cross of interlaced work, with rounded ends. The main circle has a pretty pattern of leaf-like form, interlaced. The circle is enclosed by two squares of guilloches, one set diagonally and interlaced with the other, the whole being enclosed by an octagonal guilloche border, the angles of which are brought back again to the square form by continuation of the borders, there being a small square panel at each corner interlaced with the octagonal border, and having a pattern something like an inverted vase at the angles, two being of one pattern and the other two of another. The main octagon has its spaces, up to the interlaced squares first described, filled in with various lozenge panels at the angles, which contain circles of very varying design, the centres of the composition having panels filled in with involved guilloches, circles, &c. The outer square has first a pattern of small stepped triangular form, and is concluded by a border, next the walls, of enlaced guilloche ornament. The colours, as before, are red and blue-black on a white ground.

Various apartments extend southwards, where begins the corridor, and the planning of the walls to a different angle. Since these walls are not bonded into the others, it is reasonable to conclude that this portion was an addition to the main building. No pavements have been found to these rooms, although it is more than probable that they have existed. Tessellated pavement is, however, again met with in the southern corridor, where a fine, bold Greek fret can be distinctly traced. One portion has a circular piece of paving, level with the face, composed of several wedge-shaped stones, which form the circle. This was probably the base of some circular pedestal, but why it should have been formed in the

manner stated, rather than by a single circular stone, is not easy to determine.

The walls forming the apartments vary in width from 2 ft. 3 in. to 1 ft. 10 in. They are built of local stone, roughly dressed, not squared, and are put together with mortar in which no pounded brick has been used. Pounded brick is to be found in the concrete beds or backings for the pavements. No Roman tile or brick appears in the construction of the walls, although the bright red of the pavements is formed by tesserae of cut brick. The white groundwork is of stone dug in the neighbourhood, while the blue-black is also local material.

The articles found in the excavations have not been of very great interest, nor have they been very numerous. A few fragments of pottery only have been met with, of varying colours, including two or three small pieces of Samian ware; a single third brass coin of Carausius; an iron strigil; while a few small oyster-shells proved that the Romans of this part of the country had the same taste for the succulent bivalve as their brethren elsewhere. Many split bones have also been found, showing that they had been broken for the extraction of marrow. Some features, indicative of the structure of the building, were met with, and from these we learn that it was, for the most part, roofed with split Pennant stone slabs, 2 ft. long, 13 in. wide, and 1 in. thick, both ends of the slabs being cut diamond-wise. There were a few fragments of flat flanged roofing tiles, and also of the circular tiles to cover over the flanges, but since these were not very numerous, it may be supposed that stone was the principal covering. The slabs were perforated for one large nail each. These were of iron, as was sufficiently proved by a portion of one of the nails still remaining. Several pieces of hypocaust tiles were met with to convey the hot-air to various parts of the building, having patterns scored upon them. The patterns were not, however, intended as decoration, but only as a key for plastering. This was attested by the fact that their impression was actually found on the back of some of the fragments of coloured plaster found in the rooms. The base of a circular column was discovered in one of the apartments near the principal pavement, the shaft, 8 in. diameter, being broken off. It is very neatly and truly worked, very similar to an attic base, commencing with a square plinth. Examination shows that it has not been worked by hand, but turned in a lathe. The most remarkable discovery remains to be noticed. It is a stone table slab, 2 ft. 11 in. long by 1 ft. 3 in. broad, and 3½ in. thick.

The under side is slightly dished, and the upper side shows that a back of some sort rested upon it. Three of the edges are chamfered, square stops being left in the centre of the front, at the angles, and at the ends. The chamfer is filled in with a sunk ornament, precisely like the star pattern so often found in Early Norman churches, slightly varied to the front. There is a neatly-worked cable moulding at the top edge of the chamfer, and the fillet beneath it is ornamented by a series of small sunk squares. A pattern, varied in each case, is also worked on the faces of the blocks left as stops to the chamfer. It was discovered a year ago in digging a drain in the stack-yard, not very far to the south-east of the end of the excavation of the south corridor. When found it was standing on four rough stone supports, and it was broken in removal. It is difficult to assign a use to this object, which appears to have stood as described, in the open air. It is possible that it was placed as a table to support some statues of domestic or local deities, in front of an altar. Diligent search should certainly be made for the missing supports.

The course of the excavations revealed evidences with respect to the fate of the buildings, at least to a considerable extent. Traces of conflagration were found in more than one spot. Not only was there deposit of burned wood, but several of the stones bear traces of fire.

Although there is record of a portion of the pavements having been found about 100 years

ago, as well as more recently, yet the recent discovery of these interesting remains was effected in consequence of the building of a new wall, to form a boundary to the present stock-yard, in the autumn of last year. One of the wallers cut through the largest of the pavements, to get a foundation, and not knowing the nature of the small coloured tesserae, proceeded with his work, putting a few of them into his pocket. Some time afterwards he happened to show them to the steward of the estate, who at once recognised that they had formed a portion of a Roman pavement. Search was made, and the beautiful mosaic was exposed to view. It was prudently covered over again, to protect it from the frost of winter, and, in the mean time, the nature of the discovery having been brought before the executive of the Bristol and Gloucestershire Antiquarian Society, an exhaustive exploration as far as funds might allow, was resolved upon. Sir John Maclean, F.S.A., kindly undertook the oversight and direction of the work, which is of itself sufficient to say that it has been well and efficiently done, aided by a subscription, which is, however, not yet sufficient in amount to uncover the whole of the site. Mr. Smith, the tenant, has very generously permitted his lawn and yards to be cut into and trenched, and has in every way taken the most lively interest in the works.

A meeting of the members of the Bristol and Gloucestershire Society was held on the site on the 14th inst., where a very large number of ladies and gentlemen assembled to inspect the progress of the excavations.

#### THE DICTIONARY OF ARCHITECTURE.

**T**HIS mysterious publication,\* the commencement of which dates from an unknown period, and which seems, officially at least, to belong to no one and to come from nowhere, has just evolved another instalment of itself, in the shape of what is variously called its seventh volume or its Twenty-second Part; for the Dictionary has two title-pages, which do not agree. We have adopted the simpler form, as what we suppose is intended for the real title-page. This volume completes the letters "R" and "S," leaving, we are informed, only one volume to complete the whole, so that we might hope to see the entire work within a brief period, were it not that we are told, in the same breath, so to speak, that the production of this volume has exhausted the funds in hand, and that £650 will be required to complete the Dictionary. This is not a very large sum, comparatively speaking, but perhaps more than will be quite readily raised in these not very flourishing times. The size and consequent expense have been considerably increased, we are told, beyond what was originally calculated on, owing to the constant increase in the number of terms coming under notice and requiring elucidation. The number of terms in the original list for R and S, for instance, was 1,664, whereas the number of terms actually treated under these letters is 3,131. That is the way dictionaries do; they always increase as they go along, fresh subjects which ought to be treated continually presenting themselves to the memory of the compiler, or being introduced to his notice by correspondents; and the comparative increase in the number of subjects treated over those originally proposed speaks well in itself for the care of the compilers and their anxiety to include among their subjects whatever has a proper claim to be included.

It must also be noted to the credit of the compilers that they have not allowed themselves to be tempted, by the constant increase of matter, to launch out into articles or essays beyond the proper scope of a dictionary, but have kept to the real object of a dictionary, viz., to give information; instead of allowing it to grow, like another contemporary dictionary we could name, into a conglomeration of lengthy essays compiled according to the idiosyncrasies of each contributor, without any guiding principle running through it. The

\* The Dictionary of Architecture. Issued by the Architectural Publication Society. With illustrations, Vol. VII. 1887.



age is a fine bold folio, the type admirably clear, and the articles are short and practical; almost erring, perhaps, on the side of too much brevity than in the other direction. The large number of references to works on many of the subjects treated of are very useful, and may often save a great deal of time and trouble to those who are anxious to know where to go for detailed information on any particular subject. A great many of these lists of books or examples are of considerable length, and though they occupy comparatively little space (sometimes half a column or more), they represent, as every one who has been unwise enough to undertake that kind of task knows very well, a good deal of tedious labour and research. In this respect, and in its general form and style, the Dictionary is a distinctly business-like publication; there is no show or literary pretence about it; the object is evidently to put the main facts about each subject in as terse a manner and in as small a space as possible.

All this is very good so far; but we regret to say that closer examination does not convince one that the work has been done as it might and should have been. There is every sign of good intentions, but there are certainly signs that the contributors and compilers are not quite up to the mark in dealing with some subjects, and especially that they are somewhat antiquated in their notions. Of all things, it is required of a dictionary that it should be up to date, and that is exactly what the Dictionary of Architecture appears not to be. There is a fine old crust of air of bygone days about it, which is picturesque, but not quite what is wanted in a dictionary which is to be useful for the future and not for the past generations. This is curiously obvious in the dates of the books and periodicals quoted. They are nearly all from publications twenty or thirty years old or more, as if the compilers were unacquainted with what was passing at the present moment. "The Builder Journal" is frequently quoted, but it is nearly always from numbers many years ago. If the compilers had looked a little more than they seem to have done at the *Builder* of the last ten years, they might have been better posted up than they are, in some matters, at all events. There is at times also a curious obscurity of diction, arising apparently from the effort to get a great deal in a few words: a most praiseworthy aim, the achievement of which, however, has not been granted to every writer.

The first article we open at is "Racquet Court," where we read, "The floor must be of hard-rubbed slabs with rubbed edges." Slabs of what? Under the heading "Slab" the dictionary gives "a large flat but not very thick portion of any material": so that does not help us. "For ventilation, iron gratings may be built into the walls flush with the plastering, the bars should be formed diagonally at an angle of forty-five degrees upwards from the entrance [of what?], and not more than  $\frac{3}{4}$  in. apart, so as to be in a line with, and not to hinder, the flight of the balls." Will the architect who is going to build a racquet-court gain much from that? And, supposing it were intelligible, is plaster the proper internal finish for a racquet-court? We are not, at the moment, in a position to dogmatise on the subject, but we should doubt it. Under the head of "Rain-water Cistern and Tank," it is mentioned that "Buck's Patent Percolator prevents the first portion of the rainfall (which brings down impurities from the roofs) passing into the storing-tank." There is no mention of Robert's rain-water separator, the best-known and most recently improved apparatus of this kind, the latest form of which may be found illustrated, with full descriptive details, in the *Builder* for June 11th of this year; but that, of course, is much too recent for the "Dictionary of Architecture."

On the next page we read: "Rain-water pipes are often used as drain-pipes from upper water-closets"; this is seriously given as if it were an approved practice, without a hint that there is anything to disapprove of in it. It should seem from this that the compilers do not read modern books on sanitation, and do not know that the disconnection from the drain should

be by a different method for these two classes of pipes. Next page, "Random Coursed Work" is defined as "stone walling where the courses are not continued of the same sized stones," an instance of clumsiness of expression leading to ambiguity. That definition would be as applicable to rubble walling. It should have been, "where the courses are continuous, but not with the same sized stones." In the article on "Retaining Wall" the Dictionary deals only in generalities; "such a wall is battered on the outside face from 1 in. to 1½ in. to the foot, the greatest degree of batter (which is often curved) being given to the foot of the wall." We might have expected in a dictionary for architects to find some particulars as to the circumstances under which a retaining wall should be curved, as well as some formula for obtaining the curve. We proceed, "Counterforts are invariably carried up at the back of a retaining wall, piers are also sometimes placed on (sic) the face, which break the monotony and hide any settlements which may subsequently occur." This has nothing special to retaining walls; it might apply to any wall. The article, too, proceeds to point out as one of the best examples of a curved retaining wall in a cutting, that on the London and North-western Railway between Euston and Camden Town, "though it failed." To select as the best example an admitted failure seems in keeping with the rest of this rather singular article. It is also observed that "the soil when filled in against the wall requires great care, or a failure eventually occurs"; but what kind of "care" is required, or what kind of failure impends, is left to the imagination.

Under "S or Syphon Trap" this is all we get: "A trap formed of pipes of lead, stoneware, or other material" [it should have been "a pipe" of lead, &c.], "worked somewhat to the form of the letter S. It is preferable to the D-trap which has lately been improved by its being formed of one diameter." The last sentence, which stands exactly thus, with no punctuation, reaches the climax of ambiguity. Which has been improved, and which is formed of one diameter, and what does that mean? It is refreshing, however, to find the spirit of the sanitarian awake on the next page, under the heading "Safe," "a plate of lead turned up at the edges and laid on a floor, as under a bath, water-closet apparatus, washing basin, and such like, to retain any overflow of water, and by a pipe to carry it away; this pipe should not enter a soil-pipe." But, unfortunately, Homer nods on the same page over "Saint Chapelle" (sic). We might have expected under this head to find some special word about the famous Parisian building, which is the Sainte Chapelle all the (architectural) world over; but at any rate a reference to a French dictionary would have revealed the fact that Chapelle is a noun feminine, and that the corresponding adjective is "Sainte," and not "Saint."

In the note on sawdust, when saying that "in buildings it is placed in floors and in partitions, to deaden sound," it should at least have been added that it should be thoroughly stove first; it might usefully also have been added that slag wool is preferable for this purpose. The latter material, however, is duly dealt with under its own heading. "Sculpture Gallery" is defined only as a "large apartment specially designed for the exhibition of works of sculpture." We all know that; the dictionary might have said something as to the requirements of a sculpture gallery, the best way of lighting, and the best existing examples. In the article on "Seasoning Timber" we are first told that the seasoning is "A process of preparing timber without the use of means for its preservation," a fine instance of dictionary ambiguity. Among the mechanical processes of seasoning no mention is made of "the Common-Sense Drying Apparatus" fully described and illustrated in the *Builder* of October 31, 1885, and which is the latest important improvement in seasoning methods.

Under "Sheep-cot" these two apparently contradictory statements look as if an explanation was wanted:—"The front wall, 4 ft.

high to the eaves; no walls are needed." Under the heading "soil-pipe" we are advised to have soil-pipes *within* the house (in order to get a warm up-current up them), a recommendation totally at variance with most both of theory and experience; and we are told a stoneware pipe is better than metal. It might be, if we could get it in long lengths, but not with all the joints which are inevitable; and the advice is decidedly dangerous.

The definition of "Suspension Bridge" is very amusing; it is stated to be "a roadway for spanning wide valleys and rivers, suspended from inverted iron bows of chains or wire ropes"; as if the curved form assumed by the chains were an essential element in the construction, or as if the chains were intentionally made curved, and then "inverted." This is, on the whole, one of the very silliest definitions we ever saw of a piece of construction. Does not the writer suppose that engineers would be very glad to strain the chains across level, if they could get rid of the element of their weight? The sentence is really childish. Under the head of "swimming baths," it is stated dogmatically that "dressing-boxes are to open directly on the water's edge, and not on a platform." We have never been in a swimming-bath in which this arrangement was adopted, and suspect that it is only some "fad" of the writer's; it could only be done where dressing-boxes had no doors, and were pretty wide, otherwise how is a man to get his swing of body and arms preparatory to taking a header? And it would be exceedingly inconvenient to have all passage along the side of the bath stopped by boxes coming to the edge, and leaving no gangway. It is absurd to have such a direction inserted in a work of this kind, as if it were a *sine quid non*. Then for scientific precision and clearness of language we may recommend the definition of syphon:—"A bent tube, having one leg shorter than the other. It acts from the pressure of the atmosphere being removed from the surface of a fluid, which enables it to rise above its common level." What rises, the fluid or the syphon? And how and for what purpose does it "act"? Possibly the writer of that sentence might have known what he meant by it, but he evidently did not intend to communicate his knowledge to the reader. Finally, we may suggest that if the writer of the article on "Stone" had paid any attention to the series of articles on "Our Building Stones" in the *Builder* of January to June, 1886 ("Students' Column"), he might have been in the way of giving some rather more scientific tests for stone, and generally giving a better account of his subject than is apparent in the short, empirical, and unsatisfactory article on so important a subject as "stone." He quotes "Building Stones used in London, *Builder* Journal, 1858, by W. Papworth," and that is just about the date the Dictionary likes to go back to; but he would have learned more on this subject, at any rate, from the *Builder* of 1886.

The Dictionary of Architecture, in short, is well-intentioned and highly respectable, but it might have been a good deal better if it had not, like some other respectable institutions, maintained a considerable leaven of what is termed by irreverent persons "old-fogeyism."

We hope the Dictionary will reach a speedy completion, and that funds will then be further raised without delay for issuing a new and thoroughly revised edition; which will certainly be necessary if it is to take a permanent place as the Standard English Dictionary of Architecture.

**Ventilating Gas Radiator.**—Mr. R. Craven sends us a description and illustration of what he calls the Clapham Ventilating Asbestos Gas Radiator. This is an asbes gas stove in the form of a fire-grate, with a series of vertical tubes in contact with the grate both at each side and the back, which give a large heating surface, as well as inducing a current of warm-air into the room through the series of pipes. This principle has been often used, of course, but this grate seems designed to make the most of the heat generated, taking it from the back as well as from the sides of the gas fire.



## NOTES.



WE shall give an illustration of "Terry's Theatre," with a plan and section, shortly; meantime we may say that an inspection of the house justifies in the main what has been said as to the care which has been taken to render the building fire-resisting and to afford ample exit. The arrangement of the various "extra exits" is very well planned, and the push doors work most satisfactorily. There is one point, however, which requires explanation. The extra exit from the gallery is very well arranged by a straight staircase, with one landing, right down to the street; this extra exit also serves the upper circle by a door opening on to the landing through the upper circle refreshment-room. But the street door at the bottom of this long staircase is not a push-door, but a locked one, and as there is no appearance that this door is to be generally in use (it leads only to the gallery and the refreshment-room aforesaid, and past no officially guarded post), there seems the chance that it may be found shut when there is an escape made from above; and this would prove very serious; it would be a complete trap. Unless this door is to be open every evening, it ought, of all doors, to be a push door. The exit from the dress circle is very well managed, there being a curtained doorway opening on to a small landing at the end of each tier of seats, the landings kept level with the tier. There is one door on each side of the stage through the partition wall between it and the auditorium; an iron one and locked; but several persons, we are told, would have keys of it. In regard to absolute separation of the stage from the auditorium, that is a weak point, of course, the principle of the theatre being that the auditorium is fire-proof and the stage cut off and exposed to the action of sprinklers. The asbestos curtain seems likely to cut off fire sufficiently for the period necessary to allow of egress; it gives less appearance of security than the iron one, but it is more manageable; it is strained on an iron framing. The fronts of the circle seats are of fibrous plaster on an iron framing, with wired plaster behind; something of this kind was, of course, necessary here if wood were not to be used, as it is essential to have something vibratory and that will not make sharp echoes in such a situation. The rest is all iron and concrete, and looks solid, clean, but rather cold. The acoustic qualities we have not yet tested fairly at a performance; but, in any case, it must be remembered that this is a very small theatre, and would not in itself settle the acoustic question. We can hardly, we confess, imagine a theatre of the first size built in this way which would not be disagreeable and trying for the voice of the actor and the ears of the audience.

WE are indebted to the courtesy of Mr. Waterhouse, who, as will be remembered, is one of the jurors on the Milan competition, for a copy of the conditions of the second competition for the proposed new facade, which have apparently only been sent to the jurors and to the competitors. From these conditions it appears that our conclusion, embodied in a "Note" in last week's issue (p. 522) is correct, viz., that the Committee of management are in a position, on the terms of their circular to competitors, to withhold the premium from any competitor who does not conform to the conditions of the competition; and that one of these conditions, most explicitly laid down, is that the new design must be in conformity with the construction, the architectural form, and the style and decorative character of the existing edifice: we quote the precise words of the document: "E richie-to quale condizione assoluta che la nuova facciata si accordi intimamente con la struttura organica costruttiva, con le forme architettoniche dell'edificio, e con lo stile ed il carattere decorativo delle sue parti vecchie." There is no mistake about the wording and intention of that, and it is perfectly clear that after that the Committee have bound themselves not to select a design which does not conform to the style of the cathedral; and in this we consider they are entirely in the

right. We have never admired much the style of Milan, but it is a homogeneous whole, and it would be an artistic absurdity to complete it in a Gothic of a different manner and drawn from a different country and period.

WE print in another column a letter from the Institute of Architects, a copy of which has already appeared in the *Times* (where, by the way, the "Institute" is misprinted the "Royal Society of Architects"), expressing the official opinion of the representative body of architects in condemnation of the proposal to pull down St. Mary-le-Strand Church, and pointing out that the traffic requirements may be met by continuing the road to the north of the church. In the *Builder* for December 26, 1885, we gave a reproduction of a bird's-eye view, made by a very competent architectural artist for the Strand Improvement Association, showing how effectively this could be done so as to leave a road to the north of the two churches, up to the angle of the Law Courts, making a portion of the space between them, which would not come into the line of traffic, into a garden. This scheme if carried out would be a great public improvement, both practically and architecturally. In regard to the pulling down of old churches we are by no means bigoted conservatives, and we have before expressed our opinion that in one or two cases the practical advantages have fully compensated for the loss of churches which, though old and of some historical interest, were really of no great beauty. But the case of St. Mary-le-Strand is quite different; the steeple is one of the most graceful and original of Classical steeples in London, and is the architectural centre of the Strand vista. The wish to have such a building in such a position pulled down to gain a street accommodation which can be far better gained in another way is so stupid and senseless that it is impossible to argue seriously with those who could propose it.

LORD ROSEBERY'S speech at Keighley last week was a refreshing change among political orations, for he spoke clearly and well on the subject of technical education. The speech was well timed, for the present is the time at which public attention should be directed to this question. The Government Bill of last Session was a kind of pilot balloon, and if the people of this country are sincerely desirous of keeping abreast of other nations in commerce and manufacture they will do well to set resolutely to work to establish a sound system of technical education throughout the country. Unless general interest be shown in this question, the Government will not attempt to pass so thorough a Bill as they would if public opinion be clearly and resolutely expressed. Lord Rosebery will do much more to enlarge his reputation among his countrymen by pressing this question on the attention of the public than by following the example of other official Liberals, who can find nothing to say but that Ireland blocks the way and so that no other subject can be dealt with by Parliament. It is one thing to hold firm to an opinion, it is quite another to exclude all subjects but the one from public discussion. Mr. Morley and other eminent Liberals are wrong in thus narrowing their public efforts, and we are thankful that Lord Rosebery is more wide-minded than many of his late colleagues.

THESE are, indeed, the days of big railways, as of everything else, and an undertaking that swallows up a whole continent is alluded to in a matter-of-fact little paragraph, although it may be pregnant with the future fate of nations. On this occasion Russia is in the field with a proposal to make a line from St. Petersburg across Siberia to Vladivostok, on the Pacific coast, and, what is more, to do it out of her own resources without asking any other country for help, guarantees, or a loan. It is to go through Ornsk, Tomsk, the Baikal region, and the Amoor goldfields, amongst other places; and although, of course, *in primis* of military and strategical importance, it will have a strong eye to developing Siberia's industrial resources. It will take five years in

building, and will cost 300,000,000 roubles (1 rouble = 3s. 2d.), which will include five large bridges at 6,000,000 roubles each. In the Crimean war, Vladivostok was not of so much note as a war station and arsenal as it is now, and in case of another dispute between the two countries, it might play a very decided part in that quarter of the Russian dominions.

OUR advertisement columns contain an announcement of an examination to be held at Manchester in February of candidates for Associateship of the Institute of Architects; an examination instituted for the convenience of provincial candidates who may not find it easy to come up to London for examination. The examining body will consist of members of the Manchester Society of Architects and a member of the London Board of Examiners, and we are given to understand that Manchester has been selected as a town which is so far central as to give, it is hoped, facilities for candidates from Liverpool, Leeds, and Sheffield to enter for examination with less inconvenience than by coming to London; and even candidates from Scotland will find Manchester nearer than London. We may point out that the examination papers of the Institute of Architects are carefully framed, and the passing of these examinations is now a real test of professional competency, the value of which is likely to increase.

WE have received the programme of an Institution to be called the London College of Architecture, established at 46, Great Ormond-street, of which Messrs. A. Hessel Tiltman and W. Henry Wood are the directors, "aided by qualified assistants." The curriculum is a very full one, including mathematics and mechanics, plane and descriptive geometry, chemistry, geology, building construction, history of architecture, drawing, designing, colour decoration, general professional practice, &c. This is an ambitious programme enough; and no doubt a College which gave satisfactory and sufficient instruction in all these varied and important subjects would have a future before it. But we have no information as to who are the professors who are to give instruction in all these subjects, and we should imagine that those who are thinking of adopting a Collegiate study of architecture and its cognate subjects would wish to have some information on that head first.

IN a recent issue (Sept. 3), when treating of the "recent excavations in the Acropolis" we were obliged regretfully to own that, spite of the extraordinary yield of statues, there had not yet been discovered "any statue inscribed with the name of a known sculptor." We had a number of bases inscribed and a number of statues baseless, but as yet no combination had been effected. Just such a combination Dr. Studniczka thinks he has achieved. He has put together a base, signed by Antenor, and a fragment of two feet, and these, united with the remarkable statue published by Rhomaid (pl. vi.), make up, he thinks, a complete composition. If he is right the style of the great archaic master Antenor, the sculptor of the world-famed statues of Harmodios and Aristogeiton, carried off by Xerxes, is no longer "matter for precarious conjecture." In a question so all-important, spite of the careful drawings and measurements given by Dr. Studniczka, we prefer reserving our judgment till we have examined the originals now in the central Museum at Athens. As far as we can judge by the drawing, there seems to be as yet a good piece wanting between the upper part of the statue and the recently-discovered feet. Dr. Studniczka gives a reconstruction of the whole composition, in which we think he clearly makes out one point, and that is that whatever the statue was that stood on the basis it was of size and weight, to our minds, disproportionate to the column that supported it. That it was the custom to set up large votive statues, and even complicated groups, which far overlapped the dimensions of the supporting column and which gave them a very unstable effect, is known from the copies of such votive offerings which appear on vase



paintings. Dr. Studniczka's paper, a long and complex one, appears in the last number of the *Jahrbuch* of the Prussian Institute.

THE monuments and memorial tablets at St. Olave's, Old Jewry, together with the remains of interments in that church, will shortly be removed. Failing application by the representatives of the deceased in any particular case, the monuments will be transferred to the newly-constituted parish church of St. Margaret, Lothbury, and the exhumed remains to the City of London cemetery at Little Ilford, Essex. These proceedings are authorised under the late Bishop of London's Union of Benefices Act, whereby a union has been made of the City parishes of St. Margaret, Lothbury; St. Olave; St. Martin, Pomeroy; St. Mildred, Poultry; St. Mary, Colechurch; St. Christopher-le-Stocks; and St. Bartholomew-by-the-Exchange. It is not generally known that under the Act the Ecclesiastical Commissioners are enabled to provide a sum not exceeding 10*l.* in each instance of removal under the circumstances which have arisen here.

YET another bit of "Old London" is to temporarily receive form and substance. Mr. Thomas Harris has undertaken to reproduce a portion of that once highly popular resort,—Marylebone Gardens. It will serve as the "setting" of a bazaar for liquidating a debt upon the parish church of St. Marylebone, built by Thomas Hardwicke (1813-17), whereof the interior has been entirely remodelled and decorated by Mr. Harris in 1884-5. The bazaar will be open during the last week of November, in the Portman Rooms, Baker-street, more familiarly known, perhaps, as what used to be Madame Tussaud's. We understand that Mr. Harris proposes to base his design upon a view republished in Messrs. Cassell's "Old and New London," and therein described as being taken from a print of 1780; at which time, by the way, the Gardens had been practically closed for two years and more, and their site taken for building purposes. There are extant other views showing "the grand walk and the orchestra with the musick playing,"—as, for instance, those by J. Donnowell and R. Sayer. These are dated 1755, when the gardens had reached to the height of their fashion. Marylebone Gardens had their origin in a bowling-green attached to the Rose of Normandy Inn in the High-street. This, as Long's Bowling-green, half a mile distant from town, is cited in the *London Gazette* of January 11, 1691; and in an advertisement of nearly thirty years later is styled the Marylebone Bowling Green. John Locke in his diary (1679) writes about the several persons of quality who came hither to play at bowls. Pepys speaks of going abroad to walk in the garden at Marrowbone. The Duke of Buckinghamshire, as Lady Mary Wortley Montague's oft-quoted couplet reminds us, was its warm patron. Gay alludes to the more than questionable character of some of its frequenters. Figg's and Broughton's sparring and broadsword amphitheatres, together with other haunts of the "fancy," were not far distant. In 1739, a charge was made for admission. The silver tickets will be copied for this present occasion, and hot cakes served *à la* those of the noted Miss Trusler, daughter of the proprietor, circa 1760. Gaming-tables and the performance, by Arne, of Handel's music, formed a great attraction. The Mr. Fountayne who is mentioned in the anecdote of Handel and his self-confessed "very poor stuff," as related by J. T. Smith, kept the school, hard by, which long enjoyed a high reputation. The main entrance stood over against the present parochial National schools in High-street. The grounds lay eastwards as far as Harley-street, covering Devonshire-place, with parts of Beaumont-street and Devonshire-street. Some relics of their trees may still be seen within the area we indicate. Rysbrach's workshop was situated here, as appears from a conveyance by Lowe, the singer, of his property in the Gardens for his creditors, in the year 1769.

WE are glad to see that practical subjects are having their full share of attention in the scheme of the Architectural Association classes and lectures for the ensuing session; not that we are by any means disposed to attach less importance to the artistic side of architecture, but that we have sometimes thought that the tendency of the Association was rather to lean towards the artistic side at the expense of the other. The practical subjects in the programme include a course of lectures on Construction, by Mr. Lovegrove; a course on Graphical Statics, by Mr. Quick; and a course on Land Surveying (including both lectures and field works), by Mr. A. T. Walmisley. The list of subjects to be treated by the Advanced Class of Design includes some which it should be interesting as well as useful to work out.

THE last number of the "Journal of the Royal Historical and Archaeological Association of Ireland," published quarterly, contains the fourth of a series of articles on the "Rude Stone Monuments of Sligo," by Mr. W. G. Wood-Martin, Fellow and General Secretary of the Society, which is largely illustrated, and goes very fully into the subject. The series of articles is still in continuation.

PRINCE PIOMBINO, the owner of the Villa Ludovisi, has allowed the publication of a monument of great interest and singular beauty, just discovered in his grounds, which occupy, it will be remembered, the site of the Gardens of Sallust. The monument consists of three slabs of marble forming three sides of a square, and all sculptured in rather high relief. Had there been four sides instead of three, we should have supposed they had formed a square puteal; as it is, it is difficult to see what purpose an enclosure of only three sides could have served, unless, as Signor Visconti conjectures, it formed the railing that enclosed a subterranean staircase. However, the chief interest lies in the sculptured reliefs. The centre relief is a group of three figures, a young girl, dressed in the thinnest possible Ionic chiton, clinging close to her figure, is just rising out of a stream, supported on either side by an attendant maiden; they also wear long full chitons with sleeves; they hold a piece of drapery,—evidently a sort of bath towel,—in front of the bathing maiden. We have no hesitation in saying that, merely considered as a composition, the relief is one of the most charming things ancient art has left us. The interest, however, of the design is doubled by the fact that obviously we have here no ordinary bathing scene. It is difficult to communicate an impression of this sort, but every archaeologist will agree with Signor Visconti that the whole pose and manner of the figures indicates a solemn rite, a baptism in honour of a god. Who the god is there can be little doubt. It is well known that at the lesser Eleusinian mysteries, celebrated in honour especially of Persephone and Dionysos bathing in the Ilissus was an important part of the ritual (*παρά τοῦ Ἰλισσοῦ οὐ τὸν καθαρὸν πλοῦσι αἱ τῆς Ἰλίσσου μυστηρία*). Sufficient ordinary bathing scenes remain to us on vases to make us sure that what Sig. Visconti calls "la severa decenza" of the long Ionic robe worn by the bathing maiden is due to ritual intent. He does not point out, what seems to us manifest, that the "type" of the maiden rising from the water is the same as that of Persephone rising from Hades,—no doubt, an instructive piece of symbolism. On the other two sides are respectively a nude maiden playing on the tibia, no doubt in honour of Dionysos and a closely-draped maiden lighting a lamp, again in honour of Persephone. The monument is executed in the finest archaic style. We can only hope that Prince Piombino will allow casts to be taken. It is published in phototype in the September number of the *Bullettino della Commissione Archeol. Comunale di Roma*.

COPIES of four of Mr. G. F. Watts's paintings, executed under his superintendence,

\* Dublin: Hodges, Figgis, & Co. London: Williams & Norgate, 1887.

and which have received their finishing touches from the artist's own hands, have been presented by him to the Church of St. Jude, Whitechapel, and are now hung there as permanent additions to the decoration of the church. We have occasionally mentioned the annual loan exhibitions of paintings which the Vicar of St. Jude's, the Rev. S. A. Barnett, instituted some years ago in the schools during the Easter holidays. Mr. Watts, who believes so fervently in the moral influence of art, took a great interest in these exhibitions, and many of his finest works have been seen from time to time in St. Jude's Schoolrooms. The presentation of these copies of his paintings to the church is a farther and very practical testimony of his interest in the efforts to bring art within the knowledge and interest of those who are called "the masses." The pictures of which copies have been presented are "Love and Death" (the painter's greatest work), "The Messenger of Death," "Death crowning Innocence," and "The Good Samaritan." The moral or religious turn of the three last-named subjects is obvious enough; "Love and Death," however, we never regarded as having any moral at all, or as being anything but a grand and impressive allegory of the most tragic contrast of human life. Mr. Watts may think well to read a moral into it now, but we suspect it is a moral superimposed afterwards. However, the experiment of thus introducing modern art into the church is of much interest, and perhaps so good a precedent may be followed elsewhere.

MR. WYON sends us an impression of a Jubilee medal which was struck from his design for presentation to her Majesty. The gold medal from this die is among the presents exhibited at St. James's Palace. The obverse bears a profile portrait of the Queen, which is a very good piece of modelling,—certainly far superior to that which has recently appeared on the current coinage of the realm; the reverse represents Victoria, enthroned, attended by a rather mixed assortment of mythological personages, with a decorative Gothic background to the group. This allegorical design is not, to say truth, more interesting than such designs mostly are in modern work; but the portrait on the obverse is a success.

WE are informed that an unfortunate hitch has occurred in regard to the Buccleuch Memorial in Edinburgh which will delay its completion beyond the time contemplated. A proper understanding does not appear to have been come to between the architect of the monument and the sculptor of the statue, for when an attempt was made to place Mr. Boehm's figure of the Duke upon the summit of the column it was found that there was not sufficient standing-room, a foot projecting over in front and a mass of drapery behind. This of itself would be awkward enough, but when it is known that the capital is surrounded by a bronze cresting *within* which the figure was intended to stand, it is obvious that a new arrangement must be made.\* As formerly described in this place, the memorial is in the form of an octagonal Gothic column, ornamented with bas-reliefs, heraldic devices, &c. in bronze, all of which has been fitted into its place and found satisfactory, excepting, as above stated, the culminating feature. It seems rather odd that a sculptor and an architect should not be able to make both ends meet better than this.

THE more serious portion of Mr. Harry Furniss's collection of sketches, called "Politics and Society," to be seen at 25, Old Bond-street, is the best worth looking out. The ultra-comic outline sketches of scenes in Parliament, which often figure as the headings to *Punch's* "Essence of Parliament," are well enough there, but not worth collecting, with two or three exceptions. It is otherwise with the single-figure sketches of Members, which have appeared as cuts in that same series of humorous summaries of Parliamentary pro-

\* Since the above Note was written the cresting has been removed.



ceedings, and which occupy the whole lowest line on the walls all round the room. Except that the heads of the figures are of exaggerated size in most cases, these can hardly be called caricatures; they only just emphasise the special character of each Member's physical composition, and in some cases (which it would be rather unkind to name specially) Mr. Furniss can hardly be said to have gone beyond nature at all. The whole of these little very personal sketches, which look a great deal better in the original drawings than in their necessarily rather reduced reproductions in *Punch*, are full of keen observation and clever satire, but we can hardly join with some of our contemporaries in calling it "good-natured" satire; at all events, we do not imagine that will be the view taken by the originals of some of the sketches. Among the perfectly serious portrait studies are some very fine ones, among which we may mention the "Earl of Iddesleigh" and the "Marquis of Salisbury" (20 and 31), done for the *English Illustrated Magazine*; "Two Lord Chancellors" (218) for the same publication; "Last Visit of Lord Beaconsfield to the House of Commons" (232), done for *Harper's Magazine*, and "A Jubilee Council of Past Masters" (266) drawn for *Punch*, but which is serious enough, and in which Mr. Furniss has rivalled Mr. Tenniel in the latter artist's own line.

IN reference to the question of giving plans of theatres with the playbills or admission tickets, which has been recently suggested, it appears that this is the constant custom in America, and a correspondent has sent us two playbills of the Casino Theatre, New York, and another house, containing plans of the respective houses with brief descriptions of the exits and where they lead out to. As we have said, this is a good thing to do, and a practice that might very well be adopted generally, and then people with any common sense and presence of mind would know which way to turn if there were an alarm, and might, perhaps, assist in guiding others. We are still of opinion, however, that those who are able or likely to make any use of such plans form a very small proportion indeed of an average theatre audience.

#### "AT OUR COURT AT ST. JAMES'S."

THE QUEEN'S JUBILEE PRESENTS.

By admission into St. James's to see the Queen's Jubilee presents the public are enabled to pass through some of the most interesting portions of the Palace. The crowd are formed into a queue in the Colour Court, wherein until of late years the Palace guard used to be relieved every morning. On the right, above the modern Ionic colonnade,\* is part of the Chapel, dating back more than 350 years ago. Here, too, may be seen some earlier portions of the main gate-house, its turrets denuded of the customary leaden "types," or cupolas, which is attributed to Holbein. It was ornamented with love-knots that commemorate a time when Anne Boleyn's star had risen. The clock was made by Clay in 1731; new dials were inserted at the repairs to the gate in 1831. Ascending the principal staircase, the public enter the suite of rooms which are now used for Levees only, since the Drawing-rooms have been held at Buckingham Palace. At the head of the staircase is the Guard Chamber or Armoury, opening into the Tapestry, or old Presence, Chamber. The tapestry was worked for King Charles II., and delineates a, to him, highly congenial story. The Tudor chimney-piece, in stone, of this chamber bears, amongst other devices, the initials "H. A." From the bay-window, on the left, it has long been customary to proclaim the sovereign on accession to the throne. This window overlooks what used to be known as the Chair Court, and the roadway into the Mall. The roadway has been laid through the former Friary garden, appertaining to the Capuchins, who came hither in the train of Katharine of Braganza. Pepys recounts his visits to "the new buildings," whereof the chapel was, *temp.* William III., assigned to a

congregation of French refugees. It has been rebuilt as the Lutheran or German Chapel. A part of the Palace's north-eastern wing, by the chapel, was burnt in January, 1809, and not reconstructed. According to an old bird's-eye view, the road into the Mall ran a few yards to the east of its existing course.

Next come, in the order named, Queen Anne's Room, the Red Drawing-room, and the Throne Room, or Presence Chamber. Into the furthest apartment was carried Dr. Johnson, in his infancy, that he might be touched by Queen Anne. His gold touch-piece is preserved in the British Museum. This suite of rooms, facing southwards, ranges along the garden evenly with the Mall. To the left is the park gate, at which, on August 3rd, 1786, Margaret Nicholson attempted to stab George III. Beneath the garden wall is a raised mound or terrace. This may be a continuation of the raised walk which Nell Gwynne had made for her in the garden of her second house in Pall Mall, being that whereupon she would stand to talk with King Charles as he sauntered in the park. Beyond the Throne Room is an ante-chamber, at the south-western angle of the building, wherein at ten in the morning of Trinity Sunday, June 10th, 1688,—a day long kept sacred by his faithful adherents,—was born "the most unfortunate of princes, destined to seventy-seven years of exile and wandering, of vain projects, of honours more galling than insults, and of hopes such as make the heart sick."†

Northwards from the Throne Room stands the Corridor, forming a side of the Engine Court, and bearing on its inner walls the portraits of Henry, Prince of Wales, and all our sovereigns from Henry VIII. to Queen Anne. These are by or after the old masters. The light-coloured hair of King James II. is noteworthy, as also the tall, large person of Queen Mary, his daughter, which, as contrasted with her husband's smaller frame, is strikingly emphasised by their waxen effigies at West Minister. From the corridor we pass through a lobby or ante-chamber into the Banqueting Hall, which was erected in 1822, and is lighted by gas. It contains some paintings of military scenes, including a copy of Raffaele's *Battle of Constantine*, in the Vatican; Lille, Tournay, Vittoria, the death of the Duke of Brunswick at Quatre Bras, and Sir Charles Napier's defeat of the Amereis at Meanee, in the Scinde war of 1843. Thus we quit the Palace by the Ambassadors' staircase, having the chapel now to our right, over against the apartments of H.R.H. the Duchess of Cambridge. That block of buildings abutting against Cleveland-row occupies the site of the Guards' stabling-house, and was built for Frederick, Prince of Wales, on his marriage. The Chapel Royal stands over the site of that of the ancient hospital, whereof the precincts extended northwards to near the end of Arlington-street. In the course of enlargement by Sir Robert Smirke in the year 1836, several remains of the previous structure were discovered. The ceiling is said to have been designed and coloured by Holbein, but it has been repaired and repainted often enough since his day. The register records the marriage, on the 24th of February, 1676, of Sir Christopher Wren to his second wife, Jane Fitzwilliams (Peter Cunningham).

Situated within the ancient manor of Eia, the site of the Palace and park forms portion of that dismal swamp which lay about the Eya brook, or Tyburn, and retained here and there traces of the dense thickets to the north and west of London which King Offa of Mercia cites in his charter to Westminster (785). In such a watery waste, itself adjoining to Pollenstock and the Bulinga Fen,‡ as being then sufficiently remote from town was founded,—we cannot say precisely when, but anterior to the Conquest,—an hospital, dedicated to St. James-the-Less of Jerusalem, for "fourteen poor sisters, maidens that were leprous, there to live chastely and honestly in divine service" (Stow). The pristine endowment of about 160 acres was subsequently increased by pious citizens to the extent of nearly 320 acres of fields about Westminster, together with 80 acres of land and wood in Hampstead, Hendon, and Chalcott (Chalk Farm). Meanwhile, a brotherhood of six clerks and two laymen had been set

up for the conduct of religious offices. King Edward I. not only confirmed these gifts, but, in rivalry with his subjects, granted (1290) a fair, to be celebrated in St. James's-fields, to begin on St. James's Eve, July 24th, and to continue during five days. The profits of toll, and hire of booths, &c., went to the sisterhood, and, moreover, it was decreed, in their behalf, that all shops in the City of London should remain closed for the while that this fair lasted. The fair was revived in the fields north of the present Piccadilly by King James II., who ordained that it should be open during the first fifteen days of May, thus giving a name to the quarter now known as Mayfair. In the reign of Henry III. the hospital was rebuilt by Berkyng, abbot of West Minister (1222-46). Henry VI. bestowed its perpetual custody upon Eton College, which to this day owns much of the property, locally styled South Hampstead, beyond Primrose Hill. On succeeding to Wolsey at York Place, King Henry VIII. coveted the prospect that stretched westwards to the view from his new Whitehall. So in 1532 he compounded with the authorities of Eton College, and in exchange for the Leper Hospital, then valued at 100*l.* a year, gave to them Chesham with other property in Suffolk. In the charter of feoffment, statute 23 Henry VIII., c. 21, in conveyance from Abbot Islip (1500-1532) to Henry VIII., is mentioned an ancient landmark, Eye Cross. This stood alongside of the Eya brook, on the confines of the hospital meadow. Some would connect it with the stone cross near to which our Norman kings held their *placita* or public courts and assemblies,—a relic of the Frankish *jours de Mai*. In many records, 22 Edward I. *placita quo warranto*, for example, these are said to have been held "apud stone cross in county Middlesex." About this time, too, the king had from the monks at Westminster, in lieu of their Benedictine cell or chantry at Hurley, Berkshire, some 100 acres, part whereof he converted into the modern St. James's Park. The cell at Hurley had been dissolved by Wolsey for his project of endowing colleges at Ipswich and Oxford. On the eastern verge of his park the king set up a tennis-court, cockpit, bowling-green, and tilt-yard, and, at the further corner, built himself a new house over the hospital site. He assuaged all compunctions of conscience in granting "by his especial grace and his own pleasure" an annuity of 6*l.* 13*s.* 4*d.* to one inmate of the Spital, Jane Harwood by name.\* This is the "faire mansion" cited by Holinshed,—at first known as the Manor, or St. James's, House, shown in its original shape in Wynogarde's view of London, and more clearly in his separate drawing bearing date 1558. Some hold that Holbein, who died 1543, planned the buildings, and that Cromwell, Earl of Essex, superintended the works. What the latter describes as the "sumptuous wall of brick" wherewith Henry enclosed his demesne is mentioned in the statute 28 Henry VIII., c. 12, for determining the limits of the royal palaces in Westminster. The Act rehearses that the sovereign "thereunto adjoining has made a park, walled and environed with brick and stone, and therein has devised and ordained many and singular commodious things, pleasures and other necessities, most apt and convenient to appertain only to so noble a prince, for his singular comfort, pastime, and solace." It will be remembered that he dealt in the same princely fashion with the parks of Marylebone and Hyde. Of the necessities we will say nothing, the other uses for which the park was devised were amply vindicated by Henry and his successors on the throne.

St. James's Palace has none other rival than Windsor in fulness of its chronicles concerning the domestic annals of our dynasties of Tudor and Stewart, Orange and Guelf. It has witnessed the deaths of Mary I.; of Henry, Prince of Wales, after two years' residence; of Anne Hyde, Duchess of York; and, under circumstances of unusual fortitude, of Wilhelmina Carolina of Anspach, wife to George II. During the period 1635-41 Marie de Medici found refuge † in the home of her daughter, the "Rose and Lily" Queen, who here gave birth to Charles II., his brother James and his sister Elizabeth. As in the case of the

\* This incongruous addition to a Tudor gateway has a counterpart in Wren's colonnade,—in itself a fine composition,—of the King's Grand Staircase, Clock Court, &c., at Hampton Court.

† Lord Macaulay's "History of England," chap. viii.

‡ This fen (Tribill) and the Colford (Cowford, in the Green Park) are set out in King Edgar's delineation of the Minister Manor, A.D. 951. But Kemble dates this twenty years later.

\* Rymers's "*Federa*," xiv., fo. 563.

† There is extant a small contemporary print showing the Colford Court, and how "La Reine d'Angleterre se jette aux pieds de la Reine sa mere a son arrivee dans le Palais de St. James."



Tower, this palace has been a prison. King Charles was brought hither from Windsor (January 19th) for trial in Westminster Hall. On Monday, the 29th of January, he bade farewell to his captive children, Henry and Elizabeth, the others being out of the country. The following day, at about ten a.m., he started to walk through the snow to the scaffold before Whitehall, stopping on the way for a cup of water at the Spring Garden by a tree he and his elder brother had planted there. The Loyalist Duke of Hamilton, Arthur, first Lord Capel, and Henry Rich, Earl Holland, underwent imprisonment in St. James's prior to execution of their sentence in New Palace-yard.

At night-time of November 4th, 1877 the Princess Mary was married, in her bed-chamber, to William of Orange. The chapel she subsequently decorated with the flags captured from her father's forces at the Boyne. Here, also, her sister espoused Prince George of Denmark, and here were married two of George II.'s daughters—Anne, Princess Royal, to William, Prince of Orange (1734), whom she determined to have, "even if he were a baboon," and Mary, to Frederick, Landgrave of Hesse Cassel (1740). Their sister, Caroline, died in the palace, comforting herself by deeds of charity, for an unfortunate attachment to Lord Hervey,—Pope's "mere white curd of ass's milk." In this chapel, also, have been celebrated the nuptials of Frederick, Prince of Wales and Augusta of Saxe-Gotha; of George IV. and Caroline of Brunswick; and of her present Majesty, and Victoria, the Crown Princess of Germany.

Having thus recalled some of the history and associations of the building, we may proceed to some consideration of its present contents, regarded from an artistic point of view. This, to be sure, is not the point of view of most of the visitors, for among the immense crowd of persons who are daily struggling, in a quiet and good-humoured way, through the barriers in the courtyard of the Palace, up the staircase and round the rooms, there are probably very few who care one jot about the artistic qualities of what they see. Indeed, if one might judge solely from the remarks overheard, "certainly" would be a better word than "probably." Curiosity, especially about what is connected with royalty, a love of what is costly or magnificent, a loyalty none the less real because shown in a way which benefits rather than themselves than the object of it, and a mere desire for something new, are the feelings which guide most of the feet that pass to St. James's Palace just now. There is, nevertheless, a good deal to be seen there that might tempt the lovers of art and beauty. Apart from the exhibition altogether, there are some good pictures on the walls of the rooms, especially portraits, some of them by artists whose names alone must attract attention, and whose work one ought to see when an opportunity like the present occurs.

The first room at the head of the staircase on entering is hung round with suits of armour; in it there are three valuable presents to Her Majesty from Indian potentates. One of them is a suit of horse trappings of surpassing magnificence, and the others are trophies of enormous elephant tusks mounted upon rosewood stands and covered with golden ornaments, very costly, carved with wonderful skill, and beauty of a sort, but entirely barbarous in conception. These are the presents of the Maharajah of Travancore. In the second room is some old tapestry. The third is fitted with glass cases containing a variety of costly objects, among which we noticed the following as of some artistic value also: a large and beautiful embossed silver bowl, presented by Lord and Lady Rothschild; an enormous centrepiece and vase wrought in steel, with some beautifully-executed medallions containing figure subjects, and some fine damascened work in gold and silver; a tall silver and silver-gilt vase presented by the King and Queen of the Belgians, very beautifully designed and executed; and a simple but exquisitely-formed silver bowl embossed in the style of the last century, presented by the boys of the Charterhouse, perhaps the best piece of English silversmith's work in the room, as far as refinement of form and ornament are concerned. In the same room is a finely-designed and executed vase in dull silver supported by four small nude figures well worthy of their Italian origin. The vase is the present of our fellow-subjects resident in Italy. Another case contains, among other things, a pair of beautiful vases from the Worcester

potteries, ornamented with a delicate foliage pattern of Persian character. The commercial element crops up in this room in the form of a case of presents from manufacturers of Turkey towels, colours, &c., consisting of samples of their wares. Near the door hangs an embroidered quilt from Macclesfield, with some beautiful work in the borders, but the centre exhibits the crown in a nimbus of rays, and that it was that attracted the attention of several persons as we stood by it, not the borders. In the third room the first object to attract attention is a portrait in oil of the Maharajah of Travancore, presented by herself. If it is a faithful witness she must be a very charming person. In this room are a large number of presents from India, consisting chiefly of chased silver jugs, caskets, and cups, mostly very delicately chased in the well-known patterns of which as yet, at any rate, one does not tire. Many are set with turquoise pretty thickly sprinkled, and looking very well in the silver. There are some carved ivory caskets; two of them, from the Maharajah of Kuch Behar and the inhabitants of Bombay, show distinct traces of European influence, but we could not say certainly that they are the worse artistically. One silver casket is in the form of a temple, and there is the model of a palanquin in silver, beautifully executed, and decidedly pretty enough to excuse the puerility of the design. In one case are a number of Indian inlaid and damascened boxes and vases of good shapes, and at the end of the room the Pope's present of a capital copy in mosaic of very small cubes of Raffaele's figure of Poetry in the Stanza of the Vatican, which it is unnecessary to describe.

The next room, which is the throne-room, is chiefly devoted to illuminated addresses in table cases. Most of these are of no artistic interest whatever, and one from the British Consulate at Berlin, otherwise beautiful, is spoiled by a vulgar representation of the British crown in a nimbus of gilt rays. Some ostrich feather screens from the Cape Colony, which occupy a case in the middle of this room, are marvellous in their pure feathery whiteness. In the last room but one are stacked along the wall a number of plain deal boxes containing signatures of subscribers to the Women's Jubilee Offering. The rest of the floor space is occupied by a series of screens, on which are hung collections of water-colour drawings made and presented by the members of the Royal Society of Painters in Water Colours and by the Institute of Painters in Water Colours, among which are to be seen sketches by H.R.H. the Princess of Wales and H.I.H. the Crown Princess of Germany, as hon. members of the two societies, respectively showing that these eminent ladies are at least as skilful with the brush as most good amateurs. Space fails us to mention all the well-known names of the contributors to these collections, and criticism of the few works in which the artists have failed to do themselves justice would be ungenerous. Among the best, we noticed "Roadside Pastures, Picardy," by David Murray; "A Sketch of Dean's Yard, Westminster," by Herbert Marshall; "A Surrey Cottage,"—Mrs. Allingham,—"an old man sitting, with his pipe in his mouth, by the fire to have his portrait taken;" "After Winter Rains," W. Eyre Walker; "Coming into Port, Venice," Clara Montalba; "A Highland Cottage," Birket Foster; two sketches by Mr. Ruskin; "Colliers Discharging," W. S. Wyllie; "Going to Church," Sir J. D. Linton; &c. In the last room is Mr. Gunter's great Jubilee cake, which looks very much as one would expect it to look, as well as some quilts and the banner used at the Children's Festival.

On the whole, there is, a great deal of good work, artistically, among the many offerings by which friends, subjects, and independent admirers have testified their appreciation of a sovereign whose long reign has been productive of so much good to her people, and whose personal character has endeared her to them. English artists, too, may congratulate themselves upon the notably superior artistic character of work produced at home over that which has been sent from most other countries.

**Builders' Benevolent Institution.**—The fortieth annual dinner in aid of the funds of this excellent charity will take place on Thursday evening, Nov. 3, in the Hall of the Worshipful Company of Carpenters, London-wall, Mr. Herbert H. Bartlett, President, in the chair.

#### FLOOD PREVENTION WORKS AT LEICESTER.

LEICESTER has until within the last year or two suffered for very many years from the flooding of the surface of the streets in the lower portions of the town; and entire districts thickly populated (chiefly by the working classes) were, from time to time, inundated; but the several mill-owners along the line of the river Soar, and the canals passing through the town, have also been large sufferers through their mills being flooded and by large and valuable stocks of goods being damaged or spoiled, to say nothing of the number of hands thrown out of work during the inundations, and the sickness and loss of health resulting from the occupancy of the flooded dwellings, which were for months afterwards damp and a source of danger to the inmates. The immediate danger has been met as promptly as circumstances would admit of by the cleansing of the cellars and ground-floors of the dwellings, by the removal of the mud and filth left behind on the subsidence of the waters, and by the use of disinfectants; but it is not to be wondered at that before much could be done the health of the occupants of the flooded houses should have suffered. That the constant recurrence of such inundations has given rise to loud complaints, and been followed in each case by public meetings urging the Corporation to adopt comprehensive measures of relief, is only what might naturally be expected to occur on the part of the inhabitants of any district subject to such inundations.

The Corporation have, in fact, had the subject before them from time to time for the past thirty years. The first report was made to them in November, 1853, by Messrs. Crossley & Foxton, and this report was reprinted in 1861, and again in 1867. In 1869 Messrs. Hawkshaw & Hawkeley reported on the subject, and the late Borough Surveyor reported thereon in 1872.

Acts of Parliament were obtained in 1868, 1874, and 1876 for dealing with the lower reaches of the river, and the sum of about 124,400*l.* has been expended in dealing with the river from a weir constructed in 1875 at Messrs. Evans's Mill to the Belgrave Mill, a distance of 130 chains, and in dealing with the canal from the Lime Kiln Wharf, also to the Belgrave Mill, a distance of 70 chains, including the lowering of the Willow Brook from the Lime Kiln Lock to the Midland Railway, a distance of 60 chains, in connexion with which latter work a new by-pass for a distance of 220 lineal yards through Wood-street, and an additional tunnel 100 yards long under the Midland Railway goods yard, had to be constructed.

The first works undertaken under the 1868 Act, namely, the widening of the Swans' Nest Grass Weir, the construction of sluice gates and cutting of a new channel from Swans' Nest Weir to the Belgrave Mill, a weir at Evans's Mill, and a new flood river channel to Hitchcock's Weir, and the widening of the river beyond, towards Thompson's Factory, have since proved inadequate, and another new weir and further widening of the river between Evans's Weir and the North Bridge have been carried out under an Act of Parliament obtained in 1881, while a new stone weir has taken the place of the Swans' Nest Grass Weir, and the river has been farther widened between it and the Belgrave Mill under the 1874 Act. Fig. 1 is a map showing the works from the North Bridge to the Freeman's Meadow.

The works executed under the 1874 and 1876 Acts are of an extensive nature, and for this account of them, and of the further works, we are indebted to Mr. Gordon, the Borough Surveyor. The works done under the two Acts named consist of a practically new river channel varying from 80 ft. to 90 ft. bottom width, with pitched slopes 2 to 1, and in the lower reach with extra flood slopes giving an increased width of 45 ft. of river in floods. From Evans's Weir to the new weir, which has been constructed at the Abbey Corner in connexion with the new park, the water has been lowered 3 ft. 6 in. From this latter weir to the Swans' Nest New Weir, constructed at Belgrave, the water has also been lowered 3 ft. 6 in. The works have been carried beyond the borough boundary to the Belgrave Mill, where a new towing-path bridge of 100 ft. span across the river has been erected.

Starting back from the New Swans' Nest Weir, where a new lock has been constructed



at a lower level, a new channel has been cut for the canal until the old line of canal is intersected, which has been regulated, widened, and deepened, and is practically a new canal at a 3 ft. 6 in. lower level for a distance of 70 chains up to the Lime Kiln Wharf, where another new lock of 3 ft. 6 in. lift has been constructed.

In connexion with these works a new road 1,000 yards long has been constructed from what was formerly called Sidney-street (but now the Abbey Park-road), right across the Abbey Meadow, and along by the old abbey wall to the abbey lane. Two bridges have had to be constructed for this road, one across the canal, of 45 ft. span and 30 ft. between the parapets, and the other across the river, of three spans, viz., two of 30 ft. and one of 40 ft., also with 30 ft. width between the parapets.

The road along the abbey wall, and at the other end from Belgrave-road to the first bridge, is 40 ft. in width, but between the bridges along the whole length of the park it is 60 ft. in width. These works were originally designed by Mr. Stephens, the late Borough Surveyor, and the detailed plans were worked out by Mr. Hewet, C.E., under Mr. Stephens's directions. The execution of the works was eventually entrusted to Mr. Griffith, C.E., and have been carried through by him under the direction of the Flood Works Sub-Committee, with the exception of the formation of the road between the Belgrave-road and the Abbey-lane, which was carried out under the direction of the present Borough Surveyor, Mr. Gordon, C.E., by Corporation workmen. The works carried out

under the direction of Mr. Gordon by Corporation workmen, under great pressure, in order to be ready for the opening of the park by their Royal Highnesses the Prince and Princess of Wales, in May, 1882. The whole of what is called St. Margaret's Pasture, across which this road runs, has been raised to the level of the new road since, and is now used as a recreation-ground. A new bridge has also been constructed by Messrs. Shaw & Co., of London, across the canal, 40 ft. in width between the parapets, together with improved approaches from Pasture-lane and Lower Church-gate, under the direction of Mr. Gordon, the Borough Surveyor. The expenditure upon the Abbey Park-road, Slater-street extension, Pasture-lane Bridge, and approaches, not included in the previously-mentioned sum, amounts to about 6,000l.

The important works now in progress were lately visited and inspected with much interest by the members of the Association of Municipal and Sanitary Engineers and Surveyors, of which body Mr. Gordon is this year the President. An extraordinary flood having occurred in July, 1880, which flooded about 422 acres of land and streets in the upper reaches of the river above the point to which the River Improvement Works had been carried, the Highway Committee instructed Mr. Griffith to report upon the best means of preventing future flooding. He reported on 23rd August, 1880, and his report was then submitted to Mr. Hawkey, who approved it generally, with some modifications. A Bill was then deposited in Parliament under the advice of Mr. Hawkey.

ironwork of the towing-path bridge across the new weir and the entrance to Mr. Hitchcock's basin was let to the Bridge and Roofing Co., of Darlaston, for 849l. Soon after Messrs. Kellett & Bentley's contract was commenced, the two-span bridge, erected in 1875 over the flood course at Soar-lane as a roadway-bridge to the Midland Railway goods and coal wharf, was washed down, or rendered so dangerous, by the effects of a flood which occurred in 1882, that the portions of it left standing had to be taken down. Under the Act of 1881 it was intended to add another span to this bridge, but this calamity rendered it necessary to build an entirely new bridge of three spans, and the case being pressing, a separate contract was advertised, Messrs. Kellett & Bentley being again the successful contractors. In the meantime the traffic had to be carried on across the adjoining railway bridge. The addition to this latter bridge, with retaining walls and the inverting of the river bed in connexion therewith, was also let to Messrs. Kellett & Bentley.

This section of the work embraces, in addition to the bridge work mentioned, the widening of the flood course for a distance of 533 lineal yards between the Soar-lane Bridges and the North Bridge from the original width of 45 ft. to a width of 75 ft. and 95 ft., the necessary land for the purpose having been obtained from Lord Dysart on the north side, and from Mr. Hitchcock on the south side.

The slopes of the river channel are pitched with rough-dressed granite pitching, 12 in. deep, set with blue lias lime to a height of

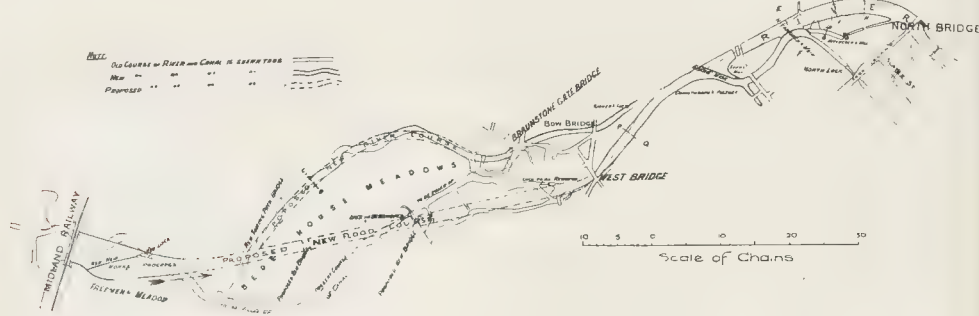


Fig. 1.—Map showing the Leicester Flood Prevention Works from the Freeman's Meadow to the North Bridge.

under the 1868 Act were executed by Messrs. Smart & Thumb, of Nottingham; and Mr. John Lea, of Leicester, carried out the new weir at Evans's Mill and the flood-channel in connexion therewith under the 1874 Act. Messrs. Benton & Woodiwis, contractors, of Derby, executed the works on the river between the North Bridge and Belgrave Mill, including the weir in connexion with the park, the new bridges at the Abbey Corner, and across the canal, also the New Swans' Nest Weir and the canal lock in connexion therewith. The towing-path bridge at Belgrave was erected by Messrs. Richards & Sons, of Leicester. Messrs. Whitaker Bros., contractors, of Leeds, carried out the canal works, including the new lock at the Lime Kiln Wharf.

The new park has been formed upon about 63 acres of the Abbey Meadow, which was subject to constant flooding, but was drained by the lowering of the weirage, while the surplus soil arising from the river excavations was used to form embankments round the park, and also to form mounds and undulations to give artistic effect to the design of the landscape gardeners, Messrs. Barron & Sons, of Elvaston, Borrowash, near Derby, who obtained the premium awarded for the best plans of the park in a public competition, and were entrusted with the superintendence of its laying-out and construction, and with the planting of the whole. The draining, formation of the roads, and other earth works, were carried out by workmen in the employ of the Corporation, under the direction of Mr. Griffith and Messrs. Barron, and the lodges and pavilion were erected from the designs and under the direction of Mr. Tait, architect, Leicester. The total cost of the park works was about 29,340l., exclusive of land. The new road, 520 yards long, from Slater-street to the western entrance, was constructed

The Bill received the sanction of Parliament in July, 1881. Mr. Gordon had in the meantime taken office as Borough Surveyor, under the obligation to take charge of these works in addition to his other official duties; but, as nothing farther than Parliamentary plans had been prepared, nothing could be done until a complete survey on a large scale and detail plans had been made, which, owing to the greater intricacies of the work, and interests involved, was likely to occupy some time. Some of the works under the former Acts, more especially the Canal and Willow Brook Works, and the formation of the Park, were then in full swing, and great efforts were being made to get the latter ready for opening in May, 1882. Little progress was therefore made with the preparation of plans for the new flood works until the new Borough Surveyor was requested to report on the condition or state thereof, when he recommended increased assistance to push them forward. Towards the end of 1882 some time was also lost by an alternative scheme being again revived, on which Mr. Gordon was requested to report, as well as on the probable efficiency of the Parliamentary scheme generally.

A commencement was made in July, 1882, by the lowering of the North Lock, the contract for which, with towing-path wall in connexion therewith, was let to Messrs. Whitaker. The Castle Mill Lock was also lowered at the same time to enable the canal traffic to be carried on when the water was lowered in the town pond to the proposed level of the new weirs. The next contract was let to Messrs. Kellett & Bentley, in April, 1883, for 13,990l. Further works were subsequently let to them, bringing up the value of the works undertaken by them to 20,658l. In connexion with this section, the

3 ft. 6 in. above the water level, or 6 ft. 6 in. above the bed of the river, the remainder of the slope being turfed. The slope is 2 to 1 on the north side, and on the south 1½ to 1 along the Midland Railway Company's wharf, varying along Mr. Hitchcock's garden from a battered wall to a slope of 1½ to 1. Beyond this, along the land of the trustees of the late Mr. Abell, the slope is 2 to 1. In Mr. Hitchcock's garden two bays or arms of the river, the one forming the overflow from the old weir, and the other from four flood-gates, widened out towards the present line of river, and were washed into deep holes, so that the intended pitched slope across these bays had, in reality, to be made more of the character of a strong retaining-wall with a stiff batter, and this had to be continued, in a modified form, all along these premises, as the intervening ground was found to be all made ground of a somewhat treacherous character. The backing up of this pitching, which, in this case, is carried up to the ground-level, consists of lias lime concrete, and is of considerable thickness.

Near to the North Bridge the whole of the works of Messrs. Thompson had to be underpinned for a depth of 5 ft. Those of Messrs. Hawley, Mr. Hollingworth, and Mr. Forsell, had also to be underpinned along the Tail Race of the North Mill, and a new retaining-wall and brick invert had to be constructed in connexion therewith, owing to the immense scour of the water in a flood over a weir which had to be constructed between the higher and lower levels of this race having undermined the foundations.

The new weir constructed at the west end of Mr. Hitchcock's garden is intended to pass the flood waters flowing past the weir higher up the river and through the bridge of the railway company along the canal towards the North



Lock, and will act as an auxiliary to the weir at Evans's Mill. It consists of four spans, each of 5 ft. in the clear, with ashlar piers to carry the straight-run, level-sill-path bridge over it, and will pass 130,874 cu. ft. of water per minute with a head of 2 ft. of water on the crest, notwithstanding that it is calculated that the latter will be drowned to the extent of about 1 foot in an extreme flood. The fall from the crest of the weir to the water below at summer level is 5 ft. 5 in., the depth of water on the low side being 3 ft., and on the high side 5 ft. 6 in. The foundation and body of the weir consist of cement concrete in the proportion of 9 to 1 and 6 to 1, faced with Derbyshire ashlar blocking, the crest stone being granite, hammer-dressed, 3 ft. 6 in. wide and 1 ft. 6 in. deep. The bed of the river for the whole width of 100 ft. opposite this weir, from the toe stone of the weir to the opposite bank, consists of cement concrete varying in thickness from 2 ft. 6 in. to 1 ft. 6 in., and forms therefore an extended apron to the weir. This was found to be necessary owing to the bed of the river consisting of gravel at the level at which it had to be formed. (See cross section, fig. 2.)

At the east end of the weir a new loading basin has been formed for Mr. Hitchcock, of the North Mill, the old and irregular form of the basin having been abandoned at the request of that gentleman, who contributed the increased cost involved. The new walls of this basin are constructed of *lias* lime concrete faced with brindle brick. The entrance to it from the

pipe from the river, and the construction of a new well in the centre of his ground.

The next contract was let in September, 1883, to Messrs. Pilling & Co., of Manchester, and was for that section of the works between Soar-lane and the West Bridge on the one hand, and the Braunstone Gate Bridge on the other, amounting to 28,000*l.*, but to which other works were added under their schedule, and, including another section of the river up to what is known as the Grass Weir, bringing up the total amount of work executed by that firm to 41,473*l.*

This contract included the widening and deepening of the Leicester Navigation from Soar-lane to the West Bridge; and the widening and deepening of the river Soar from its junction with the Leicester Navigation to the Braunstone Gate Bridge, and all works in connexion therewith. It embraced the following works, viz.:—

1. The underpinning of the whole of the buildings abutting on the river Soar between the Braunstone Gate Bridge and the eastern corner of Messrs. Turner's factory, together with such new retaining walls as were required along the route.

2. The providing of an additional flood arch at the Bow Bridge.

3. The diversion of the river in an oblique direction by means of two covered outlets, or tunnels, each of 22 ft. span, for a length of 220 ft., under the Midland Railway West Bridge, station yard, and sidings, in lieu of the old wooden structure, which was almost at right

near Mr. Hitchcock's basin, in time of flood discharge 200,793 cubic feet per minute without the aid of flood-gates. Four sets of flood-gates have, however, been placed in this weir, each 6 ft. broad by 5 ft. 7 in. in height. Two of them are placed in the bay next the Midland wharf, and two in the third bay from the eastern abutment. Part of the outhouses of Evans's Mill have been taken to give a better water-way for this weir, and land at the eastern end of the weir, which could not be utilised for weir purpose, has been given up in exchange. The weir and the towing-path and retaining walls are of similar construction to those previously described.

The underpinning has in all cases been done with brickwork in Portland cement, and faced with brindle bricks to the height of the water-line. The entire bed of the river between the toe of the weir to and through the Soar-lane Bridge is lined with 9 in. of brickwork in cement on a bed of 15 in. of lias lime concrete, the finishing ring of brickwork being brindle brick. There are 4,879 square yards of this class of work below this weir, forming one continuous apron through the bridges.

In widening the canal above the weir, part of the old station, and more particularly a portion of the original board-room and birth-place, it may be said, of the Midland Railway Company, had to be demolished, together with stabling and storage buildings, while for the diversion of the River Soar under the railway, cottages and other stabling were acquired and removed.

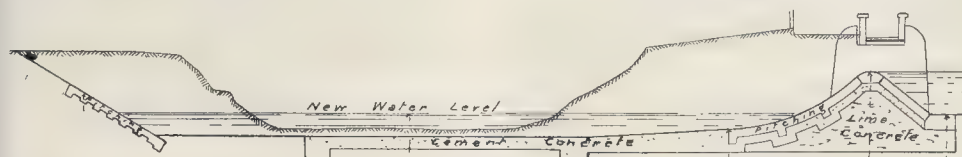


Fig. 2.—Cross Section of River Soar Improvements on line EF of Map through, Hitchcock's Weir.  
(N.B.—For "Lime Concrete" read "Cement Concrete.")



Fig. 3.—Cross Section of New Weir on the River Soar at Leicester, opposite to the Freeman's Meadow (see Map).

canal is spanned by a wrought-iron bridge of 70 ft. span in continuation of the towing-path, and giving a clear headway of 8 ft. for boats and barges passing into the basin.

Between Soar-lane and the North Lock the canal has been widened and deepened, with the object of giving increased sectional area and lowering the water to the extent of 1 ft. 10½ in. The depth of water at the lower level is 5 ft. 6 in., although the original depth was not more than 4 ft. 2 in., so that the bed of the canal has been lowered about 3 ft. 2½ in. The increased sectional area thus gained and the lowered level of the water will, it is anticipated, fully prevent future overflowing of the river and flooding of the district. New towing-path walls have been constructed throughout the whole of this length, consisting of cement concrete, the length between Soar-lane and the new weir being faced with brindle brick, that between Hitchen's basin and the North Lock being floated and rendered with cement and lined. On the opposite side, along the Midland Railway Co.'s wharf, a similar wall has been constructed, but of lia lime concrete, all these walls being coped with a heavy ashlar coping.

Heavy underpinning works and new retaining walls had to be executed in connexion with Messrs. Collier & Messrs. Bowmar's premises adjoining the North Lock. New intakes and water supply works, consisting of wells and settling-tanks, had also to be carried out in connexion with these works, and similar works have had to be executed for Mr. Hitchcock, including in this case the laying of a 12-inch

angles to the canal and railway, and which caused such serious obstruction to the flow of water in the past.

4. The widening of the river between the Bow Bridge and the above outlet on land taken from the railway company, and the construction along such length of a heavy retaining wall with a protecting railing along the top thereof.

5. The widening and deepening of the canal from the West Bridge to Soar-lane, the land required for these works being taken from the Midland Railway Co.'s West Bridge Station at great cost.

6. A new towing-path wall constructed from the West Bridge to Evans's Weir, beyond which, for a length of 110 yards to Soar-lane Bridge, the height of the retaining wall is 16 ft. above the bed of the river, protected by an iron railing.

On the opposite or east side of the river various new river walls have been constructed and a considerable amount of difficult underpinning of buildings completed. For a length of 120 ft. at the back of houses in All Saints'-road and All Saints'-place, it was thought advisable to take down the outhouses, in the shape of wash-houses, water-closets, and ashpits, resting on the river wall, and to rebuild them after a new retaining wall had been built, rather than attempt to underpin the old wall and buildings.

The new weir at Evans's Mill consists of six bays or spans, each 50 ft. in the clear, with piers between them to carry a wrought-iron towing-path bridge. This weir will, therefore, with a head of 2 ft. 6 in. of water on it, acting as a drowned weir, as in the case of the weir

The additional section added to this contract already referred to was a very expensive diversion of the Old Soar from the Branstone Gate Bridge to the Grass Weir, including the bridge, which is 45 ft. span and 220 ft. in length, and the cost of which was 7,310*l*. The additional cost of this section, including the bridge, was 10,763*l*, bringing up the expenditure under the 1881 and 1884 Acts, to 110,000*l*. This includes, however, lands purchased under compulsory powers not yet dealt with, and from the sale of which there will be a surplus which will go towards the works yet to be executed.

The extreme length and peculiar construction of the above bridge arose from the necessity of improving the flow of the river, which formerly crossed Braunstone Gate at right angles through the old Roman bridge, and also from the need of providing for a new road to open up land belonging to the Corporation, being at the same time the commencement of a much-needed means of communication between the eastern and western portions of the town.

The works of the upper reach now in progress and partly let, and for which further borrowings powers to the extent of 60,000*l.* under an Act of 1884 had to be sought, consist of making an entirely new river channel about a mile long in lieu of the present canal from the West Bridge to the viaduct of the Burton Branch of the Midland Railway, and of widening and deepening the river Soar for a length of 920 yards from the Old Grass Weir to the junction with the aforesaid new river channel at a point near the present bathing station. The present Castle Weir and lock will both be done away with



entirely, and the water above this point lowered to the extent of 4 ft. 10 in. for a distance of 483 yards up to the Swans' Mill Lock, which will also be done away with, and the level of water in the canal lowered to the extent of 7 ft. 6 in. from this point upwards for a distance of 1,000 yards to the new weir and lock, with a lift of 7 ft. 6 in., now being constructed at about 130 yards from and below the railway viaduct, opposite the Freeman's Meadow (see fig. 3). This channel, which is to answer as a navigable canal, will be in one pond or level throughout, and will be capable of carrying a maximum flood to the point at which the old Soar branches off, and two-thirds of the flood water below that point. It will have a bottom width of 60 ft. for the latter section, with slopes of 2 to 1, pitched with granite pitching 12 in. deep to a height of 4 ft. above the water-line on the one side, whilst on the other side there will be a concrete towing-path wall faced with brindle brick and provided 2 ft. above the ordinary water-level. The towing-path will be 10 ft. wide, and the slope on the west side thereof also 2 to 1. The slopes on both sides of the flood course will be carried up to a height of 3 ft. 6 in. above the anticipated flood level.

The old river Soar proper will be intersected by the new flood course about 170 yards to the north-west of the present stone weir, and will be regulated and deepened with a bottom width of 30 ft. and slopes of 2 to 1 from this intersecting point down to the Old Grass Weir, which will be demolished, and the surface-water level of the river lowered to the extent of 4 ft. 10 in. for a distance of 920 yards, making one continuous pond or level of one mile and a half in length, from the Freeman's Meadow to the North Lock.

As a part of this scheme it is proposed to widen the West Bridge, to give increased waterway, effecting at the same time a much-desired street improvement by the erection of a new bridge for a greater width of roadway, at a lower level, with an improved gradient. It is also intended to provide for other bridges along the new flood course for opening up the Corporation estate lying between the canal and river, and for which, together with new roads, the Estate Committee has made a provision of 15,000l. In connexion with this provision, a new road, extending from Braunstone Gate across the river and new flood course into the Newark, was projected and discussed by the Council, and plans deposited with Parliament, but eventually withdrawn. In October, 1881, a plan was prepared by the Borough Surveyor, under the directions of the Estate Committee, and approved by the Council, for other new roads in connexion with the flood scheme, but these are not included in the estimates for works now authorised farther than that no doubt some of the requisite bridges will be carried out.

The new flood course forms nearly a straight line from the proposed new weir to the West Bridge, crossing both the old river and the canal, and the works yet to be completed will have to be carried on in such a manner as not to interfere with or interrupt the traffic of the Leicestershire and Northamptonshire Union Canal.

At the junction of the Old Soar with the flood course, the towing-path will be carried over the mouth of the former by a wrought-iron bridge of 90 ft. span. The weir and lock now being constructed near the railway viaduct are similar in construction to those already described, excepting that the section of the weir and lock walls are proportionately greater, and suited to the greater lift of 7 ft. 6 in., which this lock will have. (See cross section, fig. 3.) The length of the weir will be 500 ft. clear of all obstructions, as there will in this case be no piers, as with those previously described. A maximum flood of 490,000 cubic feet per minute will give a head of 2 ft. 5 in. on the crest of this weir, thus reducing the former flood level from 2 ft. to 3 ft. on the high side of the weir, and beyond the railway to a considerable extent, even if no widening and deepening of the river and canal towards St. Mary's Mills be undertaken. The contract for this weir and lock, and the flood basins of about 5½ acres in extent in connexion therewith, was let to Mr. Evans, of Birmingham, in March last, for 18,000l., and will be completed in March next. It is proposed to raise the whole of the land belonging to the Corporation, and called the

Bede House Meadows, 3 ft. 6 in. above the anticipated flood level, and to form an embankment on the east side of the new flood course up to the new weir, on the high side of which the embankment will be correspondingly higher. The lowered summer water level of the whole of this section, and the reduced flood level which it is anticipated will ensue from the removal of the Castle Mill and Swans' Mill locks, together with the increased sectional area given to both the new flood course and river, will have the effect of freeing from flooding the whole of the land hitherto subject to it, and afford increased facilities for drainage, the lowering of the water and flood lines being, in fact, equivalent to a raising of the entire district several feet above the river and canal,—advantages which must result in an inestimable improvement of the sanitary conditions of the whole of the districts affected.

The money spent and to be spent upon these works for the prevention of floods has been—

Under the Acts of 1868 1874 and 1876 .....	£124,991
Act of 1881 .....	65,000
Works in progress and yet to be let under Act of 1884 .....	80,000
Roads and Bridges, 1886 Act .....	16,000
	£285,991
Purchase of Abbey Meadow, 68 acres of which have been devoted to the formation of the Abbey Park for .....	£40,258
Construction and laying-out of park .....	29,340
Approaches and roads .....	6,000
	75,598
	£361,589

We may add that the members of the Association of Municipal and Sanitary Engineers and Surveyors were much impressed with the magnitude and importance of these river works, which are such as are seldom seen in an inland town.

## Illustrations.

### EXAMPLES OF SPANISH MEDIEVAL ARCHITECTURE.

SAN JUAN DE LOS REYES, TOLEDO.

**T**HIS church was erected by Ferdinand and Isabella in 1476, noted by Street as "the only great Gothic work in Toledo besides the cathedral." Street says, "there is a nave of four bays, a cimborio or raised lantern at the crossing, roofed with an octagonal vault with groined pendentives, quasi-transapses (they are, in fact, mere shallow square recesses), and a short apical choir of five unequal sides." The view, from a photograph by Laurent, of Madrid, shows the choir end of the building.

SAN ESTEBAN, SEGOVIA.

**T**HIS view (also from a photograph by Laurent) shows as a main object the remarkable thirteenth-century steeple, with arches slightly pointed in the lower stage, the point apparently gradually disappearing as the work ascends, till the upper stage shows a completely round-arched arcade. Street expresses great admiration for the effective manner in which the angles are treated, not with an ordinary angle shaft, but as a large spire with a shaft set in the centre of it. The illustration also affords curious evidence of the little reliance which is to be placed on engravings made from sketches even under the best superintendence. It may be supposed that no author would have been more careful than Street about the correctness of his illustrations; yet the view in his book shows two faces of the tower, one of them the same that is shown here, with the arches in the third and fourth stages decidedly, and even rather sharply pointed; the incorrectness of which will be obvious from a glance at the illustration produced from a photograph of the actual building.

### EDINBURGH MUNICIPAL BUILDINGS COMPETITION.

We publish this week the two principal elevations submitted by Mr. G. E. Corson, of Leeds, in this competition, together with a small scale-plan of the floor on the level of the entrance from High-street.

### BRADFORD NEW POST-OFFICE.

This building has been erected on a site purchased from the Corporation, and having an area of about 2,500 yards, it being part

of the arrangement that the area in front of the new building should be maintained as an open space. The building is faced with Bolton Wood stone, the rear portions having dressings of the same, the walls being from the Heaton Quarries. The roofs are covered with Bangor green slates. The public entrances have polished Shap granite architraves, and the doors are of wainscot. The lobbies are faced with Bolton Wood stone, and doorways to the public offices are of oak, with pilasters and pediments on the inner sides. The public office is 60 ft. in length by 30 ft. in width, and has a dado of Burmantofts falence, the ceiling is panelled and ribbed, and the beams are supported by pilasters. The sorting-office, in the rear of the public office, is 155 ft. in length, with an average width of 32 ft. There are also on the ground-floor registered letter, private box, and inquiry offices; also offices for the Postmaster, clerks, and medical officer, and rooms for the messengers. A roadway extends round the rear of the buildings, part being roofed over for a cart-shed and loading platform. The principal posting-boxes are under the portico at the northern end of the front, but there are also posting-boxes in the public office. The instrument-room, the dimensions of which are 86 ft. by 29 ft., is on the first floor, where are also placed the telephone and superintendent's rooms, retiring-rooms for male and female clerks, approached from the roadway at the rear by separate staircases; and on the second floor are the battery-room, the office of the telegraph inspector, rooms for the linemen and mechanics, and the caretaker's apartments. The basement is occupied by stores, kitchens for clerks, postmen, pneumatic apparatus, engine, &c. The general contractors were Messrs. Beauland, of Bradford; the carving to the central dormer and panels over windows were executed by Mr. Frith, of London; the wrought and cast-iron railings and gates by Mr. Tomlinson-Walker, of York; the clock was supplied by Messrs. Potts, of Leeds; the internal fittings by Mr. Elder, of Hayes; and the public and sorting offices and instrument-rooms are lighted by Founess lamps. The architect is Mr. Henry Tanner, and the clerk of works was Mr. Thomas Leake.

### COMPETITIVE DESIGN FOR WILLESDEN PUBLIC OFFICES.

This design, submitted by Messrs. Newman & Newman, was placed second in the competition for the proposed Public Offices at Willesden.

It appears that the design placed first, by Mr. Harner, was formally accepted, subject to its being capable of being carried out at a cost of not more than 6,000l., the stipulated limit. It appears that the lowest contractor's estimate is considerably above that sum, and the authors of the second-placed design ask, with some reason, whether they ought not to have the opportunity of showing whether their design comes within the stipulated cost. In strict equity they certainly have a right to make this claim, and to have it considered.

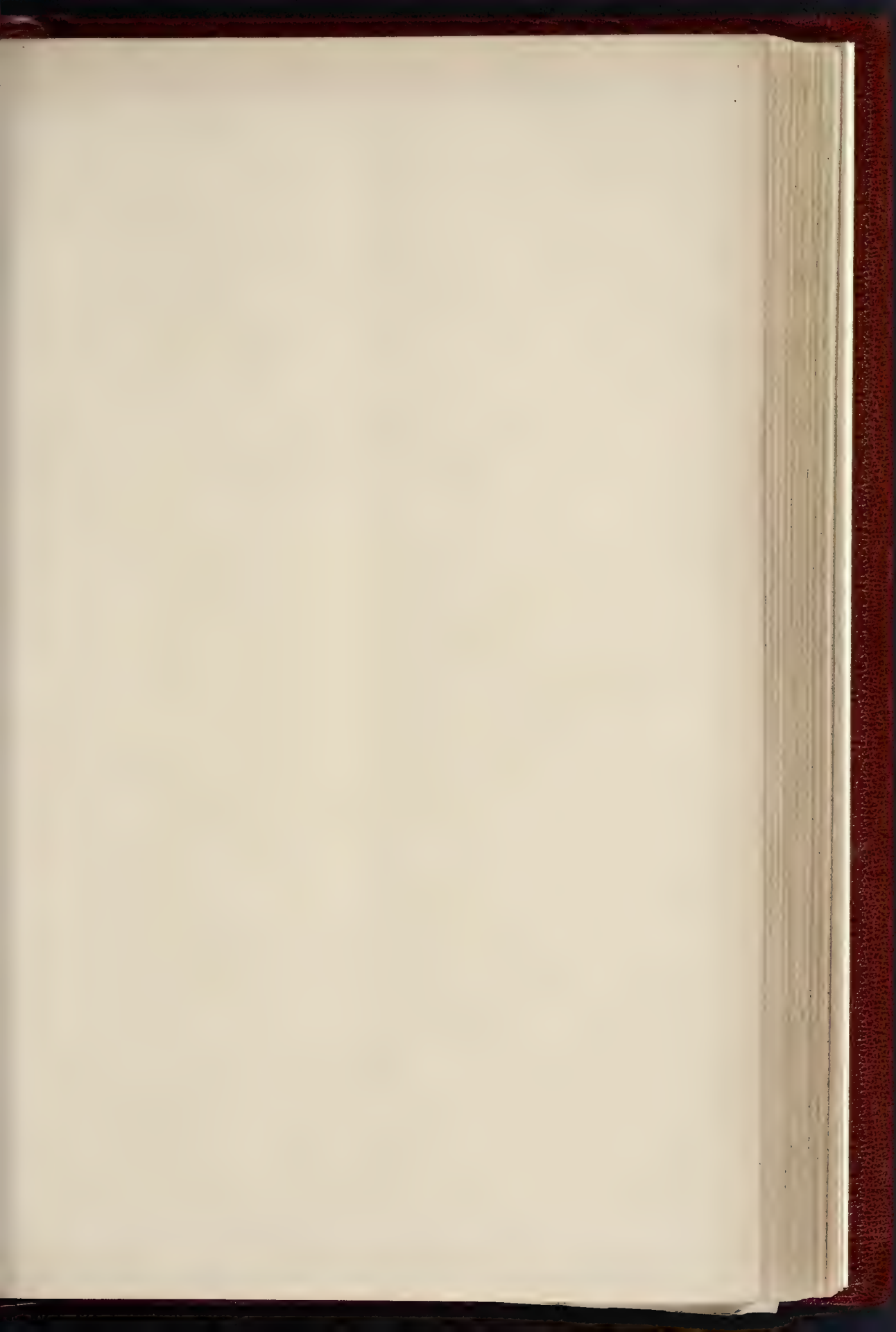
### CONGREGATIONAL CHURCH, GEORGE-STREET, CROYDON.

The total length of this church is 108 ft., and width 54 ft., providing sittings on the ground-floor for 800, and over 200 in an end gallery, the aisles being so arranged that side galleries can be added if needful. There are two main entrances to the ground-floor of the church in front, also two separate staircases to the end gallery and two back entrances, all with swing doors. Thus the church is rapidly emptied.

Beneath the church is a large school-room, 15 ft. high, and capable of seating 600 people at a public meeting, whilst class-rooms annexed give a total capacity for Sunday-school work for 1,100 children.

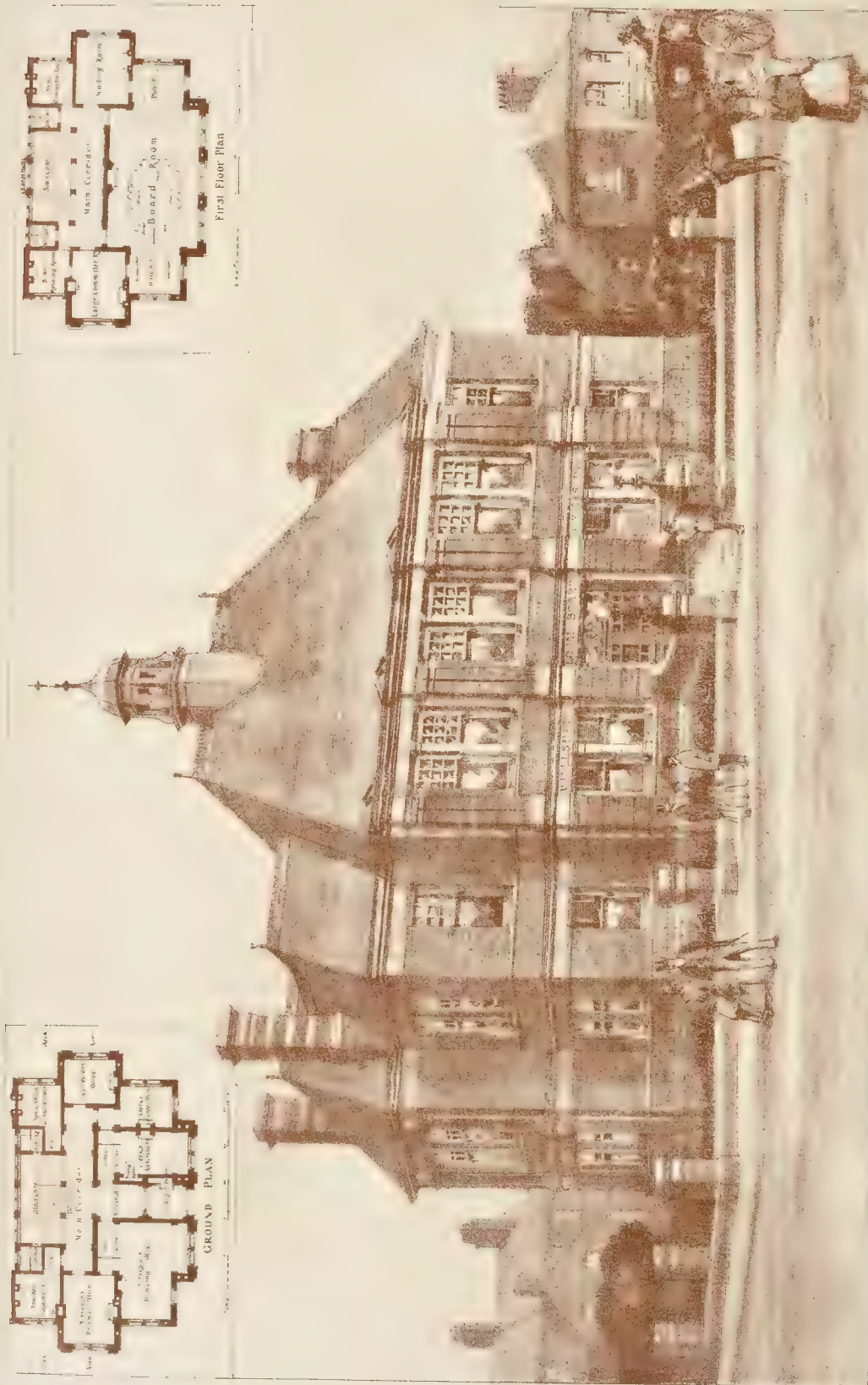
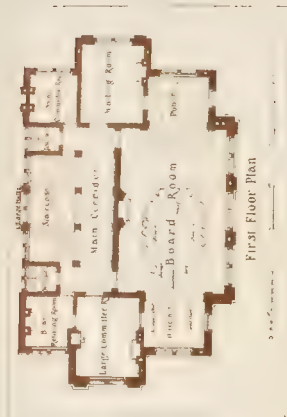
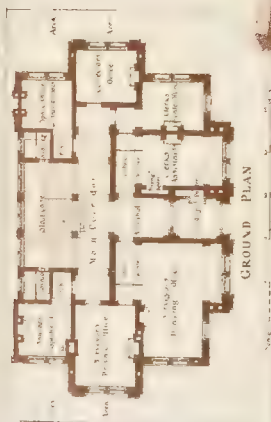
Internally, the church is faced with ganit bricks, and has Bath stone dressings and arcades,—the school and rooms being plastered. Externally, the front as shown is faced with Kentish rag.

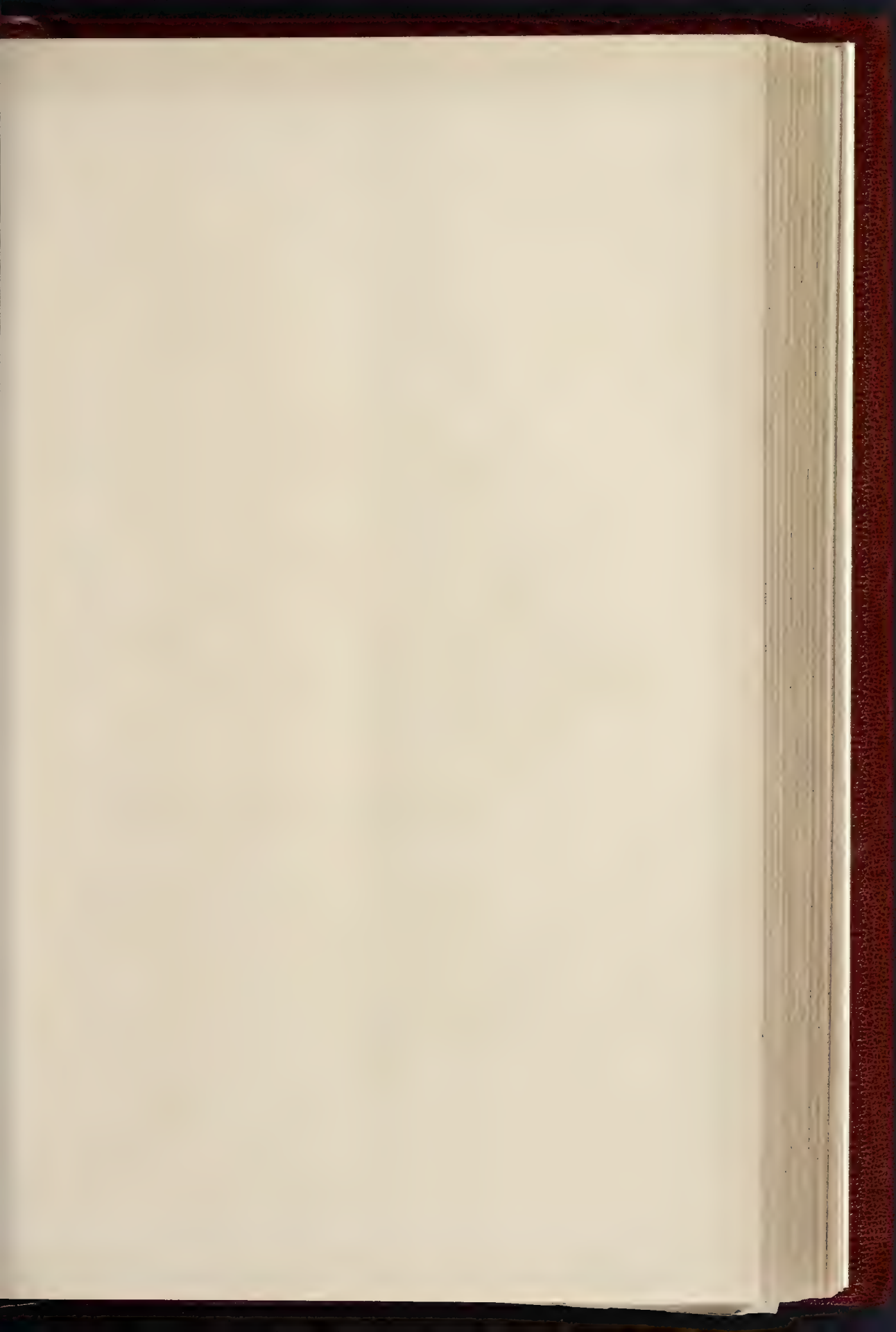
The total cost of the whole was 9,700l. (exclusive of upper part of tower and spire, which is not yet erected), the contract being carried out by Messrs. Perry & Co. Mr. John Sulman, of London and Sydney, being the architect.



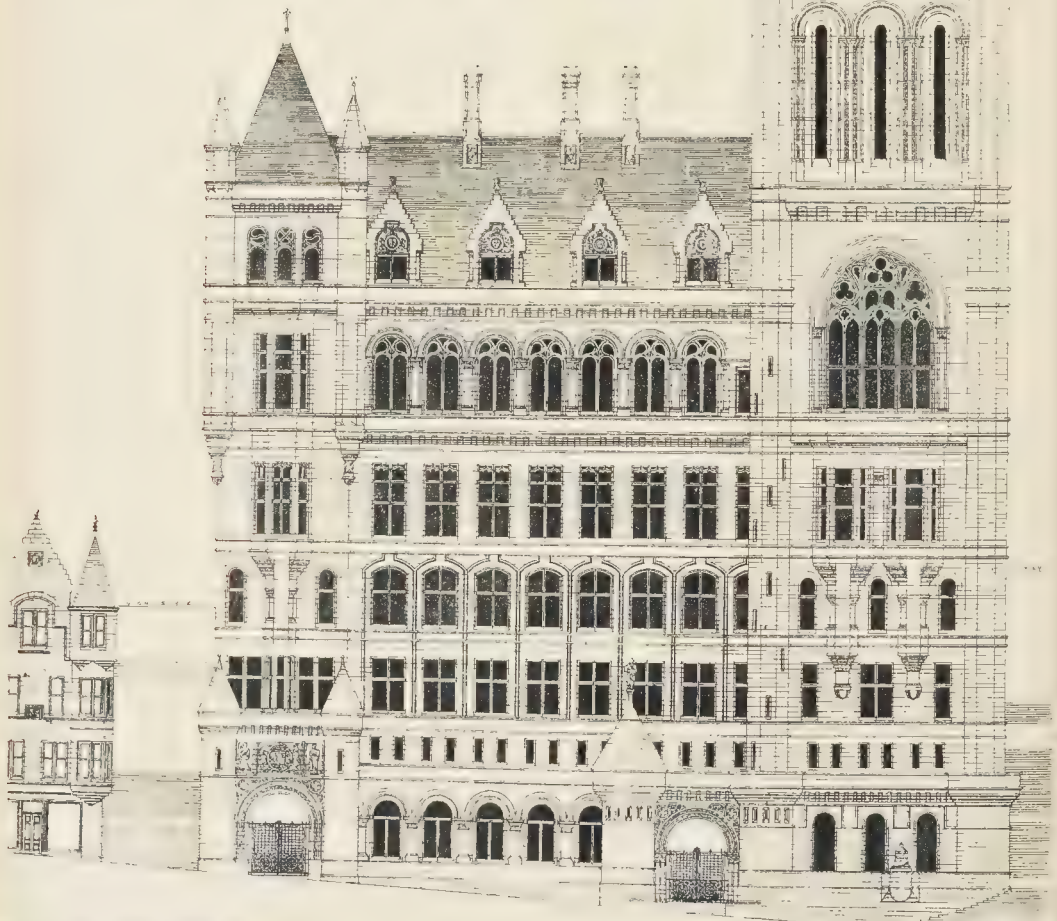
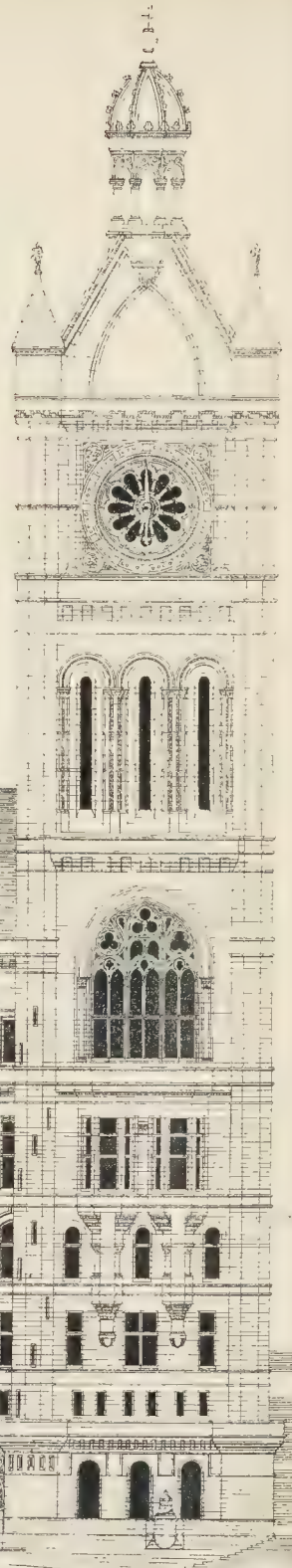


THE BUILDER, OCTOBER 22, 1897.

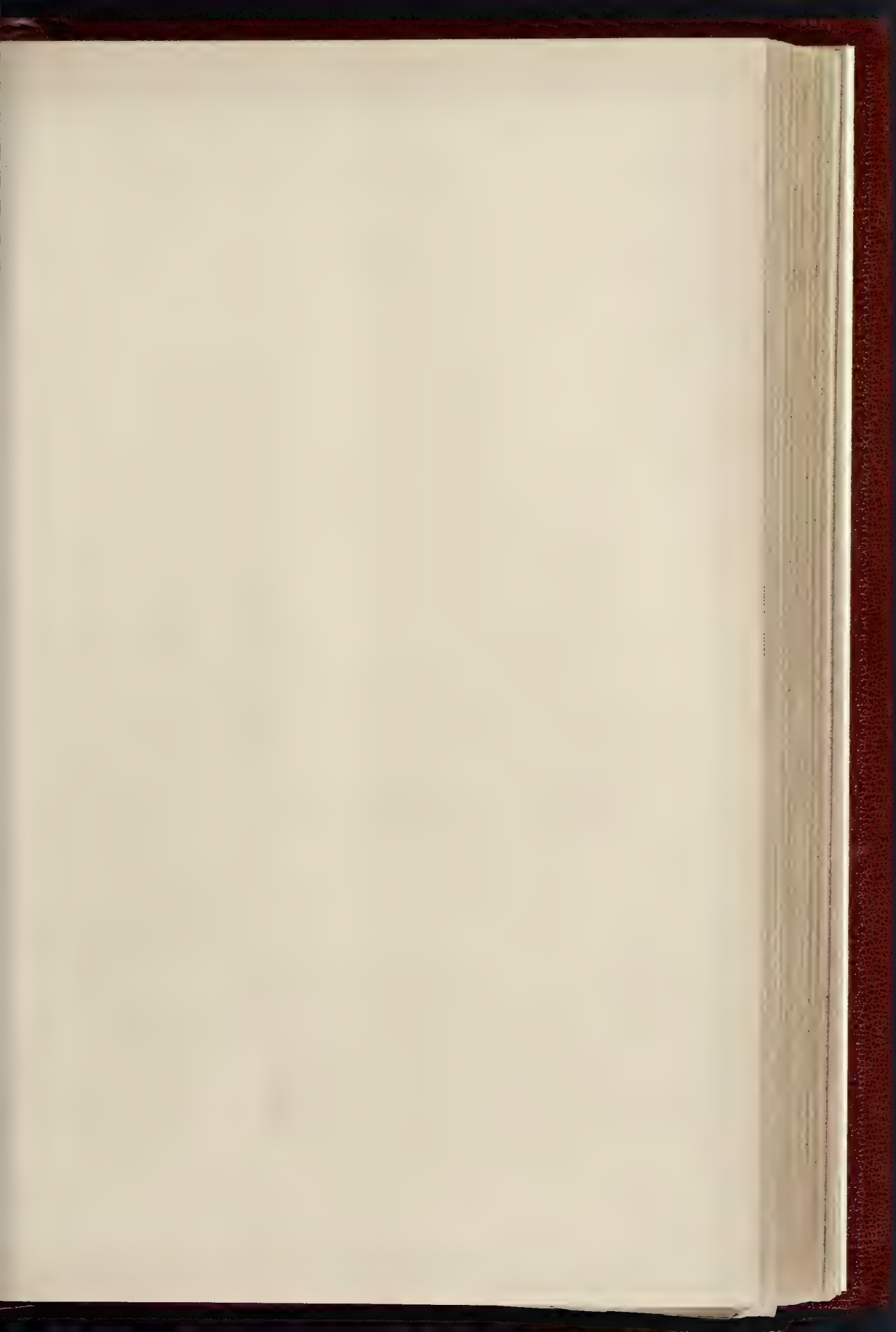








COMPETITION DESIGN FOR EDINBURGH MUNICIPAL BUILDINGS. By MR. G. E. CORSON  
ELEVATION TO COCKBURN STREET.







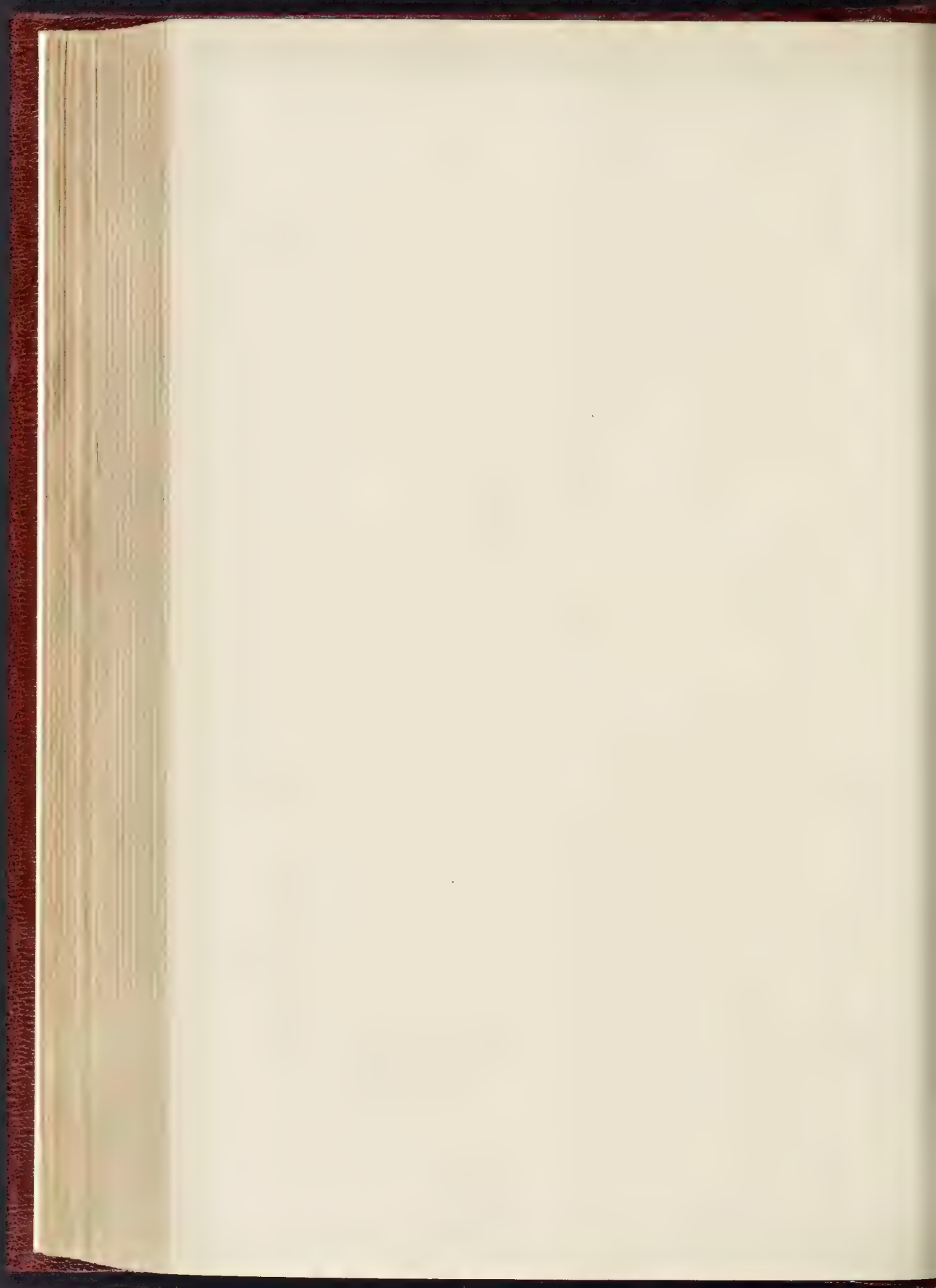
CHURCH OF SAN JUAN DE LOS REYES, TOLEDO.

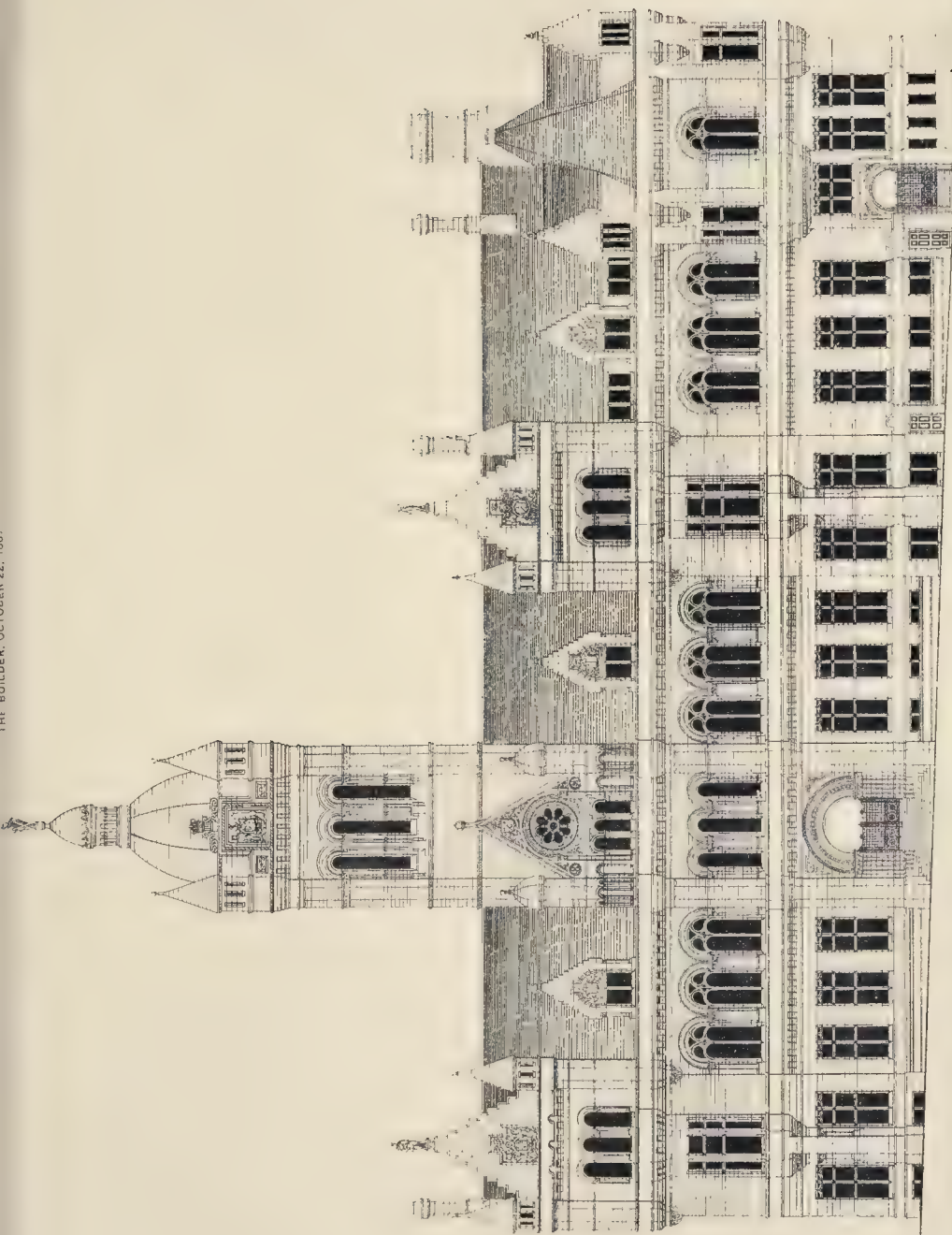
THE BUILDER, OCTOBER 22, 1887.



CHURCH OF SAN ESTEBAN, SEGOVIA.





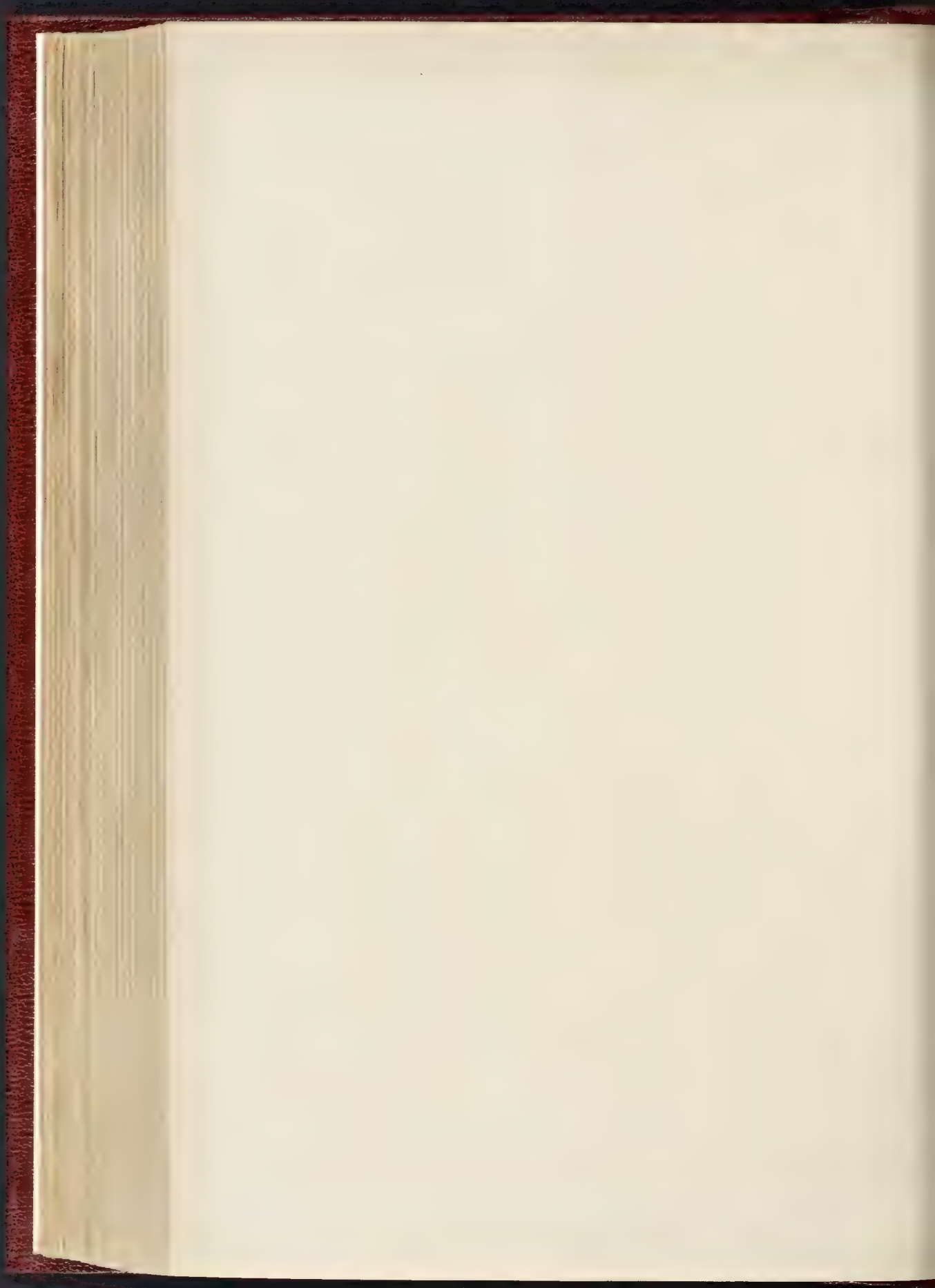


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COMPETITION DESIGN FOR EDINBURGH MUNICIPAL BUILDINGS.—By MR G. E. GOSN.

ELEVATION TO HIGH STREET

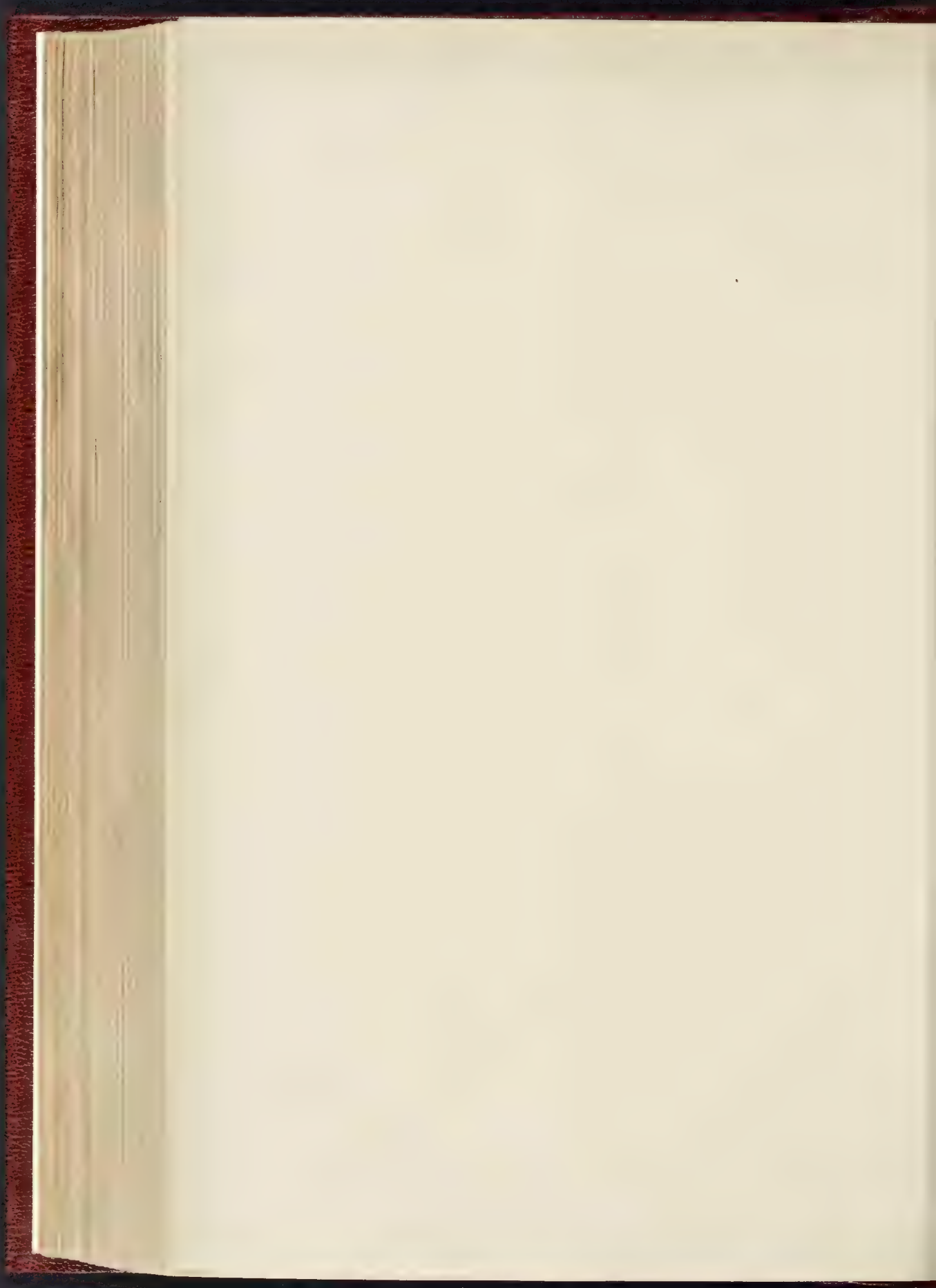


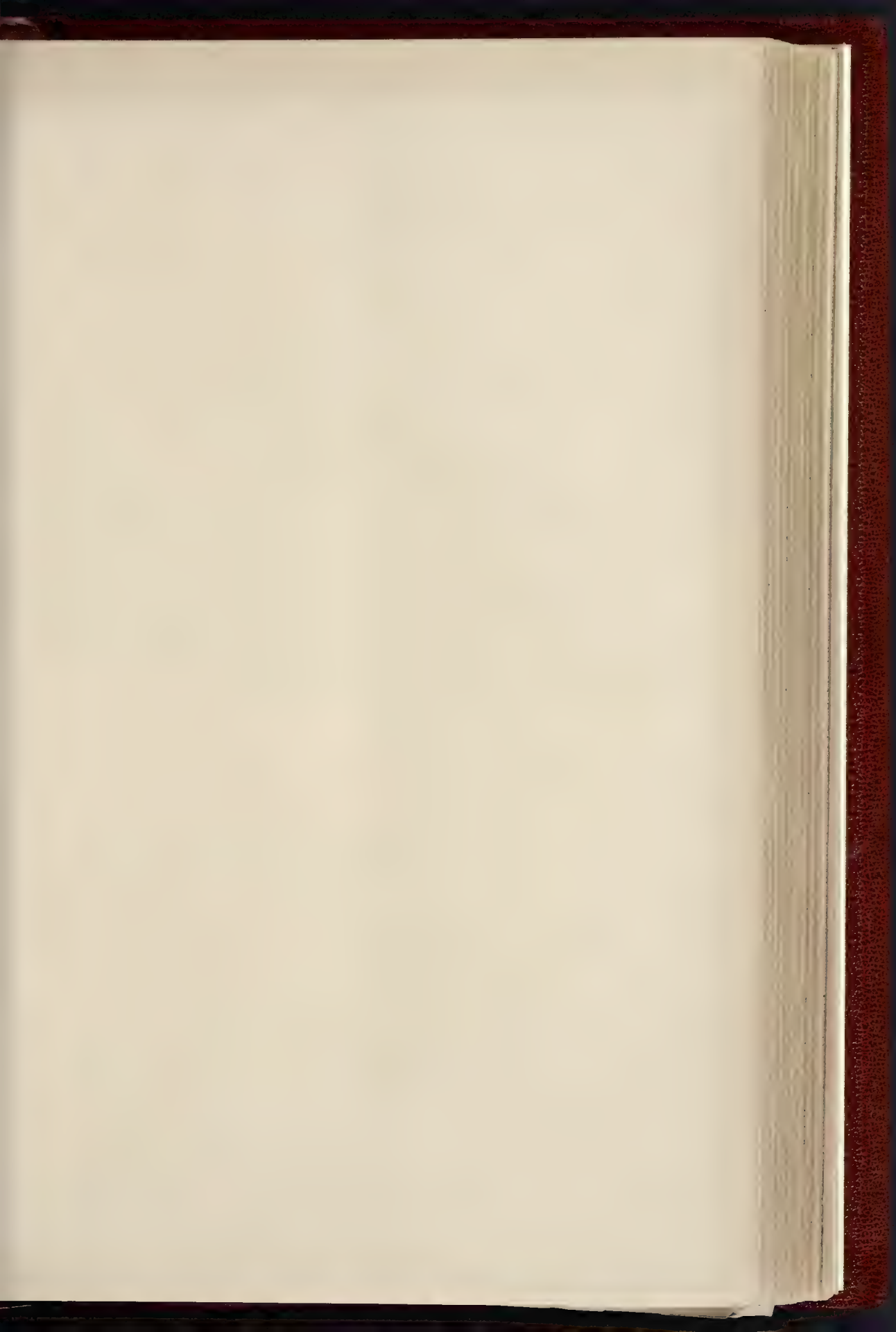




CONGREGATIONAL CHURCH, CROYDON—MESSRS POTTS, SULMAN AND HENNINGS, ARCHITECTS.





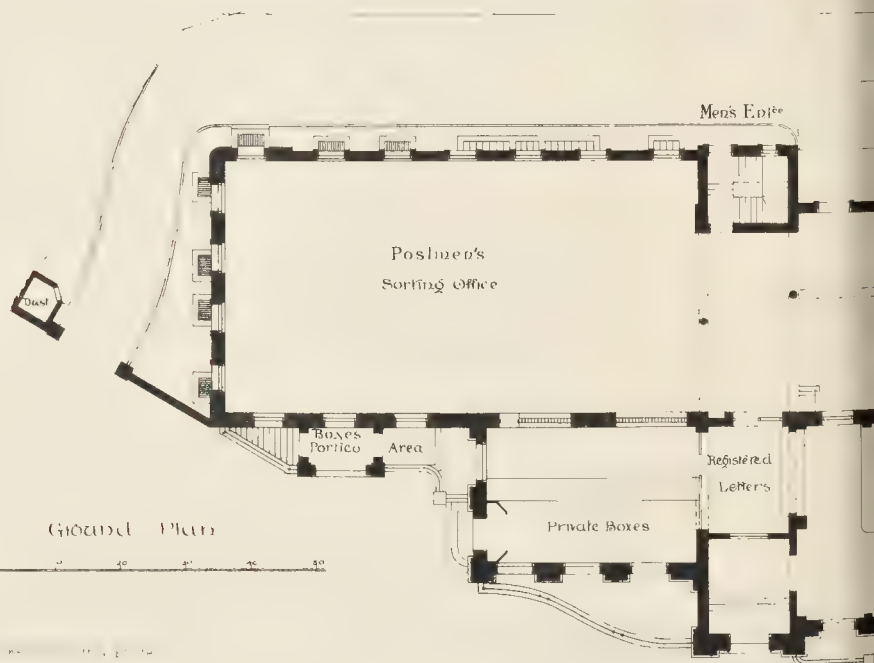






Plan

0 10 20 30 40 50



Ground Plan

0 10 20 30 40 50



—MR. HENRY TANNER, ARCHITECT.





## ARNOLD'S CEMENT TESTER.

Mr. ARNOLD's method consists in making the briquette by filling the mould with a proper quantity by weight of dry cement, and then consolidating it under a press (see fig. 1),

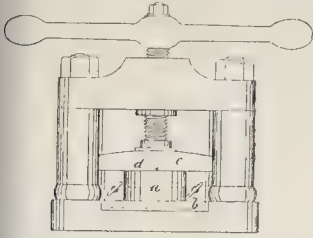


FIG 1

the requisite amount of water necessary being sucked up from a bath by the cement while the briquette is under the press. The moulds (see figs. 2, 3, and 4) are made

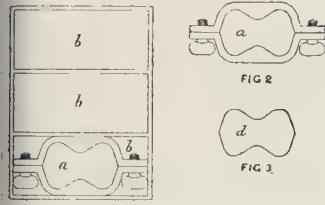


FIG 2

FIG 3

FIG 4

deeper than required for the section of the briquette. Metal dies, which exactly fit inside the mould, are placed upon the top of the cement before it is inserted in the press, so that when the die is properly pressed down, its top is level with the top of the mould, and no further compression can take place. Thus a uniformity of pressure is insured upon each briquette moulded from the same cement. But as the moulds are filled by weight, the bulk would vary with cements of different weights per bushel, and a slight difference in the pressure would be the result, with the use of cements of various qualities, unless different thicknesses of dies were employed.

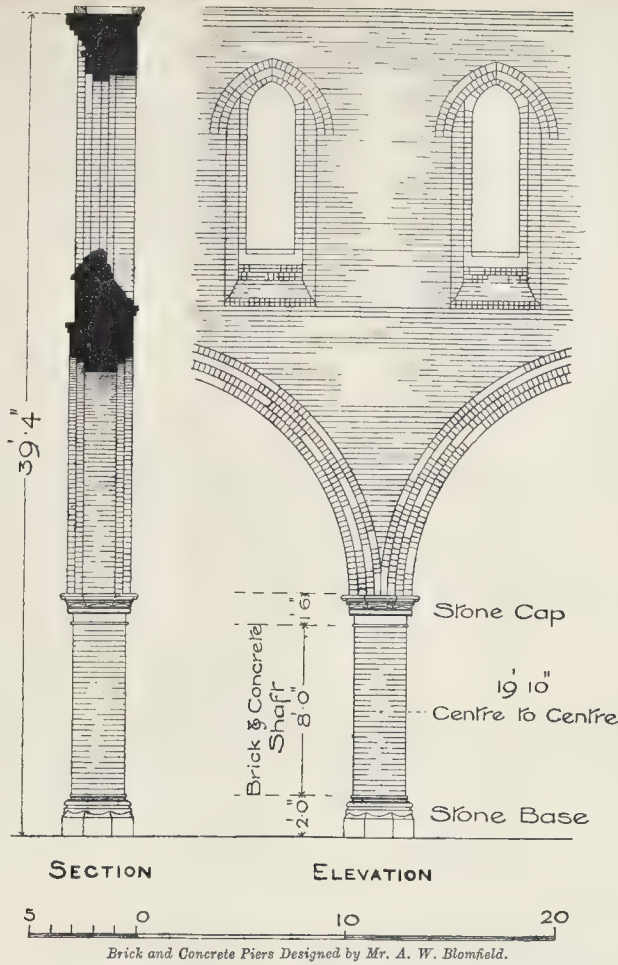
The chief advantages possessed by Arnold's machine appear to be the following:—An experienced man is not absolutely essential to form the briquette. The cement takes up the required quantity of water, and no more. Thus the sample is neither drowned nor parched. The section of the fractured area is free from air-bubbles, and the results of the tests from the same cement show a greater uniformity than can be obtained by hand-moulded briquettes.

The following advantages are also claimed by the patentee, which, if borne out, will prove of great importance to those engaged in testing cement, viz., that evidence of a blowing cement will be noticed in twenty-four hours after moulding the briquette, and that owing to the cement not being disturbed after its admixture with water, particles of free lime can be detected at the fractured area.

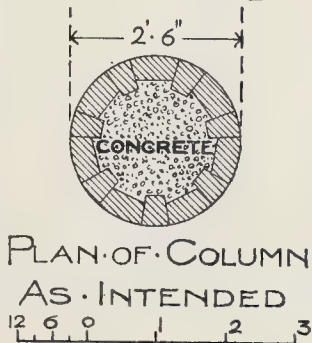
It may be anticipated that a greater strength will be indicated by the machine-made briquettes, while hand-made briquettes will give a result nearer that obtained in actual practice, and probably some slight modification in specifying cement would be required to obtain the ordinary quality of cement if Arnold's process were generally adopted.

While on the subject, we may observe that it would be a great advantage in the way of fairness and the avoidance of disputes between consumers and makers of cement, if one form of testing machine were universally adopted, though we cannot say that we think it at all probable that any such uniformity will be arrived at for some time to come.

**Obituary.**—We record with much regret the death of Mr. Robert Hunt, F.R.S., late Keeper of the Mining Records, which occurred on the 17th inst. Mr. Hunt, who had recently completed his eightieth year, was a voluminous writer upon scientific subjects. Besides producing several works of his own, he edited three editions of Ure's "Dictionary of Arts, Manufactures, and Mines."



Brick and Concrete Piers Designed by Mr. A. W. Blomfield.



## STRENGTH OF BRICK AND CONCRETE PIERS.

SIR.—Some time since, in designing a large brick church, I determined, for several reasons, to employ in the nave arcade circular columns 2 ft. 6 in. in diameter, constructed with an outer casing of purpose-made radiating Leicester bricks in cement, and a core of Portland cement concrete composed of fine shingle and sand and cement in the proportion of three to one. This mode of constructing the columns was objected to as unsafe, and ultimately I had to give way and substitute Bath stone, as the work could not be delayed sufficiently long to test by experiment the safety of my first intention.

No doubt of it had ever occurred to my mind, and my experience of the strength of Portland cement concrete, extending now over many years, gave me such confidence in the correctness of my judgment that I determined, with an eye to the future, to make some experiments with the assistance of Messrs. Kirkaldy.

These trials have lately been carried out, and I now enclose Messrs. Kirkaldy's report. I also send drawings of the columns I intended to use, and of the short lengths submitted to the tests.

I should mention that no column of larger diameter than 2 ft. can be tested in Messrs. Kirkaldy's machine, so that I could not submit a section of the column as actually designed, nor could I use the purpose-made radiating flat bricks. I therefore caused shafts 3 ft. long and 2 ft. in diameter to be constructed with rough-cut Leicester bricks, which being frogged were less suitable for the purpose and more liable to crack under pressure; the core was filled with concrete such as I intended to use.



These shafts resisted the greatest pressure which Mr. Kirkaldy's machine could bring to bear without crushing, and with no apparent injury except to the casing of bricks. They may now be seen, exactly as they left the machine, in the yard of Mr. Woodward, 96, Curtain-road, E.C.

Seeing that Portland cement concrete continues to increase in strength for many months (some authorities say two years) after it is made, and that these shafts had only been made four months; that they were not so perfectly constructed as the actual columns would have been; and that owing to the limited capability of the machine the pressure could

not be continued to the crushing point, the experiments were neither so exhaustive nor so satisfactory as could be wished, but the results are extremely interesting as far as they go, and sufficient to prove conclusively the ample strength of such columns as I intended to use.

In this particular case the weight on each column, allowing for wind pressure, could never have exceeded fifteen tons per square foot of sectional area.

ARTHUR W. BLONFIELD.

October 5th, 1887.

Subjoined is Messrs. Kirkaldy & Son's statement of the results of their tests:—

*Report on Results of Experiments in Testing Composite-Columns, Concrete and Brick, for Mr. Arthur W. Blomfield, by Messrs. David Kirkaldy & Son, 99, Southwark-street. October 1st, 1887.*

Results of Experiments to ascertain the Resistance to Thrusting Stress of four 12-in. Cubes of Concrete, mixed here by Man from Mr. J. Woodward:—

Test No.	Description.	Dimensions.	Base Area.	Cracked slightly.			Crushed, steelyard dropped.		
				Stress.	per sq. in.	per sq. ft.	Stress.	per sq. in.	per sq. ft.
V.		inches.	sq. in.	lb.	lb.	tons	lb.	lb.	tons
2,252	3 of gravel to 1 of cement. Made May 27.	12" 0" 12" 0"	144" 0"	252,870	1,757	113" 0"	278,240	1,932	124" 2
2,253		12" 0" 12" 0"	144" 0"	234,350	1,558	100" 2	272,870	1,895	121" 8
2,251		12" 0" 12" 0"	144" 0"	249,227	1,698	107" 3	269,180	1,869	120" 1
2,250		12" 0" 12" 0"	144" 0"	220,530	1,530	98" 4	265,560	1,855	119" 9
			Mean	234,467	1,628	104" 7	272,212	1,890	121" 5

Bedded between pieces of pine  $\frac{1}{2}$  in. thick.

Results of Experiments to ascertain the Resistance, to a gradually increased Thrusting Stress, of six Bricks, received from Mr. J. Woodward:—

Test No.	Description.	Dimensions.	Base Area.	Stress in pounds when		
				Cracked slightly.	Cracked generally.	Crushed, steelyard dropped.
V.		inches.	sq. in.			
2,256	Red Brick, recessed both sides	2" 6" 8" 90" x 4" 25	37" 82	77,500	96,230	99,160
2,255		2" 75" 9" 10" x 4" 36	39" 68	71,700	90,100	95,820
2,254		2" 75" 9" 05" x 4" 33	39" 19	68,000	87,423	91,780
2,259		2" 75" 9" 10" x 4" 36	39" 68	63,200	84,600	90,810
2,253		2" 75" 9" 10" x 4" 36	39" 68	57,200	81,700	89,330
2,257		2" 75" 9" 10" x 4" 36	39" 68	61,900	68,600	85,200
	Mean		39" 29	64,750	84,637	92,032
	lb. per square inch.			1,648	2,154	2,342
	Tons per square foot			105" 9	138" 5	150" 6

Bedded between pieces of pine  $\frac{1}{2}$  in. thick.

Result of Tests of two Composite Columns, composed of Bricks and Cement of the same quality, as subjected to the above Tests:—

Approximate area of Concrete, 176 square inches. Brickwork, 278 square inches.

V 2,248, Brick and Concrete column, 12 courses, 38 in. high, 24 in. diameter, 452 square inches area. Cracked slightly with 505,000 lb. = 225" 4 tons; cracked generally, 626,560 lb. = 278" 7 tons. Per sq. in. of area, 1,386 lb.

V 2,249, Brick and Concrete column, 12 courses, 38 in. high, 24 in. diameter, 452 square inches area. Cracked slightly with 522,000 lb. = 233" 6 tons; cracked generally, 635,000 lb. = 283" 5 tons. Per sq. in. of area, 1,404 lb.

ARTHUR W. BLONFIELD, Esq., 6, Montagu-place, Montagu-square, London, W.

DAVID KIRKALDY & SON.

## THE RECENT FIRE AT WHITELEY'S.

As the adjourned inquest on the death of the persons killed in this fire is to be resumed on Monday, a short summary of the evidence already given may be of use.

The inquiry was opened on August 10th last, in the Westbourne Park Institute, by Dr. Danford Thomas, Coroner for Central Middlesex.

Four deaths resulted from the fire, the immediate cause being the fall of the external wall of the factory, a building at the back part of the premises in the Queen's-road. The said wall fell into Douglas-place. Several witnesses suggested that the wall had been blown out by an explosion, but Mr. William Penfold, Engineer of the Metropolitan Fire Brigade, who was present before the wall fell, heard no explosion.

Mr. James E. Saunders, member of the Metropolitan Board of Works, said he was the architect of the factory in Douglas-place, and of the buildings in the Queen's-road. The factory was first burnt in 1883; it was then restored, the damaged brickwork being first removed, but the remainder was utilised in position. The walls were 23 in. thick from the basement up to the first floor; 18 in. thick from the first floor up to the third floor; and 14 in. thick on the fourth floor. Each floor was formed with iron girders and wooden joists. The first floor was what is called "fireproof," being formed with iron joists resting on the iron girders.

The iron girders and joists ran into the walls, as also did the wooden joists. The walls with the iron joists and those with the wooden joists had equally given way. A large block of brickwork had been thrust outwards and then laid in Douglas-place, at a great distance from the wall. He did not think that this block of brickwork could have reached its position by the simple collapse of the wall without some force to thrust it outwards. Inside the four external walls the floors were supported on iron columns, which were carried right up to the roof. The ironwork was not encased with cement or other material. The gas pipes were all of iron.

In cross-examination, Mr. Saunders said:—The walls in the basement were built in cement, and the other portions of the factory walls were built in mortar. The large block of brickwork in Douglas-place was from the wall above the second floor, if not above the third. It was lying face upwards, about 20 ft. from the wall from which it fell. Its weight was about two tons. It had not been moved since it fell. He was of opinion that some expansive force caused the wall to fall. If the wall had simply fallen out, the large block of brickwork would have fallen with the face downwards.

Mr. Horace Gundry said he was the District Surveyor for Paddington, appointed by the Metropolitan Board of Works. He was the District Surveyor during the erection of the whole of Mr. Whiteley's premises in Douglas-place and in the Queen's-road. He had sur-

veyed the buildings since the fire in 1883, and since the last fire, and he concurred in the opinion expressed by Mr. Saunders as to the falling of the large block of brickwork in Douglas-place. Some of the bricks had fallen in blocks, and these had no appearance of having been subjected to much heat. In a fire mortar becomes pulverised, and the work disintegrated; but the large block of brickwork referred to was quite solid.

The inquiry was then adjourned to August 17th, the jury requesting the Coroner to call an expert in explosives to examine the building and report thereon.

On the second day of the inquiry, August 17th, Colonel Majendie submitted a most exhaustive report in which he said that not only could the position and appearance of the large block of brickwork in Douglas-place be quite reasonably accounted for without recourse to the explosive theory, but there were points that very strongly, if not conclusively, negated the theory of an explosion. He was assured by Captain Shaw and Mr. Palmer that it was quite consistent with their experience that large masses of brickwork should come to rest at greater distances than 20 ft. from the wall from which they fell. There was evidence that a fire of more or less formidable proportions existed before the walls fell. Colonel Majendie concluded his report in the following words:—

"I believe the fire to have originated from some other cause (other than explosive) which it is no part of my duty to explore; that this fire, so to speak, 'bottled up' for a considerable time; that the fall of the building was the result of the fire, and nothing else, such fall being in all respects inconsistent with the experience of the Fire Brigade, and that the supposed 'explosions' were either the noise of the falling building, or not inconceivable some minor secondary explosion of gaseous atmosphere or steam, or noisy ignitions of inflammable substances."

A letter from Captain Shaw was read, in which he said:—

"How the idea of an explosion at Whiteley's originated I cannot say; but, so far as I am aware, it is absolutely and entirely without any shadow of foundation."

Professor Alexander Kennedy, C.E., F.R.S., said he was Professor of Engineering at University College, London. He had inspected the scene of the fire, and had heard that an explosion was suggested as the cause. He found no broken glass, and the idea that an explosion such as dynamite or gunpowder was used was negated. He examined an iron girder 16 ft long which had fallen into Douglas-place; it was only  $\frac{1}{2}$  in. out of straight; for about 4 ft or 5 ft. from its blue steel, it had evidently been very hot. The joint was covered with burned paint and dust, but beyond the 4 ft. of 5 ft. there was no sign of any serious heat. The front end of the joint rested on stone. On tier of columns was left standing complete after the fire. He did not think that the expansion of the girders could have so affected the walls as to cause them to fall.

In cross-examination Professor Kennedy said, according to the plans the girders were placed in pockets, to allow for expansion. With the exception of the external walls the entire structure of the factory rested on iron columns. The girders resting on these columns were 80 ft. long; they were bolted together at each column, but not to the walls. The bolts were loose. These details of the ironwork he gave from the plans. There was no figure showing the space for expansion. It might have been about three quarters of an inch in each wall. He thought that would be sufficient allowance for expansion. In some cases brickwork had been drawn away with the iron girders.

Mr. Samuel J. Mackie, C.E., said he had had large experience in explosives; he had examined the building, and fully concurred with Colonel Majendie's evidence. In his opinion the girders had fallen into Douglas-place had been red-hot, and was oxydised over the surface.

In cross-examination, Mr. Mackie said that had been no flaking or scaling of the girders. If it had been red-hot only for a short time, it would not expect to find it scaled.

The jury then retired, and, after a consultation of half an hour, they returned, when the foreman said that they had unanimously resolved to ask the Coroner to adjourn the inquiry till Monday, October 24th, at 10 o'clock, in order that further investigations might be made, which, under the circumstances, he thought should be undertaken by the Government. The inquiry was adjourned accordingly, and we understand that further evidence as to the construction of the building will be submitted to the jury on Monday next.



THE GLASGOW INTERNATIONAL EXHIBITION (1888) BUILDINGS.

THESE buildings, facing Kelvin Park and the new University, are making rapid progress. They occupy a site lying between the river Kelvin and Sandyford-street and Dumbarton-road, which but a few weeks ago formed the recreation ground for the youth of the eastern districts of Glasgow, but which is now most covered with buildings in various stages of progress. The foundations were completed out the middle of July, and immediately thereafter the contract for the erection of the superstructure was arranged and operations commenced. The progress made since then has been very rapid, and is to the credit of all concerned. It is always well to take time for the forelock, and in no case is that more true than in such a case as the present. Exhibition buildings are proverbially behind time; and if those now in progress are completely finished when they are opened they will be nearly unique in that respect. If one may judge from what has already been done, however, it will not be the fault of the architect or the contractor if the building is not finished; and if the main building is roofed before the winter weather sets in, which we understand it is meant to be, the satisfactory completion of the work in good time may be considered assured. The building, as it is being erected, is considerably larger than was at first proposed. At an early stage it was seen that the demand for space would probably exceed the original anticipations, and it was therefore determined that the building should be as large as the available site would permit. The increase is proportionately greatest in the machinery annex. This has been extended in area fully 35 per cent., and the main building 15 per cent., the total increase being about 20 per cent.

From an article which recently appeared in the *Glasgow Herald* we give a few details as to the dimensions and area covered by the buildings, which may be of interest. The extreme length of the space roofed in is about 1,450 ft., or over a quarter of a mile, and the extreme breadth 360 ft. The main building for general exhibits, &c., is 1,050 ft. in length, being rather more than the length of the main building of the Manchester Exhibition, while it is considerably wider than the latter building. The machinery annex is about 330 ft. in length by about 285 ft. in breadth. This department is somewhat smaller in area than at Manchester, but as the class of exhibits which may be expected in the Glasgow district will occupy less space per exhibit than those at Manchester (cotton-spinning machinery, &c., which requires large floor-space), the collection will, it is hoped, not be less numerous or representative of the engineering industries than that at present in the Manchester Exhibition. The general arrangement of the main building is very simple,—always an advantage in buildings of this class. A grand central avenue, 60 ft. in width, extends along the whole length of the main building, intersected at the centre by a transverse avenue of the same width. On either side of the former is a series of courts, 50 ft. in width, and varying from 100 ft. to 190 ft. in length. At the east end of the grand avenue the large concert-hall is placed. It is about 160 ft. in length by 100 ft. in width, with a large recess for the organ and a spacious platform for an orchestra and chorus. This hall will accommodate an audience of at least 3,000 persons.

The fine-art galleries are to be made a special feature of the Exhibition. They cover an area of about 3,200 square yards, divided into ten galleries, the largest of which is 150 ft. in length and 36 ft. in width. Three of the galleries measure 100 ft. by 33 ft. (about the same length as the large gallery in the Fine-Art Institute, and 3 ft. wider), and other three 65 ft. by 33 ft. These galleries are for pictures. Two galleries, 85 ft. in length by 25 ft. in width, are arranged for architectural drawings, photographs, etchings, &c., and there is a sculpture gallery, 150 ft. long by 25 ft. in width. The walls of this section of the building are of brick, and the roofs are of iron. The floor is to be laid solid on concrete; all the openings between the galleries and between them and the main building are to have iron doors, made by Messrs. Chubb & Co. (Limited), and the building will be practically fireproof.

Apart from the picture galleries, the building generally is constructed of wood (the roof being

of iron), with the exception of the kitchens and certain walls erected for fire prevention purposes, which are to be of brick. As a further protection against the spread of fire in the main building, it may be mentioned that the whole area under the building is to be divided into numerous sections by brick walls built up between the joists to the level of the floor. At various points inside the building there will be firemen's stations, and hydrants will be placed at short intervals along the main avenue and in the courts. The chief dining and refreshment rooms are at the west end of the main building, and as several spacious apartments, besides kitchens, stoves, are provided, ample accommodation is being reserved for this important department. Like the fine-art galleries, this section is to a large extent isolated from the main building and separated from it by brick walls.

The great central dome, constructed of wrought iron, will be the chief feature. It will rise to a height of about 140 ft., and there are four octagonal minarets or towers grouped round it. Besides these towers, the long line of the roof is broken up by other towers of varied design.

Any notice of the Exhibition would be incomplete without a reference to the work being done and to be done outside the main buildings. A large part of the park on both sides of the Kelvin is to be enclosed, to form the Exhibition grounds. In these grounds a number of buildings have to be erected,—dining-rooms, tea-rooms, refreshment-rooms of various kinds, and for other purposes. All these are being arranged for, and will necessarily be commenced very soon.

To provide facilities for exhibiting working models in the naval engineering and ship-building section, it has been agreed to deepen the river Kelvin, between the weir and the Prince of Wales Bridge, and that work is now being carried out. It has also been resolved to erect a new bridge, close to the present iron bridge, to meet the requirements of the enormous traffic between the two sides of the river. A great attraction in the grounds will be the "fairy fountain." A similar fountain was shown at the Colonial Exhibition in London, and may now be seen at Manchester.

For the accommodation of the archaeological section of the fine arts department, and for exhibits of stained glass, tapestry, ancient furniture work, ironwork, &c., a building which will be a reproduction of the Bishop's Palace of Glasgow has been proposed, and if it is erected it will probably occupy a site on the slopes below the University buildings.

ST. MARY-LE-STRAND CHURCH.

SIR,—We are directed by the Council of the Royal Institute of British Architects to address you in reference to the Church of St. Mary-le-Strand. They consider that in a matter of such public importance they need offer no apology for troubling you with an expression of their opinion to the effect that the obstruction to the traffic in the Strand, stated to be due to the existence of this church, can be most effectually remedied not by its removal, as has been suggested, but by the construction of an improved roadway on its northern side, as contemplated in a plan which, we are informed, was approved by the Metropolitan Board of Works some years ago.

The Council are further of opinion that, though obviously most desirable to put the church into thorough structural repair, any reparations to a building possessing such great artistic value as this should be carried out in strict accordance with the original design, departure from which is earnestly to be deprecated.

J. MACVICAR ANDERSON, Hon. Secretary.  
WILLIAM H. WHITE, Secretary.  
Royal Institute of British Architects,  
9, Conduit-street, Hanover-square, London, W.  
October 17th, 1887.

THE WALLS OF CHESTER.

SIR,—Mr. Thompson Watkin's letter, p. 527, calls for some reply from me. His letter is in no way an answer to my challenge. I have proposed to him a test which is a practical and a crucial one, to prove the accuracy, or otherwise, of his assertion that entire portions (from base to summit) of these walls are of the time of the Commonwealth or of the reign of Queen Anne. If the bill has ever been

paid it must be in existence, or, at any rate, there must be reference to the spending of so large a sum for so large a work. I have told him what the amount was likely to be for a specified portion only, and where the bill or reference to it is likely to be found (if the work were ever done as he says it was). I call upon him to prove his repeated assertions by producing this bill, or your readers and myself will know that he cannot do so. If he cannot, it will show that the work was never done at either of the times he names, and that the architectural evidences of the work itself, which show a Roman origin, so far as the unmortared parts and the Roodee wall are concerned, may be taken as certain evidences of date by those who will read them aright. But then the dates named by your correspondent must be dismissed as the crudest of fancies.

To make matters worse for himself, he speaks, p. 527, of the work having been done by the "Parliamentary Army." Can he bring forward any record? Surely, if an army was to carry out such a heavy mass of masonry as this, there must be some notice of it. Without such evidence being adduced, is your correspondent justified in making such a suggestion, especially since there is no record of any other Parliamentary army having erected any wall to any other city?

Mr. Watkin may accept as fully as I intended my remarks to be, that the Roodee wall is built with mortar. It had, as I expressed myself, more to do. This is not mortar adhering to the stones from some previous use, as he suggests, but the mass of the wall is constructed with mortar, in which Mr. Williams has detected pounded brick. The word "detected" he will notice, if he reads carefully, is used by me not for the detection of mortar, but of pounded brick in it. The lower courses do not show any such cementing, I am told, as if it had been washed out from the face, perhaps, by the action of tide; and where the wall clears the bank, the mortar is, at any rate, not apparent, resembling, in this respect, the other Roman walling elsewhere.

In my calculations, which your correspondent calls "formidable,"—and they are so for his hypothesis,—I have allowed nothing for the value of the stone used, and have said so, p. 512.

E. P. LOFTUS BROOK.  
London, October 18th, 1887.

SIR,—Of the opening in our north wall, Mr. Brook wrote recently in your columns, "that from the base it rises to the height of about 10 ft. without mortar, and 8 ft. with mortar." After visiting the spot in question, I was able to inform him, as I did in your columns [see p. 512, ante], that there was at the spot mentioned 19 ft., and not 10 ft. of wall without mortar. Since then, I have seen a drawing of the wall at the Townhall, showing nearly 20 ft. of mortarless wall. Such being the fact, it is neither correct nor generous of Mr. Brook to say [p. 526, ante] that the "parts of the wall are fairly of the dimensions he has given." I do not see it; and I invite Mr. Brook to get the correct height of the unmortared part of the wall, and publish the result in your columns.

Mr. Brook says of the unmortared walls, "all is a compact mass." That your readers may be in a position to form an opinion of the wall in question, let me give a description of its interior composition, from the published account of the visit of Sir Henry Dryden:—"Nearly the whole of the material of the part taken out and rebuilt consisted of sculptured stones,—plinths, cornices, copings, sepulchral slabs, bas-reliefs of figures about 2 ft. high, and other moulded stones,—evidently the remains of large, ornate, solid buildings."

Given the above material, with dry earth as the bonding element, to form a wall, would it be possible to do so?—and worthy of being called a "compact mass?" Some, I have no doubt, will ask, how a wall of this kind manages to hold together. The answer is, that it is backed up by 14 ft. of earth.

The composition of the whole being as I have stated above, with earth only between the stones, there was no difficulty in putting the arm between the various courses.

GEORGE W. SHUTEBOLE.  
Chester, Oct. 17th.

SIR,—Mr. Brook, in the last number of the *Builder* [p. 526] says that the "existence" of the foundations of the Roman North Gate, or, in fact, of two Roman gates, until "fairly recent times, must make it more difficult for Mr. Watkin to believe that the massive stones in the walls, which he acknowledges to be Roman, could have ever been shifted in position, as he asserts. There they are in line with the gates, in both cases where Roman walls must have been."

He will see by my letter in the same number that neither of the gates was Roman "until fairly recent times," though I think the later gates (Medieval) were probably built upon their foundations; but with regard to the "massive stones" in the walls, especially near the North Gate, as Mr. Brook admits they have been brought from Roman buildings they must have been "shifted in position" by somebody. Mr. Brook says by the Romans themselves. Whoever placed them in their present position was almost bound to do so if the Roman line of wall was to be kept; and as Mr. Brook is aware that I hold that the present north and east walls, from New



Gate to Morgan's Mount, are more or less on the site of their Roman predecessors, it is merely the question of who moved them.

With regard to the views of Dr. Bruce and Mr. Blair on the "eccelesiastical" stone, I may say that the Rev. H. C. Scarb, and many antiquaries and architects, hold that the stone is ecclesiastical. Mr. R. S. Ferguson, without speaking absolutely, thinks it more like a Mediaeval ecclesiastical stone than otherwise.

W. THOMPSON WATKIN.

Liverpool, Oct. 17th, 1887.

### "SHONE'S EJECTORS IN THE RECENT RAINSTORMS."

SIR,—It is really unprofitable labour to attempt to answer Mr. Donaldson's long inconsequent letter at p. 546 in this week's *Builder*. But as he seems very desirous of having a further answer from me, I will indulge him so far.

As to his first and second paragraphs, the sentences therein are mere assumptions, without any facts to uphold them, and therefore are not worthy of argument or consideration.

As to his third paragraph, I have nothing to say against his gathering himself among others under the wings of the gentleman he has named. He says, "the excess storm-water ought to be discharged through a storm-water outlet," and he refers to "a 12 in. pipe connecting the sump with the metropolitan sewers." These observations prove that he is unacquainted with the real facts of the matters he questions. If he wishes to learn what the facts are, let him explore the places, and there ascertain them for himself. Then he may be able to discover in what he is wrong in his deductions.

As to his fourth paragraph, in which he says "that time will prove the installation to be a failure, not only as a means of discharging the sewage, but in a sanitary point of view," time and circumstances have already incontestably proved that he and the clique he represents are false prophets. The ejectors and the gas engines have effected doing their work under varying circumstances since Christmas last, and will, I am certain, continue to do so. If the installation should ever fail or get out of order, it will be through the neglect, inattention, or wilful damage to it of those having charge of it.

As to his fifth paragraph, that I have not answered his "crucial questions," viz., how I ascertained the height of the sewage in the metropolitan sewers, and the depth of the sewage in the subway reservoir,—I may state that I have had special experience in ascertaining these matters, and therefore no one is better acquainted with the various depths or altitudes of the sewage and rainfall flowings in the metropolitan sewers in Westminster and elsewhere both in dry and wet weather than I am. I also am as well acquainted with the depth of the sewage in the subway reservoir when 2,000 gallons, or any other quantity, overflows into it. I may add that the air pressure used since the commencement has been 10 lb. per square inch; that no more pressure has been, or ever will be, required under any circumstances; that the lift has never exceeded, and will never exceed, 20 ft.; and that there never will be any flooding of the basements.

As to his sixth, seventh, eighth, and remaining paragraphs, I may dispose of them by again stating the facts of the case, which he has not and cannot disprove, namely: (1) that the rain-storm at Westminster, on August 17th last, was 0.69 in. per hour; (2) that the area draining to the ejectors is 10 acres; (3) that the quantity of water draining from this area to the ejectors was 357 cubic feet, or 2,227 gallons per minute; (4) that this quantity of water (except 2,000 gallons which overflowed for two minutes into the subway reservoir), Shone's three ejectors of 1,100 gallons aggregate capacity, and Atkinson's four gas-engines of 4-h.p. each, all working together, successfully discharged at the rate of 1,134 gallons per half-minute, without any flooding whatever of the basements; and (5) that the lift was 20 ft. to the head of water in the main low-level sewer outside. These are "the actual facts of the case." It is, therefore, not I who am "labouring under a misapprehension," but Mr. Donaldson himself, who will not accept the facts, and imagines and argues on all sorts of things which are beside the question. If he wants to know what the heads of water were on the 17th of August, on the receiving and discharging sides of the ejectors, let him go to the places, and ascertain, if he can, the particulars for himself. I very much doubt, however, his capability to do this.

The hydro-pneumatic system of drainage, as invented by Mr. Shone, and carried out at Eastbourne, at the Houses of Parliament, at Henley-on-Thames, at Warrington, at Southampton, and elsewhere, is now so well understood and appreciated by scientists, sanitary engineers, and the intelligent rate-paying public, that nothing Mr. Donaldson, or the clique he represents, may say in depreciation of it will have the slightest effect in retarding its adoption. Let all who are interested in sanitary drainage go learn from them as to the actual working of the system.

I beg to say, in conclusion, that I shall not waste my time by again answering Mr. Donaldson.

October 15th, 1887.

JOHN PHILLIPS.

\* \* Mr. Phillips will not be placed under any necessity to answer further letters from Mr. Donaldson,—in our columns, at all events. We have received a copy of a reprint of a letter addressed to the editor of the *New York Sanitary Engineer*, signed by Mr. Donaldson, and dated December 17, 1884, consisting entirely of a strong recommendation of Mr. Shone's system, and observing, among other things, that "the safeguards used under the ordinary system, namely, storm-water overflows, can be with equal ease used to discharge the ejectors when the Shone system of sewage is adopted." Mr. Donaldson describes himself in this letter as "a personal friend of Mr. Shone, engaged with him in promoting drainage schemes on his system." The reprint of this letter bears on the cover a second letter, dated ten days later, and signed jointly by "William Donaldson" and "Shone and Ault," addressed to the Improvement Commissioners of Cambridge, and inviting their attention to the recommendation of the Shone system contained in Mr. Donaldson's letter to the *Sanitary Engineer*. It appears, therefore, that Mr. Donaldson was very recently doing all he could to recommend the system which he is now doing all he can to disparage. After that, the least we can do is not to reach such value to Mr. Donaldson's opinions or statements on the subject as to waste any more space upon them. If Mr. Shone thinks it worth while to reply categorically to the statements in Mr. Donaldson's last letter, he can have space to do so in our next, and then the correspondence must close.

### A DECIMAL SYSTEM.

SIR,—In your recent article (see p. 483, ante) on "Our National Maps," you allude to "our tedious and troublesome duodecimal subdivision of the lineal foot," and to the great advantage of substituting a decimal subdivision. This subject is of such great importance that I hope you will not allow it to drop; for there is nothing by which you could do a greater service both to architects and to the nation at large than by setting on foot such a reform. One great defect of our present system is that it utterly fails in the essential point of facilitating accuracy, by the want of minute and regular subdivisions of the inch. Our eighths and sixteenths are always awkward, and for accurate calculation quite useless; hence, whenever scientific men have to use careful and minute measurements, they are obliged to discard English measures altogether, and to use not only French measures, but French terms, which are so gaining ground that we shall have to adopt them bodily unless we speedily render our own system convenient and adapted to scientific necessities. For larger measures we are overburdened with useless and cumbersome cross-divisions, and a simplification of these is urgently needed. The random use of yards and feet in linear measure is bad enough; but our square measures, in which some things are reckoned by the square foot, others by the square yard, some by the "square" of 100 square feet, others by the "rod" of 272, and where no number of linear yards makes up the side of a square acre, would strike a stranger as an absurdity, apparently designed to cause waste of labour and facilitate confusion.

It would be hard, but would it be impossible, to divide the foot into tenths, hundredths, and thousandths, to abolish the yard, and make all larger measures multiples of a foot? It should thus at once have a simple and logical system, still retaining a link by which all measures could be easily converted from the old to the new; and we should save ourselves from the much harder alternative of embracing the entirely different system of France, with its long, ugly names, which otherwise appears to be inevitable. Shall it be reform or revolution? None would benefit by the former more than architects; will not they lead the way?

A. S. FLOWER.

### A NEW METHOD OF VENTILATION.

SIR,—Messrs. Boyle's letter in the *Builder* of the 15th inst. (which must not be too severely criticised, as their monopoly is being attacked) may be briefly condensed thus:—"Your system of ventilating from above downwards is not new, has been tried before, and is contrary to the laws of nature." Messrs. Boyle recommend their own system of a mica flap (outlet) ventilator as answering every purpose which ours professes to do. Our own experience, and that, we venture to think, of most people who have had to do with the system they advocate, is that it is not satisfactory. These ventilators are noisy, and we have heard of one instance at least in which they had to be blocked up from this cause alone.

Our letter in yours of the 15th inst. [p. 547, ante] will have explained the reason for the ventilation of the cylinder in our system of ventilation, viz., as a disconnector to prevent the heating of the downcast pipe, which, without some such mode of isolating it, would be liable to become heated in the same manner as the upcast pipe, and thus probably cause a reverse action. It has other functions, one of which we suspect to be additional motive power due to the rarefaction and expansion of the air within by reason

of the heat; but this is a point on which we do not at the present moment feel justified in enlarging, until further investigations enable us to speak with more certainty. It is to be inferred from Messrs. Boyle's experiment in a somewhat similar direction to ours in ventilating the sugar mills at Greenock failed in a more or less degree, but this is easily explained to us by two facts,—first that the place of exit of the conducting shaft employed by them was not the point of maximum draught in the flue, as in our system; and secondly, that the shafts, not being disconnected somewhat in their course (for which purpose we insert a cylinder with a syphon), were liable to become heated throughout, and so gradually lose their efficacy as air conductors, and possibly even cause a reverse action to be set up. It is true that hot air naturally rises, but this tendency can be modified by superior attraction, and this is what we claim for our invention. We have not in actual practice had to employ artificial means of creating a draught, but in certain cases in summer this may be necessary, or where the flue is defective and to provide for such contingencies we suggest that a gas-jet may be used with advantage in the cylinder, and a blast fan can be applied to the flue by us in large halls, but in any case this letter only refers to our comprehensive scheme for ventilating large buildings. Lastly, we would invite Messrs. Boyle, or any of your readers who take an interest in this important problem of sanitary science, to inspect our system, which we feel sure will carry conviction to the most sceptical.

YOUNG & MOSS.

**Aberdeen New Public Baths.**—The ceremony of opening the newly-finished Public Baths at Aberdeen took place on the 12th inst. Lord Provost Henderson presided. The buildings (which cost 6,000*l.*) belong to a limited liability company, who have secured a site at the east end of Constitution-street, abutting on the Links, and measuring nearly an acre, so that there is space to enlarge the buildings, the venture proves a great success. The front buildings, two stories in height, face the Queen's Links, from which place of recreation they are well seen, and present a pleasing contrast to the rather plain buildings in the neighbourhood. The front elevation is 90 ft. in length, the materials used being white Aberdeenshire granite blocks hammer-bossed ashlar, relieved with dressings of string courses and pediments, &c. In the front block there are on the ground-floor the entrance lobbies, staircase, ticket office, superintendent's rooms, cloak-room, and refreshment-room; and on the first floor a spacious billiard-room, directors' room, and first and second class slipper baths, Russian bath, dressing-rooms, &c. At the west end of the front block are situated the steam-boiler house and engine and pump rooms. The principal feature of the buildings, however, is the swimming-bath lying at the rear. This bath is 75 ft. long by 30 ft. wide, with a depth of 3 ft. 6 in. at one end, gradually increasing to 7 ft. at the other, and is lined with white enamelled tiles. Along the sides of the bath are ranged dressing-boxes and also fresh-water foot-baths, lavatories, &c. In the hall containing the swimming-bath is a promenade and gallery to accommodate about 500 spectators. At one end there is a commodious gymnasium. The upper part of the roof is glass, and ventilation is provided by means of moveable louvre boards in the roof. The buildings are heated throughout by steam pipes. The water for the baths is pumped from the sea, about 600 yards distant, through 9-in. cast-iron pipes laid across the Queen's Links. The water is drawn from the sea by a 25-h.p. engine and centrifugal pump, capable of filling the swimming-bath in two hours, thus admitting of the water being changed once a day or oftener if required. Before being used in the baths the salt water will be filtered through beds of sand and gravel, and perforated pipes. The equipments of the baths are on the best modern models, and have been erected from designs by Messrs. Jenkins & Marr, civil engineers and architects, Aberdeen.

**The Swinton Local Board and the Pollution of the Irwell.**—The Swinton Local Board, who have been served with notices by both Captain Dauntsey, of Agercroft Hall, and the Salford Rivers Conservancy Committee, to cease polluting Slack Brook, Pendlebury, and the river Irwell, have invited Mr. Vawser, C.E. of Manchester, to visit Pendlebury and report upon the scheme prepared by the Board's surveyors for dealing with the sewage of the above district. The Board have purchased several acres of land for erecting precipitating and other works.—*Manchester Guardian*.

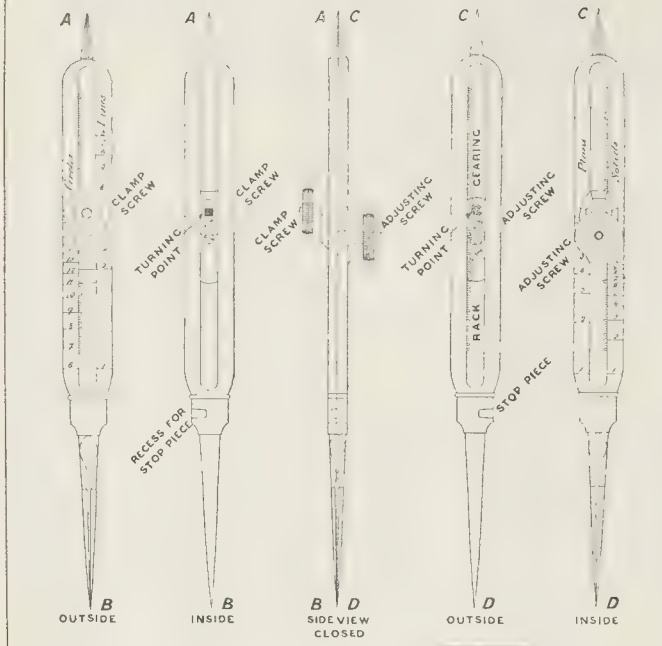






## PROPORTIONAL COMPASSES

## ELLIOTT PATTERN



fastened if desired, so that the draughtsman can prevent false or unnecessary marks being made upon the paper by passing over the cord at the tracer end two fingers of the same hand that moves the tracer. Additional small weights are provided to rest upon the top of the pencil-holder when the pencil is required to make strong marks upon the paper.

When the plan to be reduced contains numerous buildings, the use of the proportional compass will be found advisable. Those fitted with a rack gearing for the movement of the slider are the best, as they can be most accurately set by means of the milled-headed adjusting screw shown in the diagram, and when clamped by the opposite milled-headed screw, are not liable to slip. To move the adjusting screw, the clamp screw must be first loosened, and the instrument is then so set that when the arms are opened, the distance between the points marked A and C bears the required proportion to the distance between the points marked B and D. The plan to be reduced, and the paper upon which the reduced plan is to be plotted, are covered with squares drawn to their correct scales respectively, and the intersection of the lines are indexed for reference by numbers in the one direction, and by letters in the other direction.

## Books.

*Sanitary Engineering for India.* By B. R. HARRINGTON, C.E. Calcutta: W. Newman & Co. 1887.

"Sanitary Engineering," the title of a work lately published in Calcutta, has been written, the author states, with a view to affording instructions "to municipal officials and others not specially informed on the subject." Sanitation, though sorely needed, cannot be said to have yet obtained a firm footing in India, and Mr. Harrington may be right when he observes that the methods and works which are needed by, and adapted to, European conditions are not applicable as yet to Eastern countries. In his remarks, however, on the disposal of sewage, he seems to have overlooked the fact that their prejudices must, at all events for a long time to come, prevent the Hindoo portion of the agricultural community being reconciled to the idea of sewage farms.

The second division of Mr. Harrington's treatise is devoted to the kindred subject of the water-supply of towns, which is perhaps of greater importance than that of drainage in a climate which during nine months of the year is perfectly dry. It is undoubtedly true that the health of the native population is more dependent on, and is more affected by, the quality of the water-supply than by the condition of the drainage, and is therefore deserving of prior attention. The author states that "the pressure system" is not adapted to Indian towns generally, and the statistics of comparative cost per head of population, if correct, go to prove his assertion. Without accepting his views altogether, it may be admitted that, as a general rule, there is no need to adopt the European system for the supply of towns, and that the wants of the population generally may be sufficiently met by a simple gravitation system. But Mr. Harrington argues too exclusively from the situation of the great cities of Upper India, and the existing sources of supply from snow-fed rivers. In the peninsula different conditions prevail, and it is only from a few rivers that a perennial supply of water can be depended upon; hence a system of storage is absolutely necessary, and where such a system has to be resorted to, the supply under pressure necessarily follows both on the score of economy in distribution and prevention of waste, as well as security from pollution. In no other way could the cities of Madras and Bombay have been supplied. There are many other cities in Mysore, the Deccan, and Rajputana similarly situated. Where, however, it is possible to draw direct from snow-fed rivers, as in Upper India, undoubtedly water may be supplied by simple gravitation so as to meet all the requirements of a town or village community, but it is questionable whether Mr. Harrington has realised all the difficulties of securing the permanency of the off-take in rivers whose beds are constantly shifting and whose level varies so much in the season of flood and low water. His plan of distribution, however, as illustrated in his diagrams, certainly seems to combine practical effectiveness as well as simplicity; and if there are no local objections thereto, it undoubtedly is deserving of consideration on the score of economy, and may, it is to be hoped, if it has not already done so, attract the attention of the authorities in India.

*A Treatise upon Cable or Rope Traction as applied to the Working of Street and other Railways.* By J. BUCKNALL SMITH. London: Offices of Engineering. 1887.

This book consists of a reprint of a series of articles which have lately appeared in the pages of our contemporary *Engineering*. The author has been engaged for some time past in carrying out the practical work connected with the subject of which he treats, and his work has a real and living interest for those who may be engaged in working out problems of a like nature. This is a point that will not be unappreciated by practical working engineers in the present day, when the schoolman and theorist occupy so much of the technical book-producing field.

In his preface Mr. Smith tells us that upwards of twelve and a half millions sterling have been expended upon tramways in this kingdom alone, and three per cent. of the entire population is carried daily by this means of transport, and in some cities one person in five, 20 per cent. of the population, travels daily on street railroad. This being the case, it is evident that tramway should have a literature, and Mr. Bucknall Smith supplies the most important contribution yet issued of a no inconsiderable branch of the subject, and one, if the author is right in his opinions, that will take a far more prominent position in the near future.

The modern tramway,—a term, by the bye, against which the author exclaims,—was first employed in the United States as early as 1832, but it was not until 1852 that the first successful line was laid down. The first type of street railroad was introduced in this country at Birkenhead in 1860, and the next year obtained temporary footing in London. The "Endless Cable Haulage System," the chief subject of the book, was introduced during the year 1873 in San Francisco, and had the important merit of achieving a marked financial success. Since then it has been adopted in other cities of the United States and has crossed the ocean to Australia and New Zealand, besides being tried in other countries. In England we first have practical experience of the system on an suburban height of Highgate Hill, where a cable line was built in the year 1883, and similar works are described as being in course of construction in other parts of London and Edinburgh and Birmingham.

In his introductory chapter the author gives further particulars relating to the introduction of tramways in general. In 1875 powers were granted by Act of Parliament authorising steam traction, and, as our readers are aware, electricity and compressed air have both been used for supplying motive power. We can hardly expect to see the other fast rising sources of motive power, gas, used for locomotive purposes, although even that is possible if startling improvements in gas producers and means of refrigeration are in store; but the petroleum engine may yet propel the street cars of our cities, although here again we want vast strides of improvement to bring such a motive power within the range of practical problems.

These speculations are, however, beside the mark, and we must return to our author at his cable haulage, which is very much within the field of engineering practice. Sir Frederick Bramwell told the members of the British Association at Manchester, a few weeks ago, that rope haulage was first introduced by a less person than the great Brunel (we do not know whether Sir Frederick meant to include mining operations) in the construction of the Thames Tunnel; and some of our readers, alas! too few now, for time passes,—remember when the trains on the Blackwall Railway were hauled from Poplar by rope worked by stationary engines. This, however, was a very different system to that which Mr. Smith has been instrumental in introducing into this country from across the Atlantic. It will be as well, however, to let our author enumerate the merits of his system in his own words. It offers important advantages, by reducing the working and maintenance expenses by avoiding dirt, smoke, sparks, and steam, and by obviating cruelty to horses. On the last point Mr. Smith lays considerable stress and not without reason. The working life of a tram horse averages 4½ years, and annually about 5,000 horses are crippled, used up, and destroyed by the tramways of this country alone. In other words, the existence and use of a tram horse might be described without exaggeration as death by slow torture, and



Professor Silvanus P. Thompson, D. Sc., on "Technical Education." 8 p.m.



## Miscellaneous.

**Fireproof Paints.**—A Danish manufacturer, Herr H. Didrichsen, of Copenhagen, has produced some fireproof paints with which experiments have just been made. Two little wooden buildings were erected, furnished with curtains, &c., one building being painted with the new paint and the other not. The latter was consumed in nine minutes, whilst the former was at the end of a quarter of an hour not warmer than that the walls could be touched, although only  $\frac{1}{2}$  in. in thickness. Other experiments were also made with thatched roofs, those coated with the paint not burning, but only becoming charred; whilst gauze, such as is used for theatrical dresses, showed an equal resistance to burn. Even when petroleum was poured on wood thus impregnated the fire made but little progress. Mr. Didrichsen has patented his invention.

**The Theatres of Brussels.**—The grand opera in Brussels, the Théâtre de la Monnaie, which was opened a few weeks ago, has been greatly improved. The passages have been widened, and the number of exits increased in all parts of the house, whilst the orchestra has been so constructed as to be raised and lowered in order to make the performers invisible when Wagner's operas are being played, according to the composer's favourite arrangement. The house is still lighted with gas, but in the course of the present month it will be replaced by the electric light. In Belgium, by the bye, all theatres are under the supervision of the local authorities; thus in the smaller towns the Commissioner of Police is responsible for all safety arrangements in case of fire. During the last few months nearly all Belgian theatres have, in consequence of the fires in Paris and at Exeter, been greatly improved, whilst one, the Théâtre des Galeries, in Brussels, has been condemned. The new Flemish theatre opened in that city a couple of weeks ago is fitted with iron galleries with numerous exits, whence iron ladders lead down to the floor of the house.

**Burwash, Sussex.**—The new (R.C.) Church of St. Joseph, built by Madame de los Heros, of Southover Hall and Carlton House-terrace, has been opened. The church is built of local bricks with Bath stone dressings, is cruciform on plan, and consists of nave, chancel, and side chapels, these latter forming the transepts. The chapels and chancel have circular apsidal ends and a delicate arcading runs round each. The nave has wagon vaulting in brick in pointed form, carried on stone transverse ribs, and terminating against the chancel arch. The side chapels are domed in brick and stone. The chancel is elaborately groined, the filling in being of fine brick. The carving has been executed by Mr. A. Stevens; the hot-water heating by Mr. F. W. Gritten; the marble mosaic by Mr. R. Davison; the glazing by Messrs. Bell & Co. The Presbytery adjoining the church is also near completion. The contract has been satisfactorily carried out, under the architect, by Mr. E. Thurton, of Tunbridge Wells.

**Window-Cleaning Accidents.**—Attention has been repeatedly called to the extreme risk to which servants are exposed when standing or sitting on the outside ledges of windows for the purpose of cleaning them. It should go without saying that such work is wholly unfit for female servants, and they ought never to be permitted to clean the outside of windows at all. Even for men, unless they are steady, careful, and "strong"-headed, there is much danger. Yet what is to be done? The professed window-cleaners are generally reckless of carpets and paint, and the percentage of panes of glass they break, while repudiating all liability for damages on frivolous pretences, is very large; moreover, they are so arbitrary in their practices and aberrant in their arithmetic, that it is a misery to employ them. Windows ought to be so constructed as regards sashes that they could be cleaned from the inside. Where this is not practicable, it is better to use long-handled pads, which do not necessitate either standing or sitting on the ledges, or leaning against the too often broken or insecure frames themselves. It is lamentable that limbs and lives should be imperilled and occasionally sacrificed in the performance of a simple and quite ordinary domestic function which ought to be wholly free from risk.—*Lancet.*

**Manchester Architectural Association.** The annual *conversations* of the Manchester Architectural Association was held on Tuesday, October 18, in the lecture-hall of the Athenæum, Princess-street. There was a large attendance of members and their friends, who were received by the President of the Association, Mr. A. H. Davies-Colley, A.R.I.B.A., who also delivered a short address, in which he reviewed the work of the year, and welcomed the members and guests. Mr. Davies-Colley was supported by Mr. Lawrence Booth, Past-President; Mr. A. E. Murray, Honorary Secretary of the Royal Institute of Architects of Ireland; Mr. G. O. Hoskins, President of the Northern Architectural Association; Mr. J. Murgatroyd, Mr. Medland Taylor, and other gentlemen. There were also present, Mr. E. Kirby, President of the Liverpool Architectural Society; Mr. J. Ely, Honorary Secretary of the Manchester Society of Architects; Mr. Alderman Bennett, &c. Letters of apology for absence had been received from Mr. E. L'Anson, President of the Royal Institute of British Architects; Mr. W. H. White, the Secretary of the Royal Institute; and Mr. A. McGibbon, Hon. Secretary of the Glasgow Architectural Association. An attractive exhibition of architectural drawings and models, decorative art and furniture, and specimens of building materials and construction, were inspected by the guests during the evening; and selections of vocal and instrumental music were given at intervals, the latter by the band of the Agercroft Rowing Club.

**Stanningley, Leeds.**—Mr. Briggs Priestley, M.P., laid the memorial stone of a new Congregational Sunday School at Stanningley on Saturday, the 8th inst. The portion of the building of which the memorial stone was laid is part of a larger scheme which it is intended to carry out, which will consist of an extension of the chapel adjoining, with new rostrum, communion screen, choir seats, &c., and which is being built by Messrs. Wordsworth & Maskell, of Leeds. At the rear of the chapel it is intended to erect four new class-rooms, averaging 15 ft. by 14 ft., and an infants' room, 24 ft. by 22 ft., with gallery. The communication with the chapel is to be by a covered corridor and vestibule from the outside. On the basement will be a heating-chamber and kitchen. The communication with the upper floor will be obtained by means of a hoist. The warming will be by hot water, on the low-pressure principle. The chapel extension will add 100 sittings to the present seat accommodation, and the estimated cost is 750*l.* Mr. S. Robinson, Bradford, is the architect.

**Election of Water Engineer of Nottingham.**—Out of over ninety applicants for the post of Water Engineer to the Nottingham Corporation, nine were invited to appear before the committee on Friday, the 14th inst. The following were the selected gentlemen:—Mr. H. J. Clarson, Surveyor and Manager, Tamworth Waterworks; Mr. L. T. Godfrey Evans, M.E., Liverpool Corporation Waterworks; Mr. J. E. Hughes, London; Mr. W. A. H. De Pape, M.I.M.E., Tottenham Local Board of Health; Mr. C. H. Priestley, Assoc.-Mem. Inst. C.E., Cardiff Waterworks; Mr. H. Preston, Grantham Waterworks Company; Mr. Whitton, Nottingham Corporation Waterworks; Mr. Willink, Vymwy Water Scheme of the Liverpool Corporation Waterworks. The committee decided by nine to four in favour of Mr. W. A. H. De Pape, M.I.M.E., subject to the confirmation by the Nottingham Council.

**Cemetery Chapels, South Shields.**—In a competition limited to the architects of South Shields, the Burial Board of that town have selected the following designs submitted for their proposed new cemetery chapels and superintendent's house:—1, "Respect Finem," by Mr. Henry Gieves, A.R.I.B.A.; 2, "Accipe Homo," by Messrs. Stout & Dockwray. Six designs were sent in. The Board have given instructions to the author of the first to carry out the works, and have awarded a premium of ten guineas to the authors of the second design.

**Marble Mosaic Hearths.**—Messrs. W. & M. Mainzer send us a sheet of chromolithographed examples of their marble mosaic hearths. The designs in themselves are of no great interest, but they serve to indicate what class of work can be executed for hearths in this material, the effect of which in such a position, and with a good design, is a very agreeable change from tiles.

**Glasgow.**—The Stockwell Free Church, erected in Pollokshields, for the Stockwell Free Church Congregation, was opened on Sunday last. The buildings, which are very extensive, comprising a church seating 1,000 people, church hall seating 480, large class-rooms, session house, ladies' room, vestry &c., have been designed by Mr. John I. Wilson, of Glasgow, his scheme having been selected by the Committee from those submitted in competition. The style of architecture is a free treatment of Italian Renaissance, with a massive tower rising to a height of 140 ft., and containing a fine bronze bell of nearly two tons weight. The entrance vestibule which is semi-octagonal in form, and unusually spacious, has a mosaic floor, laid by Mr. W. Main, of Glasgow. The interior of the church is somewhat novel in treatment, and being free from columns supporting the roof, has a very light and open effect. The area, 52 ft. wide, is roofed over in a single span with a double coved ceiling, across which the roof principals are partly shown. The following are the contractors for the various departments of the work, mainly of Glasgow:—Mason, Mr. I. Shannon; Wright, Mr. D. Buchanan; Plumber, Mr. W. Anderson; Slater, Mr. A. Sinclair; Plasterer, Mr. A. Brown; Glazier, Messrs. Melkie & Sons; Painter, Mr. W. Stevenson; Gasfitters, Mr. I. Buchan, Glasgow, and Mr. T. Brown, of Birmingham. Heating, Messrs. Cook & Co., Edinburgh; Upholstery and carpets, Messrs. F. & J. Smith; tiles and mosaic, Mr. T. Main; wrought-iron gates and railings, Mr. George Adam, Purbeck. Mr. George Banks was clerk of works.

**The Keighley Technical Institute.**—The new wing of this Institute was formally opened by the Master of the Clothworkers Company of London (Dr. James Self), on the 14th inst. The whole building forms three sides of a square, with a large open court in the centre. The style of the new wing is in harmony with that of the main structure, and the entrance is formed by a spacious vestibule approached under moulded arches, surmounted by a balcony. Surrounding the vestibule is a stone arcade, which on one side gives access to the hall of the new school, and on the other, a cloak and crush room. The chemical lecture theatre, which is 52 ft. long, 30 ft. wide, and 23 ft. high, is entered from the level of the hall and the vestibule. Adjoining the theatre is a lecture-room, and in close proximity to a wide corridor a spacious apartment is situated, which will be utilised as a workshop and weaving room. This apartment is 70 ft. long and 30 ft. wide. The upper floors are reached by a broad staircase leading from the hall. Several class-rooms occupy the first floor, and on the second floor a museum, 90 ft. long by 28 ft. wide, is placed. On this floor also is the chemical laboratory, which measures 70 ft. long by 30 ft. wide. The entire cost of the building, including the fitting and furnishing, is estimated at 12,000*l.* The architects are Messrs. W. & J. Mawson, Bradford.

**The Munich Exhibition of 1888.**—The Bavarian Association of Industrial Art (according to the *Sprechsaal*) organised an exhibition to be held at Munich from May 1 to October, 1888; the principal object of which is to display the progress made during the last twelve years by German industrial art. The development of art in Germany will be represented from an historical point of view by fitting up of a series of rooms in the styles of the principal artistic epochs; these apartments being fitly devoted to the reception of specimens of the older styles of German industrial art. Modern works are to be grouped according to national and corporate associations, German, Austrian, and Swiss artists being invited to exhibit, and the necessary supervision being exercised by local and central committees. Arrangements are being made for the decorative treatment of the rooms at the cost of the exhibitors, but where collective exhibits are organised the exhibitors will be allowed to carry out the decorative work in conjunction with the directors of the enterprise. The question of awards and distinctions will be treated by a commission representing the various countries taking part in the display. The official circular refers to the previous Exhibition of 1876 as having given a marked impetus to artistic progress, and urges upon the exhibitors the duty of making the forthcoming display in every respect successful.



The Water Supply of Italian Towns.

In the inquiry on the sanitary condition of all the Italian towns and villages instituted in 1885, the following data, according to the Reichsanzeiger (Berlin), were obtained with regard to the supply of drinking water. In 2,491 communes, with 6,196,584 inhabitants, only spring-water was consumed; 1,583 communes, with 5,267,744 inhabitants, had only well water; 1,732 (5,965,703 inhabitants) spring and well-water, and 130 (721,893 inhabitants) only water collected in cisterns for consumption. In 1,321 communes, with 7,026,229 inhabitants, cistern-water in combination with spring and well water was drunk, whilst 946 communes, with 3,201,803 inhabitants drew their drinking water exclusively or chiefly from rivers, and 55 communes with 79,154 inhabitants from lakes. Spring-water is consumed chiefly by the populations of Liguria, Latium, the Abruzzi, the Basilicata, Calabria, Sicily, and Sardinia; well-water preponderates in Piedmont, Lombardy, and Emilia; cisterns are found most frequently in Tuscany, the Mark, Emilia, Campania, Apulia, and Sicily; river-water meets with the largest consumption in Venetia and by the population living near to the mountains of Lombardy, Piedmont, Liguria, and Tuscany; lake-water is drunk near the large lakes of North Italy. In 2,720 communes drinking water is brought longer or shorter distances in metal or wooden pipes, or in conduits constructed of masonry, cement, or clay; in 447 communes the supply is simply through open channels. In 614 communes lead pipes are used in taking drinking-water to towns and houses. In 6,763 Italian communes, with a population of 22,434,735 persons, the required drinking-water is supplied in sufficient quantities; in 1,495 communes, with 6,024,375 inhabitants, the quantity furnished is insufficient. Regarding quality, it is stated that, with a sufficient supply of drinking-water, 81.8 per cent. of the communes have good, 13.1 per cent. medium, and 5.1 per cent. bad water; in the case of the communes with insufficient supply, the proportions are 56.3, 25.5, and 18.2 per cent.

PRICES CURRENT OF MATERIALS.

TIMBER.		2. s. d.	2. s. d.
Greenheart, B.G.	ton	8 5 0	7 10 0
Teak, E.I.	load	8 0 0	12 10 0
Sequoia, U.S.	foot cube	0 2 3	0 3 0
Alaska, Canada	load	3 0 0	4 10 0
Do. do.	load	3 0 0	4 10 0
Do. do.	load	3 10 0	4 10 0
Do. do.	load	1 10 0	4 0 0
Do. do.	load	2 10 0	4 10 0
Do. do.	load	3 0 0	6 0 0
Do. do.	load	2 0 0	3 10 0
Do. do.	load	2 0 0	4 0 0

TIMBER (continued).

	2. s. d.	2. s. d.
Lath, Dantale	5 0 0	5 0 0
St. Petersburg	4 0 0	5 10 0
Waincoat, Riga	0 0 0	0 0 0
Odessa, cargo	2 10 0	3 0 0
Do. Finland, 2nd and 3rd	7 0 0	8 0 0
Do. 4th and 3rd	5 10 0	8 10 0
Riga	5 10 0	7 0 0
St. Petersburg, 1st yellow	8 10 0	13 0 0
Do. 2nd	7 0 0	8 0 0
Do. white	6 10 0	8 10 0
Sweden	6 0 0	14 0 0
White Sea	0 0 0	0 0 0
Canada, Pine, 1st	16 0 0	24 0 0
Do. 2nd	10 0 0	15 0 0
Do. 3rd, do.	8 0 0	9 0 0
Do. Spruce, 1st	5 0 0	7 0 0
Do. 3rd and 2nd	5 0 0	6 10 0
New Brunswick, do.	4 0 0	10 0 0
Battens, all kinds	0 8 0	0 11 0
Flooring Boards, 9 1/2 in. prepared, first	0 8 0	0 7 6
Second	0 6 0	0 7 6
Other qualities	0 4 0	0 5 0
Cedar, Cuba	0 0 2 1/2	0 0 3 1/2
Honduras, do.	0 0 2 1/2	0 0 3 1/2
Australian	0 0 2 1/2	0 0 3 1/2
Mahogany, Cuba	0 0 4 0	0 0 6 0
St. Domingo, cargo average	0 0 4 0	0 0 6 0
Mexican	0 0 3 0	0 0 3 1/2
Toloso	0 0 3 0	0 0 3 1/2
Honduras	0 0 3 1/2	0 0 4 0
Maple, Bird's-eye	0 0 6 0	0 0 7 0
Rose, Rio	8 0 0	11 0 0
Bals	7 0 0	0 0 0
Box, Turkey	0 0 6 0	12 0 0
Satin, St. Domingo	0 0 6 0	0 0 9 0
Porto Rico	0 0 8 0	0 0 10 0
Walnut, Italian	0 0 3 1/2	0 0 5 0

METALS.

Iron-Bar, Welsh, in London	4 15 0	5 0 0
Do. in Wales	4 5 0	4 10 0
St. Staffordshire, London	5 10 0	6 0 0
Copper		
British, cake and ingot	48 0 0	43 10 0
Best selected	44 10 0	45 10 0
Sheets, strong	40 10 0	50 0 0
Chili, bars	39 12 6	40 0 0
Yellow Metal	0 0 4 1/2	0 0 4 1/2
Lead		
Pig, Spanish	12 0 0	0 0 0
English, common brands	12 5 0	0 0 0
Sheet, English	13 5 0	0 0 0
Snails		
Silesian, special	16 17 6	16 0 0
Ordinary brands	16 12 6	16 15 0
Tin		
Straits	105 15 0	0 0 0
Australian	106 10 0	0 0 0
English ingots	106 10 0	0 0 0

OILS.

Linseed	19 12 6	19 15 0
Cocunut, Ceylon	30 0 0	39 0 0
Ceylon	23 15 0	24 0 0
Palm, Lagos	22 0 0	0 0 0
Rapeseed, English pale	25 5 0	25 10 0
Do. brown	24 0 0	0 0 0
Cottonseed, refined	20 10 0	0 0 0
Tallow and Oleine	25 0 0	46 0 0
Lubricating, U.S.	5 0 0	6 0 0
Do. refined	5 0 0	12 0 0
Turpentine		
American, in casks	1 4 9	0 0 0
Do. do.	0 14 0	0 14 6
Stockholm	0 9 8	0 9 8
Archangel	0 9 8	0 9 8

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Construction of Shed for Steam-Roller	Hendon Local Board	S. S. Grimley	October 24th	ii.
Team Road-Roller and Water-Cart	do.	do.	do.	ii.
Temporary Mortuary	do.	do.	do.	ii.
Cast-Iron Work	Com. of Sewers	Official	October 25th	ii.
Coast Guard Station, Isle of Wight	Admiralty	do.	do.	ii.
Cornish Boiler	Uxbridge Local Board	G. Eves	do.	xii.
Froughton Roof, &c.	Casterbury Cor.	Official	October 26th	ii.
Ironwork	Hackney Board of Works	J. Lovegrove	do.	ii.
Making-up Roads, &c.	Bromley U. R. S. A.	T. W. Aldwinckle	October 27th	ii.
Labour Sheds and other Works	Wideworth & Clapham Un.	do.	do.	xii.
Food Paving	St. Martin-in-the-Fields	Official	do.	xii.
Broken Granite and Flints	Twickenham Local Bd.	H. M. Ramsey	do.	xii.
Granite and Ballast	Walthamstow Local Bd.	H. S. Ridings	October 29th	ii.
Gas-Kitchens, W.C.'s, & Extension of Kitchen	Bromley Union	Official	do.	ii.
Ulling Down Exhibition Buildings	Newcastle Jubilee Ex.	H. Carrick	October 29th	xii.
Forming and Making-up Road	Beckenham Local Bd.	G. B. Carlton	October 31st	xii.
Broken Granite	Hanwell Local Board	Official	do.	ii.
Gas Park Fencing, Dulwich Park	Met. Board of Works	do.	Nov. 1st	xii.
Enlargement of F.O. at Woolwich	Com. of H.M. Works	do.	Nov. 2nd	xii.
Making-up Footpaths	Chislewick Local Board	A. Ramsden	Nov. 3rd	xii.
Pipe Sewer, &c.	Wanstead Local Board	Official	do.	xii.
Heaven, Scullery, &c., at Workhouse	Barnet Union	do.	Nov. 4th	xii.
Laying Cast-Iron Pipe Sewer	Hull Corporation	A. E. White	Nov. 7th	xii.
Stone Work, Iron Railings, &c.	St. Pancras Burial Bd.	Official	Nov. 8th	xii.
Iron Fencing	Buckingham Corporation	do.	do.	ii.
Making-up Roads, &c.	Bromley Local Board	H. S. Creggan	do.	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Clark of Works	Hendon Local Board	32. 3s. weekly	October 24th	xvi.
Team Road-Roller and Engine-Driver	do.	Not stated	do.	xvi.
Surveyor's Assistant	Tunbridge Wells Lcd Bd	22. 2s. weekly	October 28th	xvi.
Clark of Works	Schl. Board for London	31. 3s. weekly	do.	xvi.

TENDERS.

BAYSWATER.—For the erection of a private dwelling-house at 2, Bayswater Hill, W., for Mr. John Newton Mappin. Mr. Wilfred J. Hardcastle, architect. Quantities by Mr. W. Thorncraft, 70, Guilford-street, W.C.:—

	House.	Boundary walls and gates.	Total.
Foster & Dicksee	£2,670	£329	£2,999
Parrell & Son	2,652	340	2,992
Collis & Sons	2,629	310	2,939
Higgs & Hill	2,640	294	2,934
E. Lawrence & Sons	2,379	305	2,684
E. C. Howell & Son	2,394	314	2,708

\* Accepted.

BOURNEMOUTH.—For pianoforte warehouses, for Messrs. Price & Sons. Messrs. Lawson & Donkin, architects, Bournemouth:—

George & Harding	£1,295 0 0
George James	1,175 0 0
Higley & Crane	1,170 0 0
F. Hoare & Son	1,149 0 0
G. Bevan	1,098 0 0
Barrow & Rutledge	1,089 0 0
Lucas & Cosser	897 0 0
F. Holden	888 0 0
Scott & Mitchell	885 0 0
W. Hoare	918 0 0
Jenkins & Son	945 0 0

BRACKNELL (Berks).—For house and shop at Bracknell, Berks. Mr. J. T. Lawrence, architect, Leighton Buzzard:—

Brooking, Slough	£2,927 0 0
Snell & Co., Maidenhead	2,799 0 0
Hughes, Wokingham	2,670 14 2
Searle, Reading	2,600 0 0
Charman, Ascot	2,500 0 0
Woodbridge, Maidenhead	2,500 0 0
Margate, Reading	2,335 0 0
Oades Bros., Egham	2,335 0 0
Newland, Cobham	2,300 0 0
Green Bros., Colnbrook	2,300 0 0
Addis, Hounslow	2,267 0 0
Trust, Ascot	2,250 0 0
Wernham, Reading	2,154 0 0
Winter & Tipl., Reading	2,150 0 0
Simmonds, Reading	2,079 0 0
Newberry, Reading	1,975 0 0

BRIGHTON.—For the erection of Mr. James Willing's presentation clock tower to the borough of Brighton:—

G. Smith & Co., London	£1,644 0 0
J. Barnes, Brighton	1,470 0 0
Carey & Corben, London	1,452 0 0
King Bros. & Co., Norwood	1,442 0 0
W. Phillips & Co., Brighton	1,416 0 0
Cheesman & Co., Brighton	1,410 0 0
J. T. Chappell, London	1,342 0 0

BURY ST. EDMUNDS.—For the erection of a gate lodge at the Free Grammar School, Bury St. Edmunds, for the Governors. Mr. F. Whitmore, architect, Chelmsford:—

Frost	£246 10 0
Robinson, inn.	234 0 0
F. Tooke (accepted)	208 0 0

[All of Bury St. Edmunds.]

CHELMSFORD.—For alterations to Boarded Barns Farm, Chelmsford, for Sir H. B. P. St. John Midway, Bart., Dogmersfield Park, Winchfield. Mr. F. Whitmore, architect, Chelmsford:—

Beaumont	£250 0 0
Moss	241 0 0
Baker (accepted)	235 0 0

[All of Chelmsford.]

CLERKENWELL.—For reinstating No. 168, St. John-street, Clerkenwell, E.C., for the Hand-in-Hand Insurance Society. Mr. Robert Willey, architect, F.R.I.B.A., 69, Ludgate Hill, E.C.:—

Clarke & Bracey, City	£637 0 0
Lester & Sons, City	625 0 0
Lobby Bros. (accepted)	629 0 0

CLEVEDON (Somerset).—For the Jubilee Memorial Almshouses. Messrs. Barker & Cross, architects, Weston-super-Mare:—

H. Forss	£450 0 0
W. Green	398 0 0
W. Dowland (accepted)	385 0 0
A. Pollard	230 0 0

CRICKLEWOOD.—For the erection of four shops at Cricklewood, for Mr. Thos. Reed:—

Wicks	£2,475 0 0
Thorpe	2,149 0 0
Tout	2,085 0 0
Cheahire	2,067 0 0
White	2,000 0 0
Tennant	1,988 0 0
Ditcham	1,988 0 0
Portman	1,910 0 0
Gregory	1,850 0 0
Grimley	1,815 0 0
Favey	1,753 0 0
Beach	1,763 0 0
Arthur	1,760 0 0
Lane	1,725 0 0
Judson	1,678 10 0
Woodhouse (accepted)	1,632 0 0

DULWICH.—For the making of roads, sewers, and drains, and lake, &c., at Dulwich Park, for the Metropolitan Board of Works:—

Oseman, Brith	£23,247 0 0
Adams, London	21,903 0 0
Merton, London	19,475 0 0
Mayo & Co., Brighton	19,400 0 0
Harris, Camberwell	17,465 0 0
Bath & Blackmore, Clapham	16,400 0 0

\* Accepted.

EALING.—For altering and decorating Grimston Lawn, Ealing, W. Mr. H. Phelps Drew, architect, 99, Gloucester-road, S.W.:—

Bailey, Ealing	£2550 0 0
Norton, Chelsea	520 0 0
Rye, Ealing	450 0 0

\* Accepted subject to additions.



**FARNBOROUGH**—For alterations and additions to the Cambridge Hotel, Farnborough, Hants. Mr. Stanley Parker, architect :—  
 Prestige ..... £393 0 0  
 Bishop (accepted) ..... 455 0 0

**PULHAM**—For the erection of shops at Stamford Bridge, Fulham-road, for the executors of the late Mr. John Howden. Mr. A. Benyon Tinker, architect, 4, New Inn Chambers, Strand, W.C. :—  
 W. H. Smith ..... £2,593 0 0  
 Simpson & Co. .... 2,395 0 0  
 Prestige & Co., Cambridge Wharf, Grosvenor-road, S.W. (accepted) ..... 2,473 0 0

**HARLOW (Essex)**—For alterations to new hall, Mr. Chas. Granville Baker, architect, 5, Bloomsbury-square, W.C. :—  
 Thos. Rider & Sons ..... £703 0 0  
 [No competition]

**HAROLD WOOD (Essex)**—For the first two pairs of semi-detached workmen's cottages, on the Powisbrook Estate, Harold Wood, Essex, for Mr. Alfred Rutley, Messrs. C. & F. Rutley, architects, 11, Dowgate Hill :—  
 Henry Tassie, first pair ..... £220 0 0  
 Bernard Cooney, second pair, with extra bedrooms ..... 235 0 0

**ISLINGTON**. For new entrance and shop front at the Islington Bazaar, for the Home and Colonial Trading Association, Limited. Mr. Robert Willey, architect, 68, Ludgate Hill, E.C. :—  
 Saby & Son, Islington ..... £418 0 0  
 Jones Bros., Baling ..... 375 0 0  
 Ashby Bros., City (accepted) ..... 310 0 0

**KINGSLAND**. Aligned tenders for alterations to the Lamb public-house, Kingsland. Messrs. Wilson, Son, & Aldwinckle, architects :—  
 Hearle & Son ..... £1,297 0 0  
 Drew & Cadman ..... 1,199 0 0  
 W. Shummur ..... 6,098 0 0  
 Jarvis & Son ..... 1,140 0 0  
 Jackson & Todd ..... 1,119 0 0  
 J. & H. Mills ..... 1,90 0 0

**LAMBETH**—For the erection of new moulding-mills, &c., at York-road, Lambeth, for Messrs. M'Gaw & Co. Mr. R. P. Whellock, architect. Quantities by Mr. H. E. Polard :—  
 A. Mackie ..... £7,322 0 0  
 W. Howard & Co. .... 6,796 0 0  
 Longmore & Burge ..... 6,098 0 0  
 B. Hoesgood ..... 6,325 0 0  
 W. Brass & Son ..... 6,232 0 0  
 Colls & Son ..... 6,239 0 0  
 Rider & Son ..... 6,163 0 0  
 C. Ansell ..... 6,161 0 0  
 E. C. Howell & Son ..... 6,069 0 0  
 J. Holloway (accepted) ..... 6,060 0 0

**LONDON**—For new baths and laundry at Hampstead. Mr. Henry S. Legg, architect, Christ's Hospital, London :—

*For the Building.*

Manby ..... £2,717 0 0  
 Gould & Brand ..... 2,036 0 0  
 A. Hackworth ..... 2,365 0 0  
 Bradford & Son ..... 2,359 0 0  
 Allen & Son ..... 2,312 0 0  
 Wall Bros. .... 2,292 0 0

*For the Engineer's Work.*

Fresser & Co. .... £1,253 0 0  
 Bradford ..... 1,091 0 0  
 Berry & Co. .... 925 0 0

**LONDON**—For alterations and improvements at No. 1, Moorgate-street, City. Mr. Henry S. Legg, architect, Christ's Hospital, London :—

Colls ..... £1,745 0 0  
 Perry & Co. .... 1,715 0 0  
 Brass ..... 1,704 0 0  
 Simpson ..... 1,650 0 0

**LONDON**—For alterations and stables to Nos. 171 and 173, Lancaster-road, W., for Mr. W. Taylor. Mr. Stanley Parker, architect, 437, Edgware-road, W. :—  
 Mark ..... £1,409 0 0  
 Roberts ..... 1,331 0 0  
 Lyford (accepted) ..... 1,114 0 0

**LONDON**—For the erection of a shop and warehouse, No. 18, Chiswell-street, E.C., for Mr. John Dale. Mr. E. W. Brooking, architect, 44, Finsbury-circus, E.C. Quantities by Mr. C. W. Stephenson, 38, Parliament-street, S.W. :—  
 W. Goodman ..... £4,555 0 0  
 Clarke & Bracey ..... 4,485 0 0  
 J. Morter ..... 4,197 0 0  
 E. Lawrence & Sons ..... 4,020 0 0  
 J. Grover & Son ..... 3,957 0 0  
 Kilby & Gayford ..... 3,920 0 0  
 Patman & Fotheringham (accepted) ..... 3,893 0 0

**LONDON**—For warehouses, Chiswell-street. Mr. F. Chambers, architect :—  
 Holland & Hannen ..... £10,443 0 0  
 Greenwood ..... 9,960 0 0  
 Kilby & Gayford ..... 9,736 0 0  
 Stubbs ..... 9,480 0 0  
 Grover & Son ..... 9,400 0 0  
 Saby & Son ..... 9,300 0 0  
 Lawrence & Son ..... 8,695 0 0

**LONDON**—For alterations to the Royal George public-house, Charing Cross-road, for Mr. Winsor. Mr. W. Ansell, architect :—  
 Godden ..... £415 0 0  
 J. Beale (accepted) ..... 384 0 0

**MANCHESTER**. For alterations and additions to Congregational Sunday Schools, Rusholme. Mr. J. L. Barker, A.R.I.B.A., architect :—  
 Thos. Durborough ..... £2031 0 0  
 Wilson, Toft, & Huxley ..... 836 0 0  
 Thos. Rufe ..... 775 0 0  
 Owen Williams ..... 719 0 0  
 Edward Wood ..... 678 0 0  
 William Maben ..... 649 0 0  
 William Shaw (accepted) ..... 648 0 0

**SHIPTON (Wilts)**—For rebuilding the Old Boot Inn, in the village of Shipton, Wilts, for Mr. George Gibbons, Messrs. C. & F. Rutley, architects, 11, Dowgate Hill, E.C. :—  
 J. Worr, Salisbury ..... £870 0 0  
 Pike & Son, Andover (less 30M., for old materials) ..... 785 0 0  
 R. G. Battley, London ..... 765 0 0  
 \* Accepted.

**SOUTHALL**—For the erection of a cow-shed, &c., at Southall, Middlesex, for Mr. George Gosney. Mr. Robt. Willey, architect, 68, Ludgate Hill, E.C. :—  
 Hanson & Son, Southall (accepted) ..... £19 17 0

**SOUTHEND (Essex)**—For erecting a house, South Church-road. Mr. W. J. Wood, A.R.I.B.A., architect, 1, Finsbury-circus, E.C. Quantities by Mr. Jas. Kennedy, 31, Great James-street, Bedford-row, W.C. :—  
 Alp & Ventris ..... £1,731 0 0  
 Steward ..... 1,637 0 0  
 Baker & Wiseman ..... 1,631 0 0  
 Darke ..... 1,417 0 0  
 Woodmans ..... 1,279 0 0

**SOUTHEND (Essex)**—For erecting the Victoria Hospital. Mr. W. J. Wood, A.R.I.B.A., architect, 1, Finsbury-circus, E.C. :—  
 Darke & Son ..... £1,317 10 0  
 Steward ..... 1,291 1 5  
 Whur ..... 1,237 18 0  
 Alp & Ventris ..... 1,171 0 0  
 Woodmans ..... 1,142 0 0  
 Baker & Wiseman ..... 1,134 0 0  
 [Hot and cold water supply and sanitary arrangements not included in these estimates.]

**STRATFORD**—For alterations to the front of No. 100, Broadway, Stratford, pulling down present premises, No. 102, and rebuilding, for Mr. Marten. Mr. Arthur Ashbridge, architect, 78, Leadenhall-street, E.C. :—

	A*	B†	Total.
Thomerson & Son	£1,992	£1,335	£3,327
J. Azeley	1,050	1,689	2,739
J. H. Johnson	1,729	1,149	2,878
Hearle & Son	1,699	1,171	2,870
Asherton & Latta	1,730	1,109	2,839
W. Shummur	1,719	1,080	2,799
Mark Gentry	1,720	1,075	2,795
A. Reed	1,610	1,121	2,730
J. Cantley	1,698	978	2,676
Boulter & Lee	1,514	984	2,498

A\* Front building. B† For the erection of store with workshop over at rear. † Accepted.

**SUNNINGDALE**—For alterations and additions to Mr. Kingston's premises at Sunningdale. Mr. Byrne, architect and surveyor, Ascot :—

Norris, Sunningdale ..... £405 0 0  
 Charman, Ascot ..... 460 0 0  
 Watson, Ascot ..... 437 0 0  
 Bland, Sunninghill ..... 485 0 0  
 Walker, Sunninghill ..... 472 12 0  
 Trust, Ascot ..... 445 0 0

**WALWORTH**—For alterations, &c., at the King's Head Tavern, Walworth-road, S.E., for Mr. Hunt, proprietor. Mr. George Treacher, architect. Quantities by Mr. C. Danneil :

Teller & Coulthurst ..... £1,548 0 0  
 Turtle & Appleton ..... 1,445 0 0  
 Burman & Son ..... 1,435 0 0  
 Tyerman ..... 1,255 0 0  
 Vesale ..... 1,210 0 0  
 Royal ..... 1,159 0 0

**WANDSWORTH**—For fitting up pumps, &c., at the Infirmary, St. John's Hill, New Wandsworth, for the Guardians of the Poor of the Wandsworth and Clapham Union. Mr. Thos. W. Aldwinckle, architect, 2, East India-avenue, Leadenhall-street, E.C. :—

J. Taylor & Sons ..... £270 0 0  
 T. Horn & Sons ..... 731 0 0  
 Z. D. Berry & Sons ..... 110 0 0  
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### The Late Mr. Beresford Hope.



THE death of Mr. Beresford Hope calls for something more than a passing notice in the pages of a journal devoted to architecture, if only on account of the fact that he was the only amateur since Earl de Grey, the first President, who was ever considered worthy to fill the office of President of the Institute of British Architects. But apart from this claim to commemoration, the active part which Mr. Hope took in promoting church building, his great munificence in aid of such work, his knowledge of and enthusiasm for Mediæval architecture and art, his loyalty towards all that was best in the architectural profession, and his interest in their work, render his name of which all English architects will think with regard and gratitude. There is something beyond this, too, which the death of Mr. Hope suggests. For he may be said to have been one of the most prominent representatives of a great movement which has run its course and passed away. His name is indissolubly connected with the Gothic revival and with the great modern church building age of the England of this century. Many of us can remember well how great was the zeal, how fervent the hope and enthusiasm for the future, which characterised the writings and speakings and the whole course of action of the leading architects and ecclesiologists who were associated with that movement; how certain they all were about it, how fully persuaded in their own minds that there was a glorious future for English Mediæval architecture, starting on the basis of the great works of the fourteenth or the thirteenth century (for in this matter there were fluctuations of faith) and going on continually to greater and nobler developments. And of this faith Mr. Hope was no wavering or backsliding disciple. He stuck to his guns to the last, and, with a persistence which had its pathetic aspect, he, at the last meeting of the Architectural Museum at which he presided, went through the same profession of love for and belief in Mediæval art as the starting-point of modern architecture, before an audience which gave him its applause and respect, but not its credence. The movement with which he was so closely associated died, in fact, before him. And now his own death seems to remove one of the most noteworthy links between us and a past period of architectural history, which, so fast do things move in these latter days, seems

already far behind and forgotten, hidden away, as it were, behind the balustrades and flower-pots of the new Renaissance. Let us think kindly, however, of the Gothic revival and its champions. All revivals are in their nature doomed to be transitory; but at least the Gothic revivalists worshipped a noble and pure phase of the art, which stooped not to such gauds as pots and balustrades.

Mr. Hope was born in 1820, the son of the Mr. Thomas Hope who distinguished himself as the author of a kind of modern Greek novel or romance under the title of "Anastasius," from which he got the sobriquet of "Anastasius Hope," by which he has been sometimes referred to in print as if it were his real name. Mr. Hope the elder had, however, other claims to remembrance besides this work, which have been overlooked in the notices which have appeared in the daily papers. He was the author of a book of illustrations of "Household Furniture and Interior Decorations," executed from his own designs, which was published in 1807, and consists of a number of finely-executed outline plans of rooms and furniture designed on severe antique models; and he also wrote a "History of Architecture," in two volumes, published in 1834, which is, of course, out of date in the light of recent archaeological knowledge, but which is a well-written and comprehensive treatise from the point of view of the author's day, and deserves not to be forgotten. Both the wealth and tastes of the son may be said to have been hereditary, for Thomas Hope was an enthusiast about Greek art and architecture, which was the taste of his day, and the son's architectural proclivities turned in the same manner towards Gothic, as the taste of his own day; the general interest in art and architecture was inherited; the particular form it took in father and son respectively was merely an example of harmonising with the environment. Mr. Beresford Hope's architectural leanings were probably influenced by,—at least, they were closely connected with,—his ecclesiastical creed: he was throughout his life an earnest and devoted adherent of the moderate High Church party, and was one of the first and most important members of the Ecclesiological Society, in which sound Church views and correct Gothic detail went hand in hand.

The election of Mr. Beresford Hope to the office of President of the Institute of Architects, to which we have already referred, did not take place without considerable opposition and paper warfare, as our own columns of the early part of the year 1865 bear witness; and we then expressed our decided opinion, with the greatest respect and friendly feeling to Mr. Hope, that the election of an amateur President as the head of an

essentially professional body was a mistake, especially in regard to the discussion in Council of the many purely professional questions which must inevitably come before such a body. This opinion no one at the present moment will be likely to dissent from; but it must be added that in the address which Mr. Hope delivered from the presidential chair at the opening of the Session 1865-6 of the Institute, he did much to justify, so far, the choice of the majority who voted his election. Instead of giving, as might have been expected, an address from his own special point of view as an ecclesiologist, Mr. Hope adopted the broadest view possible of the profession of architecture; and his address (which will be found in the *Builder* of November 11, 1865, under the heading "Architects, Engineers, and the Coming Season") was in the main a most sensible and well-written appeal in favour of doing away with the strong but, as he considered, arbitrary and unnecessary line of demarcation which in modern times has been drawn between the profession of architect and engineer. He wished to see engineers included in the ranks of the Institute of Architects, that so each branch of the profession, now too much separated, might be drawn into closer union, and each might learn something from the other. "The world should not," he urged, "continue to deceive itself with the belief that Stephenson and Brunel were not architects,—self-made architects, it may be, just as the mathematician Wren and the physician Perrault were self-made architects, but, like those worthies of the seventeenth century, great architects. The notion that because to them architecture came without its usual training, therefore the engineer is for the future to dispense with the trained and learned architect for the construction of buildings whose monumental elevation gives its colour to our age, is a wrong on our whole craft of architecture." The idea which Mr. Hope proceeded to enlarge upon was that all works were not engineering, in the true sense of the term, because they were executed by engineers; that great railway stations and viaducts were really works of architecture; those who erected them were in reality doing, well or ill, architectural work; that in order to do it well they required architectural training and study, the study of the past, as much as those who undertook any other class of building; whereas pure engineering practically repudiates the past, or uses it only to point a self-exalting contrast. "I do not say," he added, "that engineers themselves do so; but this repudiation of the past is the necessary price at which the constructive part of the engineer's business can any longer be formally divided from architecture." In the



same address Mr. Hope took a very high view of the part which ought to be played by the Institute of Architects.

"The Institute ought to be, without rival and without demerit, the central regulating Areopagus of Architecture, of architecture as a science and architecture as an art; of architecture as practised by its professional votaries, and as studied by the amateur, as loved by both,—throughout this imperial realm. The time should come when the absence of those letters which denote some grade in the Institute from the name of any one who practices architecture should be as much cause for inquiry, as the absence of academic distinction from that of the clergyman who has the misfortune to be a 'literate.'"

Thus the amateur president sketched out a position for the Institute which it has certainly of late been doing its best to fulfil, and which it may entirely fulfil if the best members of the architectural profession will be true to it and to the highest interests of their profession: for that is where the rub really lies.

Among Mr. Hope's various essays and addresses on architectural subjects are some which will repay perusal, even from the standpoint of the present moment. Some of the best of these were addresses delivered at the Architectural Museum, and published afterwards as pamphlets. In one entitled "The Common Sense of Art," delivered in 1858, he gave a fairly comprehensive view of what he thought might be evolved in the way of architectural novelty and originality, from an eclectic study of the whole field of Gothic architecture, answering at some length the question he quaintly propounded at the outset, "What are we to select?" Eclecticism has run wild since then, but Mr. Hope's view was a broad one for the time, and would have been thought by many conservative Gothicists of that day a great deal too broad. Thus it is, in architecture as well as in politics; the liberalism of one generation is the conservatism of the next. In another address, given at the same place in 1864, on the "Art Workman's Position," he made one claim for the art-workman which is only now beginning to meet with any response, viz., that the name of the actual maker and designer should be connected with a piece of art-work, and not only the name of the people who sell it; and he urged this not only on behalf of the art-workman in order that he might have the credit of his work, but on behalf of art and of the public, in order that the actual executor of the work might have the stimulus to do his best which can only exist along with public reputation for his work, coupled as it must be also with liability to wholesome public criticism.

Mr. Hope's most important contribution to the literature of architecture was, however, his book, published by Mr. Murray in 1861, on the "English Cathedral of the Nineteenth Century." This is, of course, in one sense, purely a Churchman's book, and some portions of its contents deal rather with what may be called ecclesiastical polity than architecture; but, so far as it deals with the architectural question from the writer's point of view, it is admirably done, clearly and eloquently written, and very carefully illustrated. A great point in the book is the stress which he laid on the desirability of large-scale churches, churches of cathedral type, in fact, if not quite of cathedral size. He wanted a small number of impressive and spacious buildings rather than a greater number of small parish churches of the average scale and pattern; and if the most is to be made out of the picturesque and artistically elevating side of church worship, there can be no doubt that he was in the right. The whole book is, of course, based on the assumption that Gothic is the only style to be taken into consideration for churches,—it could hardly have been otherwise at that period, but it contains a great deal of excellent criticism and suggestion, which might be applicable to church building independently of style.

Personally, Mr. Beresford Hope was a man with many friends; possibly he had some enemies, as no one is without; but we cannot say we ever heard of them. He was a genial, courteous, kindly man, with a kindly manner. In public speaking, of which he did a good

deal in his lifetime, his manner was what might be called a little pompous, only that the word rather implies something sour and ill-tempered, which he certainly was not; and he generally managed to make some good hit in his speeches, whether on architecture or any other subject, and enjoyed his joke quite as much as his audience did; and if his friends smiled at his little peculiarities of this kind, they did not like him the less. He was, to sum up, a typical and withal very favourable example of the wealthy amateur and patron of art, with much more knowledge of one branch of art, at all events, than wealthy patrons usually possess; one who used his wealth in this direction both with judgment and liberality, and did his best to encourage what he believed to be the best.

In the *Builder* for March 12, 1870, we gave a portrait of Mr. Hope, which is a very good likeness of him as he then was.

The funeral at Kildown, on Wednesday, was attended by a great number of relatives and friends of the deceased, and the coffin was almost hidden from view beneath the offerings of wreaths and flowers heaped upon it. The monumental tomb in Kildown Churchyard was erected some years ago, from the designs of Messrs. Carpenter & Ingelow, at the time of Lady Mildred Hope's death. It is a monument of some elaboration, in the Gothic style which Mr. Hope so loved, and an illustration of it will be found in the *Builder* of May 6, 1882.

#### BRITISH MUSEUM.

ROOM OF GREEK AND ROMAN SCULPTURE IN RELIEF.



WE have already (p. 523) called attention to the new room in which some of the Greek and Roman reliefs so long buried in the dark basements have now been restored to exhibition and a certain amount of daylight. It would be premature at present to criticise the arrangement of these sculptures, as the deficiencies under which they are now seen are due to temporary circumstances for which the niggardliness of the Treasury is responsible, and which, it is to be hoped, may soon be remedied.

These sculptures, it will be remembered, are mainly sepulchral reliefs of Greek and Roman workmanship, dating roughly from about the fourth century B.C. down to the third century A.D.; many of them came to the Museum with the Townley Collection, others from the Earl of Aberdeen, Lord Elgin, Lord Stratford de Redcliffe, and Colonel Leake. In 1852 they were crowded out for want of space and withdrawn from exhibition, and from that period till now their place has known them no more. They have practically ceased to exist for the general public, except in Corbould's fine drawings in the "Museum Marbles."

About eighteen months ago the removal of the Department of Prints to new buildings left a room vacant, and amongst the many clamorous applications for this vacant space it was considered that the "buried sculptures," with their record of thirty-five years in disgrace, had a prior claim. This room had been used as a study by the previous occupants, and obviously a good deal of alteration was necessary in order to prepare it for the new tenants. When, however, the question came forward of granting the funds for this purpose, the Treasury absolutely declined; thirty-five years were in their sight but as yesterday, and their Lordships were of opinion that the alteration proposed was not of urgent necessity and should be postponed for the present. The sum set apart for this purpose out of Museum funds reverted to the Exchequer as savings. Fortunately, in England it sometimes happens that when public spirit fails private munificence comes to the rescue. A small balance remaining from the White bequest has been available for the little that was required to render the room at least presentable. But the whole story is an interesting evidence of British bureaucracy.

If funds should ever be forthcoming, the room will assume a very different aspect. The

sculptures now fixed in the walls will remain, but the windows in the west wall will be built up, and large skylights will take their place. By this means the whole space of an additional wall will be gained, and the present unsuitable side light will be done away with. The present wooden floor will be removed entirely, and a stronger one built on the level of the Elgin Room; and as a small flight of steps will lead from the Mausoleum Room, passage direct into the reconstructed room, the whole floor space will in future be available for exhibition of sculptures. The floor space thus provided will be occupied with the finest series of large sarcophagi, with subjects in relief, which are still waiting in the basement round the walls will be placed the sculptures in low relief, which are now temporarily ranged in rows across the room; while the sculptures in high relief, built in the walls, will be seen at a more convenient height than they are from the present floor. Furthermore, the new level of the floor will allow for a basement, corresponding in height to that of the present Greco-Roman basement, which will admit of the exhibition of those objects for which there is no space above; for it must not be supposed that one, or even two, new rooms would exhaust the wealth which the cellars are ready to disgorge. Besides the large sarcophagi, already mentioned, there are a host of sculptures still awaiting release; upwards of forty more reliefs, a set of casts illustrating the development of the Akroterion on Athenian stele; a large series of capitals and other members architecturally most interesting; and a complete columbarium, fitted up with all the various forms of marble sepulchral urn in use in Roman times, some of which are of extremely beautiful work in alabaster.

To turn from what is still unseen to that which is visible, it must be confessed that at present the first sight of the new room will appear somewhat bewildering, especially to those who have not even by lantern-light seen these treasures during their incarceration. Until the room is finally arranged, it is only possible here briefly to point out some of the leading features of interest.

In the collection now on view, we have represented all the different forms of Greek and Roman sepulchral monument. The earliest type of tomb found in Greece is probably the so-called "cupola" grave, which consisted of a subterranean domed chamber, covered with a heap of earth, *xōma*. After the cupola form had disappeared the *xōma* was sometimes raised to an enormous size, as we know from a law of Solon restricting a work of this kind to the labour of five men for five days. Gradually this gave way to the simple grave, marked by a slender shaft, on which a more or less elaborate design came to be either carved or painted. We know that both forms of burial existed in the time of Plato, who distinguishes between the *xōma* and *λίκνα* *ισαρίφαρα*. The Egyptians, on the other hand, from the earliest times, buried their dead in a wooden sarcophagus, the sides of which were painted with subjects and inscriptions; and probably about the time when the Greek traders were imitating Egyptian wares at Naukratis on the Delta, this custom was conveyed to Greece. In the First Vase Room is a terra-cotta sarcophagus, painted with Greek designs of the sixth century, from Rhodes. A further stage is represented by the beautiful sarcophagus at Florence (*Hellenic Journal*, vol. IV., p. 354, pls. xxxvi-viii.), painted with a battle of Greeks and Amazons, of about the beginning of the third century B.C., and the analogous example found at Kerch. But, beyond a few isolated instances, which, however, are sufficient to show us the continuous stages of evolution, the Greeks do not seem to have much affected the decorated sarcophagus. How prevalent it was among the Romans we may judge from the large series of small chests arranged on the southernmost shelf across the new room. The lid of the Egyptian prototype took a form which was intended to represent the likeness of the deceased; and so it follows that in Etruscan, and often in Roman imitations, the marble figure of the dead person reclines on the cover, while the paint-



ings on the sides are here replaced by sculpture in relief. Sometimes the sarcophagus was taken to represent, in miniature, the actual house, and the lid is then carved in imitation of a tiled roof, with the edge finished off as eaves; one example here exhibited has the front carved in the form of the façade of a Roman house, with columns and pilasters, and four doorways. In the same row are two reliefs of special interest: the one represents two gladiators in combat, inscribed with the names probably of the schools,—*familie*,—to which they belonged, with the single word *ἀνελίθησαν*, signifying that Death had presented them with the foil of dismissal; on the other is the very rare representation of a skeleton, with a somewhat cynical reference to Death the leveller, "When only this is left, who is to tell whether I have been a Hylas or a Theseites?"

In the next row (No. 2 from the south side) is a set of banquet scenes, which furnish a rich illustration of the Greek ideas of a future state dealt with in our previous article (p. 383). One of these, marking probably the tomb of some bold sea captain, has in low relief beside his inscription the effigy of the galley in which he served.

In the third row are principally low reliefs of a better period, where the figures are freer and the composition, as a rule, quite simple; graceful figures of ladies at their toilet, or in their earthly home, friends meeting or parting with a friendly grasp of the hand; here is Athens, personifying perhaps the Athenian demos, crowning the citizen who has deserved well of her. One very fine relief from Athens commemorates three ladies of Sestos who died far from their native town; on another, which marked the tomb of fallen warriors, a female figure pours wine for a snake who twines around the trophy which they, perhaps, had helped to win, while a mourning comrade stands beside his horse looking on. The snake is frequently employed, specially in early art, as the symbolic watchfulness which guards the tomb, perhaps also not without some reference to its Chthonian character. A similar relief in the Louvre is explained as the thanksgiving sacrifice of a general for a victory. In that instance, the snake is probably the attribute of Athens Polias.

The next row (No. 4) contains a beautiful series of stele illustrating the slender shafts of the best period, crowned with the graceful akroterion in the form of a palmette: it is instructive to note how the ornament, beginning as the simple finish to the angle of the pediment, grows into the main feature of the monument, covering, as it were, with its luxuriant beauty the shaft which gave it birth. One stele in this row deserves special attention; the main relief is in the form of the special funeral amphora, on which are carved the figures of two warriors, Archades and Polemonikos. This amphora is supported by a sphinx, who faces the spectator, but whose body, on an heraldic principle common in early art, but very rare in this good period, is flattened out as it were on both sides of the head. This stele formerly belonged to Lord Guilford, owner of the famous Corinthian puteal, which has long since disappeared. The stele was obtained at a London sale by Mr. George Plucknett, who recently presented it to the Museum. May we not hope that its long-lost companion, the puteal, which must be somewhere in England, may also one day find its way here?

The vase which is depicted on the Guilford stele has a peculiar significance in connexion with many other marble vases here exhibited. From the earliest times vases are an indispensable accompaniment of Greek funeral rites; they were employed for the funeral ceremonies, for furnishing the tomb, and sometimes for holding the ashes of the dead. Made of earth, they represented, perhaps, indistinctly the element into which human life must resolve itself: an epitaph of Zonas in the Anthol. Pal. xi, 43, says,—

Δός μοι τοῦκ γαίης πεπονημένον ἀδὲ κτελλόν  
ἀν γένεσθαι, καὶ ὑπ' αὐτὸν ἀποθνήσκειν.  
And so it came that a special fabric grew up intended solely for this purpose, and the

beautiful series of polychrome lekythi of the fourth century show us the shape most in vogue: probably from this period date the large marble lekythi here exhibited, in which the vase takes the place of the stele, and the painted scenes are replaced by an inscription on sculpture. In another passage of the Anthology, Erinna says,—

"My funeral shaft, and marble shapes that dwell  
Beside it, and sad urn, receptacle  
Of all I am, salute who seek my tomb,  
If from my own, or other cities come,"  
(Garrett's translation.)

Of course, the form of the vase, imitated from terra cotta into marble, undergoes in the new material certain modifications. As a direct development of the idea, we have in Roman times the marble and alabaster actually intended for the ashes, to be placed in columbaria.

On the north wall of the room are fixed some of the most beautiful of the later reliefs; on one of these, on the left, is a pastoral scene, with a pair of goats butting, bulls, and cows; at each end is a shepherd with his dog, the one asleep in the noonday heat, while his companion breathes upon his pipes; the whole is an idyll instinct with the spirit of Theokritos. On the right is a charming decorative design of a frieze of Amazons half reclining, each holding up her crescent shield. In the centre is the head of a sleeping baby, which looks as if it had come direct from a canvas of Raffaele. On the same wall is a curious late design of the carceres of the circus, out of which issue two Erotes driving chariots, to which are harnessed pairs of greyhounds, a scene which one would expect on late Roman gems, and which is probably of the same period as the gems of this class.

On the south wall are two long slabs sculptured with similar subjects, but which show interesting differences of treatment. The one on the right has the Nine Muses, each with a feather in her hair, plucked from the vanquished sirens, and with her distinguishing attribute: in the centre are Apollo striking the lyre, and Athens. It is curious to note that the lyre of Apollo and one Muse rests on a column, as if these reliefs had been copied from statues in the round. A similar group occurs on a sarcophagus in Berlin representing the contest of Apollo and Marsyas. In the group on the left the Nine Muses meet us again, but here they are divided off into pairs, each pair standing within a richly-sculptured niche between two columns: the treatment of this composition is strikingly like some of the early ecclesiastical sculpture of the Renaissance: a likeness which is further suggested by the style of another group on the same wall; it is a very late relief, representing boys at play, which an inscription informs us, was dedicated by a father to his son, "Filio super omni caritate dulcissimo." The wealth of new material here offered for the study of Greek and Roman sculpture and thought in their latest phase will probably prove the most attractive feature of the new room; the interest of these sculptures will have a special claim on all students of Mediæval art.

# NOTES.

**I**N spite of the long and elaborate evidence given by Mr. Walker at the inquest in connexion with the fire at Whiteley's (printed in another column), we are not inclined to accept the theory that the wall was pushed out by the expansion of the girders. Theoretically, no doubt, a length of butted girders such as existed there would expand to the extent of 6 in. or 8 in., if the fire had no action upon the iron except in the direction of its length, but the probability is that before that degree of expansion in length was reached, the iron would have buckled and twisted so much in various directions that the expansion in length would be nullified, or the actual result might even be a contraction so far as the action of the beams on the walls was concerned. The conclusion arrived at by Mr. Walker is perfectly logical if the iron did exactly what it is assumed it would do; but the

fact is, no one can say what iron will do in a fire. Our opinion is that the wall fell from the action of heat upon it, assisted by the disturbing action of the girders under the influence of heat; but we do not think there is anything to prove that this disturbing action was a pushing-out one arising from direct expansion of the iron-work; and it may just as likely have been a dragging weight and leverage exerted by iron which had twisted and lost its bearing power, and was hanging and dragging on the walls. Of course the iron does expand with the heat of a fire, but it may and probably will have become distorted in so many other ways by the time it comes to that point, that it cannot be regarded as a matter of simple linear expansion in length. The real moral is,—protect your iron with a heat-resisting coating, which will give time to put the fire out before the iron can feel it to any serious extent.

**L**ORD RANDOLPH CHURCHILL has been enlightening the public on art at the Science and Art Schools at Newcastle. Lord Randolph seems to have had a misgiving that he was not much of an authority on such subjects, and in regard to the arts of painting, sculpture, and music he confined himself to the comfortable generalisation that these three arts "are holding their own not only amongst certain classes of this country, but over the whole mass of the population of this country." What Lord Randolph means by that he best knows. Probably it was intended as the kind of pleasant generality which would draw applause and might mean anything or nothing. But there is another art about which Lord Randolph is compelled to speak more plainly, that of architecture. He does not find it progressing. He was recently appointed (as, indeed, we observed with some amusement) on a Special Committee on the War Office sites question, and is therefore, no doubt, constituted *ipso facto* an authority on architecture. The War Office designs were all very bad, Lord Randolph thinks, and so English architecture is in a bad way. Now, as a matter of fact, one of the designs was much better than Lord Randolph knows of; but the generally unsatisfactory character of the selected designs was due in great measure first to the fact that the Government conditions were such that many of the first architects of the day would have nothing to do with the competition, and secondly to the fact that one meddling and pragmatical amateur on the first committee of selection managed the rejection of some much better designs because they did not agree with his preconceived notions. The Law Courts is a failure, no doubt; not, however, because it is Gothic, but because it is badly planned, and in this case again the failure is due to the fact that the authorities weakly allowed the best plan, which they had premiated as such, to be pushed on one side. The most audacious statement of this amateur exponent of architecture is that there is no trace of architectural excellence in the residential architecture of to-day. It is a fact that there are a larger number of picturesque houses, houses in which artistic effect, externally and internally, is carefully studied, being built during the present generation than for many generations previous; and it may be useful to Lord Randolph (or, at any rate, to those who listened to his clap-trap) to know that one of the most gifted of the younger architects of France, M. Paul Sédille, in some recent articles on English architecture contributed to a French periodical, has expressed his special admiration of the English Domestic architecture in the warmest terms; and Frenchmen are not by any means given to praising English art. But then M. Sédille knows something about architectural design and Lord Randolph knows nothing, and that makes all the difference.

**T**HE Transactions of the Institute of Architects become more and more interesting and valuable in regard to their illustrative contents. The third volume of the New Series, which is just in the hands of members, is full of architectural illustrations, many of them of great beauty and interest. The Institute



acted well in giving a large series of Mr. A. B. Mitchell's drawings as Sonne Medallist: these are admirable in their combination of freedom of effect with architectural accuracy, and are beautifully reproduced by the phototype process. Mr. Bidlake's drawings as Pugin Travelling Student include very careful measured illustrations of the north porch at Spalding Church; and two pencil drawings by Mr. Oakeshott (Aldwinckle Student), are also given. There is a whole series of illustrations to Mr. Brindley's paper on the use of marble, showing a number of examples of the decorative use of this material. Mr. T. G. Jackson's drawing of the remarkable doorway at Trau is also reproduced as a double-page plate by the phototype process. There are a considerable number of illustrations of Japanese domestic architecture appended to Mr. Conder's paper on that subject, including some reproductions from photographs of interiors by the phototype process. Some sketches in Shropshire and Worcestershire, by Mr. H. D. Walton, are also of considerable interest, and very well executed. In fact, from being what it once was, a mere collection of papers, the *Transactions of the Institute of Architects* has become a volume of things full of artistic beauty and interest, and we heartily congratulate the Institute on their new volume, and hope it may have many equally worthy successors. Among special points in the literary portion of the present volume may be mentioned the reprint of Mr. Wyatt Papworth's paper on "English Buildings in the Middle Ages," which contains a great deal of curious information on prices and the mode of conducting building operations at that period, and in a historical point of view is of permanent value.

CONSIDERABLE interest is being taken in this country in a railway case now proceeding in America involving the question of "undue preference." The suit is against the Cincinnati and New Orleans and the Texas Pacific lines for "discriminating" in freight rates in favour of the Standard Oil Company. This latter concern is a tremendous monopoly, and has been able to apply such pressure to the Railway Companies as to compel them to refuse to convey the oil of its competitors. Whatever may be said as to the adequacy of our laws relating to railways, those relating to undue preference are clear enough to make it impossible for such arbitrary proceedings to be taken with us, and the injustice involved in the case in question is so glaring that it is probable that Mr. Rice, the complainant, will win his suit. He claims that the offending companies should forfeit their charters,—a very heavy penalty,—for their abuse of privilege, so that a verdict in his favour would place them in a most peculiar position. Some years ago a verdict was given against another railway company for "discriminating" in favour of the very same concern, and the present complainant appears to have been far more hardly used than were the firm (Messrs. Scofield & Co.) who instituted the proceedings alluded to. That case was fully argued at Cleveland before a jury composed of men selected especially for the case, and, although the damages awarded were considerably below the amount claimed, the principle of the right of the State to interfere in such matters was clearly affirmed.

A MOTIONLESS GRINDER at first sight seems an impossibility, but nevertheless such an instrument has been produced. When, however, we learn that the motion is contained in the particles to be operated on themselves, the mystery is explained. The pneumatic pulveriser, now being introduced by the British Pneumatic Pulveriser Co., works on this principle. The material to be operated upon is fed into a couple of receptacles or hoppers placed side by side a short distance apart. Close to the bottom of each of the hoppers there is a small pipe-like opening, the mouths of these openings pointing towards each other. A jet of superheated steam or compressed air is introduced into each opening, and in this way the particles of the material to be pul-

verised are thrown violently against each other, and the result is a powder of any required degree of fineness ranging between a coarse sand and an impalpable powder. The company have issued an ecstatic circular as full of italics and superlatives as a young lady's letter, in which they set forth the virtues of the apparatus. From this we learn that some of the most difficult substances, such as chrome iron ore, quartz, corundum, cast-iron chips and turnings, granite, French chalk, soap-stone, &c., have been successfully treated. The possibility of an improved grinder for cement-making is a point that more nearly interests us, and we are pleased to learn that the pneumatic pulveriser has been used for this purpose with most gratifying results. When used for reducing clinker cement to powder, a fineness corresponding to a mesh of 200 holes to the inch has been readily obtained. "Diamond cut diamond" has always been recognised as the leading canon of pulverisation, and the apparatus in question appears admirably adapted for extending the principle.

THE relation between science and nature has received a fresh exemplification in the newly-discovered connexion between agriculture and the iron trade. Everybody nowadays has heard of the Thomas & Gilchrist process, by which the phosphorus, which is so bad for steel-making purposes, is eliminated cheaply and quickly from the iron, where it is often very abundant. The resulting rubbish is known as "slag," which hitherto was deemed waste material and which contains an immense deal of phosphoric lime. Any stray iron in it is first separated, and the slag, which in the early days of the iron trade grew into perfect mountains of hideous blackness around the site of the works, is ground into a fine powder, when it forms an admirable fertiliser, far exceeding the capabilities of guano, coprolite, or bonedust. The quality of the powder depends on the fineness of the grinding; it contains as much phosphoric acid as superphosphate, while the price is only one third.

DR. DÜMMLER, in a recent paper, tries to rescue from the reproach of being "Etruscan" a small but important class of Greek vases which have not hitherto received the attention they deserve. As six out of the twenty specimens he enumerates belong to the British Museum, his theory will be weighed with interest in England. All of the vases that we have seen (the five at Würzburg we take on trust from Dr. Dümmler's account) certainly bear an unmistakable stamp of identity of *fabrique*. They also have a puzzling barbaric air, which, of course, is the reason that they have so long been shelved as Etruscan. Dr. Dümmler thinks they are Greek work under the influence of Scythian surroundings; in fact, that they were made at some colony in the Pontus, exported probably to Corinth, thence re-exported to Italy. He bases this opinion, which he frankly acknowledges is only opinion, on one of the series, an amphora in the Museo Gregoriano at Rome, on the shoulder-piece of which a combat is depicted in thoroughly Scythian fashion; three horsemen in peaked Scythian caps turn round in rapid flight to shoot at their pursuers. Herodotus (vii. 64) describes the Scythians as wearing sharp-pointed caps, to which he gives the Eastern name "kurbasia." Their custom of fighting in feigned retreat was well known, not only Herodotus but Plato refers to it, in the *Laches*; he uses the Scythians as stock example of men who fight flying as well as pursuing (*ὡς ποιοῦν τοὺ καὶ Σκυθία. λήγονται οὐχ ἡττον ἐπιπορεύεσθαι ἢ διώκοντες μάχεσθαι*). Dr. Dümmler rightly says that a number of questions must await the complete and accurate publication of the whole series. He gives five instances in plates viii. and ix. of the last issue of the *Bulletino* of the German Institute in which his paper appears.

IN the same number (II. Heft., 3, 1887) Dr. Hartwig gives two autotype plates of a head of Parian marble, in the possession of Mr. E. Haug, once American Consul at Rome. The head is in itself of fine work and considerable

interest, but Dr. Hartwig's paper seems to us little more than a string of precarious conjectures. From some marks in the head it is conjectured that it was provided with a coronal of rays, and hence was intended to represent the sun-god Helios. It is compared with a rayed terra-cotta head, also in the possession of Mr. E. Haug, and with the well-known coins of Rhodes with the Helios type. The marble head seems to have been attached to a body, and, from the turn of the neck, it is possible that the complete statue stood in a quadriga. From this it is, of course, only a step to think of the Helios, by Lysippos, the work for which the artist was most highly celebrated in antiquity. In fact, Dr. Hartwig thinks that we have here a marble copy of early date of the original bronze. We feel inclined to say with the Scotchman: "Mebbe yes, and mebbe na."

THE last vacant site in Chambers-street, Edinburgh, has been disposed of by the Improvement Trust. By an arrangement between the trustees and the gentleman to whom the site has been disposed of, a memorial tablet is to be placed in the building which is in course of erection, bearing the inscription:—"Near this spot stood the house in which Sir Walter Scott was born, August 15, 1771. Erected by the Magistrates and Town Council. Sir Thomas Clark, Lord Provost; James Lessels, Architect."

THE President of the Royal Scottish Academy, Sir William Fettes Douglas, has represented to the Merchant Company of Edinburgh that it would be a graceful act were the Company to provide a statue of Adam Smith, to be erected in the new National Portrait Gallery now approaching completion. This appeal has been unavailing, as it appears the Company are fettered by their rules as to the disposal of the funds under their management. An effort is, however, being made to procure the money required for the statue by public subscription.

THE *Indian Engineer* of October 1st contains an interesting account, with illustrations, of the process of "launching" the Torkham Bridge girders over the Meheob river. The river is in a deep ravine, and subject to sudden and violent floods, so that building the girders below and hoisting them vertically was out of the question, and they were built on the cliff side and hoisted or landed forward into position by the aid of a steel rope stretched across the ravine, the trailing end of the girder being taken by a roller working on rolled beams laid as rails. The details of the attachment and method of working are given in the diagrams.

THE collection of drawings by the members of the Dutch Watercolour Society now on view at the Goupil Gallery in New Bond-street includes some fine things, but also shows that the Society is entirely devoted to a mannerism of the "blottesque" type. There can hardly be said to be a finished drawing in the room, though there are some very fine and powerful sketches of landscape, nearly all of a murky and desolate type, melancholy having apparently marked the modern Dutch School for its own. Among the best of these cold pastorals are Bakhuizen's "Spring Evening" (22), Du Chattel's "Winter" (30), and Bastert's "Winter Evening" (39), Bakhuizen's "Wood, Winter" (60), and Poggenbeck's "Winter's Evening" (95). Mauve's "Across the Village" (95), with a back view of a flock of sheep, shows a remarkable power of indicating forms of animals in the middle distance without giving a single detail,—a power which means, of course, very careful study, though it looks careless; but the same artist's "Return of the Flock" (56), where the sheep come up nearer to the foreground, might be entitled "Return of the Sinudges," and shows a tone and colour in landscape which we are thankful to think exists nowhere on this earth. In Gabriel's "Landscape" (2) it is impossible to make out whether the middle portion represents a river or a wet road after rain; after-



trying some time we gave it up. Among the architectural subjects are two large interiors by Bosboom (11, 18), executed on a thin paper, which is pasted on a mount so as to leave ridges and wrinkles over the surface; as this occurs in both drawings, it is evidently by design, and is about as shallow a piece of trickery as could be. If the painter had given the same trouble to getting his architectural lines perpendicular it would have been better for his work. There are two or three little bits of Israel; among others, one, "Reading the Bible" (102), which is interesting as showing what the artist's style was in his early days; the others appear to be recent works. Van Essen's "Heads of Lion and Lioness" (28) is an admirable piece of animal painting. In another room is to be seen a large "Pastorale" by Henner, a nude figure relieved against a background of sombre trees, under an evening sky, piping to another who listens; the scale is larger than necessary for the subject; it would have done as well or better half the size; but it is a pure poetic fancy expressed in rich colour, which is worth all the dingy achievements of the Dutch water-colour artists.

A COLLECTION of drawings, under the title of "The Sunny South," by Mr. G. Q. B. Talbot, is on view at the gallery of the Fine Art Society. The landscapes show what may be called good painting, but no great force or originality; the artist has been successful, however, in representing a curious and striking effect of "Morning Mist from Montreux" (39). The drawings dealing with architectural subjects are very good; we may notice particularly the little drawing of "A Marmou's Tomb, Algiers" (31), which is very bright and sparkling in effect. Architectural subjects seem to be Mr. Talbot's best point, though there are but a small proportion of them in the collection.

SIR WILLIAM MUIR, Principal of the Edinburgh University, in his opening address for the winter session, delivered last week, referred to the outward aspect of the University, and to the additional embellishments it had recently received, specialising the dome over the entrance to the quadrangle of the old college buildings. These buildings, he said, had been hopelessly closed in by the noisy bustle of crowded streets, but now the building, as befitted one of the great edifices of their beautiful city, could be discerned from afar. He also alluded to the handsome fountain erected in the quadrangle by Dr. Cunningham,—"a touching monument of the affection, *patris hand patris* of the octogenarian founder toward his Alma Mater." He intimated that arrangements were in train for the erection of the academic hall to be attached to the new buildings. He alluded to the progress made in regard to the building for the Students' Union, and to the efforts being made to provide university houses or hotels or the accommodation of the students,—a movement which he wished would meet with every success, and he felt that success was certain if they were carefully planned and arranged, and well regulated.

It appears that a proposal to build a hotel on Shepperton Egot, near Shepperton Lock, has excited the reasonable apprehension of the West Surrey Water Company, whose intake is a short distance below the Egot, and who apprehend that their water supply must inevitably be contaminated by the drainage from the proposed hotel. Their secretary has addressed a letter to the Rural Sanitary Board, pointing out that if such a building were erected "it might become a serious matter to the district supplied by this Company," as it unquestionably might, and probably would. Plans of the hotel would have to be submitted to the Board for approval: so the architect and proprietors of the same would do wisely to consider in the meantime what can be done to provide for the drainage of the hotel otherwise than by sending it into the river. They will probably find it difficult to get permission to do the latter from any Sanitary Authority properly alive to its responsibilities.

THE special number of the *Art Annual*, forming what used to be called the Christmas number of the *Art Journal*, is already out; we suppose before long Christmas numbers will be published at Midsummer. As before noted, it consists of a sketch of the life and work of Meissonier, by Mr. Lionel Robinson, with a number of illustrations from the painter's works. These include an admirable photogravure of "La Rixe," as a frontispiece, and a very successful engraving by Mr. Carey after "Waiting for an Audience"; there are also engravings of the brothers Van de Velde, and of the celebrated picture of the retreat from Russia. The smaller illustrations go to prove that Meissonier is a very difficult artist to reproduce, and that much of the painter's delicate art evaporates in the process; few of the cuts gave any just idea of the delicacy of the originals. Some reproductions of original studies by Meissonier are of considerable interest, and will be new to most readers. The study of horses on page 24 shows the care which Meissonier gave to the representation of the animal which he has rendered so splendidly in many of his small masterpieces. The view of the painter's house in Paris is a very poor specimen of architectural sketching. Mr. Robinson's biographical essay contains a good deal that is of interest as to the painter's method of working, &c.

HOW many of our readers are aware that there is a journal devoted especially to bookbinding, under the title of *The Bookbinder*? It is published monthly,\* and the number dated October 25th contains three interesting illustrations of the bookbinder's craft, one by Dupin (1498), and another of a quarto bound by Francis Bedford, and another of the "Hortus Sanitatis," a book bound at Strasburg in 1536, but in the quasi-Oriental style derived from Venice, the first Paradise of bookbinders. There is something else in *The Bookbinder* which interests us more, however, namely, a suggestion that "finishers" who are readers of the journal should, from time to time, send designs to its Editor worked out in printers' ink on white paper, and that any that seemed worthy of it should be published. That is a direct and practical encouragement to artistic effort on the part of working bookbinders, and we should be interested to see what it results in.

#### "OLD BRICKS FOR SALE,"—BOW-STREET AND COVENT GARDEN.

THE best known, perhaps, though by no means the most popular house in London, will very soon have been razed to the ground. An important scheme for improvements on the Duke of Bedford's estate, at the north-eastern side of Covent Garden, involves the destruction of the old Bedford Hotel, in the East, or Little, Piazza,—its back premises and the kitchen extending far behind Russell-street; and of the former Bow-street Police-court. This latter is Nos. 4 and 4A, and with it will fall the adjoining premises, Nos. 3 and 5, in that same street. Since the removal of the criminal business to the new Courts on the opposite side of the way these premises have hitherto been occupied by various theatrical agents, hosiers, and costumiers. For the new buildings, erected in 1879,† were demolished all the premises which lay within the area bounded by Broad-court, Cross-court, and Duke's-court, and the last-named alley, a turning out of Bow-street, was abolished.

In Sir Patrick Colquhoun's work‡ we read that a police-court with three magistrates was first established at Bow-street in the year 1749, and that seven other metropolitan courts were subsequently opened in terms of the Statute 32 Geo. III., c. 53. At Bow-street presided the celebrated Sir John Fielding, a descendant of Sir William Fielding, first Earl of Denbigh, and younger half-brother to Henry Fielding, the novelist. Despite the affliction of blindness, Sir John Fielding composed numerous didactic works, amongst them being a description of the

\* William Clowes & Sons.

† For view and plans of the new courts and police offices (Mr. John Taylor, architect) see *Builder* for June 21, 1879.

‡ A Treatise on the Police of the Metropolis, &c. By a Magistrate. Third edition. 1796.

cities of London and Westminster, 1776, 12mo. His ability and rectitude elevated the character of the office of a metropolitan Justice, which in those days had sunk to very low repute. Having succeeded to his brother, whose efforts for the Hanoverian cause were, in December, 1748, rewarded by the then paltry place of Acting Justice for Middlesex and Westminster, he removed to Bow-street. His house there, occupying the site under review, was destroyed, with all its contents, by the No Popery rioters on Tuesday, June 6th, 1780. He died at Brompton, four months afterwards, in September of that year. That house, moreover, had another claim to fame, for it was thence, on February 28th, 1749, that Henry Fielding gave forth to the world his labour of some years, "A History of Tom Jones, a Foundling." Its successor, built of red brick, may yet be distinguished by a stuccoed front, rising one story above its neighbours, by the railing before Nos. 3 and 4 and 4A having terminals in shape of Roman fasces whereof all but two of the axes are broken off, and by its high-pitched gable at the rear. The police-court and cells to the south were on the ground-floor at the back, and had a large apartment in the basement. But these features are now in ruins; all movable fittings have been carted away; and an extensive clearance is being made, preparatory, as we gather, to the opening out of a wide thoroughfare from Bow-street in alignment with the Northern or Great Piazza, and King-street beyond. These changes, combined with others of recent date, quite alter the aspect of this familiar street.

At daybreak on the morning of Wednesday, March 5th, 1856, Covent-garden Theatre, which Sir Robert Smirke had rebuilt in 1808-9, was totally consumed by a fire that broke out towards the close of a masquerade ball given by Anderson, the *soi-disant* "Wizard of the North." Of that house the pit and box entrances were in Bow-street. The theatre was reconstructed by the Messrs. Lucas, after the late E. M. Barry's designs, and at a total cost exceeding 70,000l. Then followed the ridiculous and for many years useless Floral Hall, which was opened on March 7th, 1860, by a ball to celebrate the constitution of our Volunteer Rifle Corps. For its southern entrance the continuity of Inigo Jones's Piazza was ruthlessly broken, and arches of cast-iron substituted for the arcade. Gye's project for a large central flower-market is at length, however, partially realised, since within the past few weeks the Floral Hall has been adapted for service as a fruit depot in connexion with the market in Covent-garden.

"I've had to-day a Dozen Billet Doux  
From Pops and Wits, and Cits, and Bow Street Beaux."

Thus did Mrs. Bracegirdle begin an epilogue, by Dryden, on the boards of Drury-lane. Sir Walter Scott comments on the passage by observing that a billet-doux from Bow-street would now be less flattering than alarming. But in Dryden's time Bow-street was eminently the Bond-street of the town. It was originally laid out in the year 1637, being more curved in shape than it is at present, and terminated towards the upper end, beyond Hart-street, in a *cul-de-sac* that abutted against the back of Long-acre at a spot a few yards east of Phoenix-alley, since Hanover-court, the last home of John Taylor, the Water Poet. Hutton, in his "New View of London" (1708) calls it "a spacious Str. betw. Russel Str., Covent Garden, Sely, and near Long Acre;" Strype, writing in 1730, describes it as being "open and large with very good houses, well inhabited, and resorted unto by gentry for lodgings, as are most of the other houses in this parish" [St. Paul's]. But within four or five years it rapidly declined in favour; a downfall to which the Police-court, with its inevitable surroundings, in all likelihood largely contributed. Amongst its inhabitants during the decadence were Edmund Cuth, at No. 1; Spranger Barry, over what is now Mrs. Edwards's ham and beef shop, and was formerly Will's Coffee-house; \* and Dr. Johnson, who came hither from the "Black Boy" in the Strand, and quitted his lodgings for others in Holborn. For Rich's theatre was pulled down the house which Dr. Radcliffe had occupied during the interval 1687-1714. It was whilst residing here that he had the famous passage of arms about the garden door with

\* This shop, with a private door opening out of Bow-street, is now 21, Russell-street. First known as The Red Cow, and then as The Rose.



Sir Godfrey Kneller, who lived in the Eastern Piazza (Bedford Hotel). Three doors from Radcliffe, at the widow Hilton's, opposite to the "Cock," lived Wycherley, with his wife, the Lady Letitia, widow to Charles, second Earl of Drogheda; and it is in the "Cock" tavern, on the eastern side of Bow-street, that he lays two of the best scenes of his "Plain Dealer," wherein, as elsewhere, he excels all our comic dramatists for his truth of detection of what is cant, and in exposing hypocrisy: the play is worth volumes of sermons. Tonson, too, had his private house and printing-office in Bow-street. At No. 3 lived Marcellus Larone (1680-1702), who drew the figures for Tempest's "Cries of London." The house which Grinling Gibbons occupied for many years was, if we mistake not, over against the present Strand Union Relief and Register offices. On the eastern side, too, once lived Major Mohun, the actor, and William Longueville, friend to the author of "Hudibras." In this street was born (1661) Robert Harley, Earl of Oxford; and Waller for two years was tenant of the house on the site of the old Police-court. Here Waller composed his famous Panegyric upon Cromwell, for whose superiority as compared with his subsequent Congratulation he excused himself to the King in saying that poets succeed better in fiction than in truth. In his rooms at the northern end of the street, Bunell Thornton held (1762) an exhibition of paintings in ridicule of the Society of Arts,—for as yet the Royal Academy was not,—which we have seen imitated in our own day by Mr. Furness's humorous set of drawings recently collected at the Grosvenor Gallery. To finish, though not to complete our list of worthies, we must cite one other name,—as immortal, indeed, as any we have mentioned. Sukey receives a letter, gives it to Will Honeycomb, and Sir Andrew Freeport reads it to the club, which concludes:—"If you would go down to the country, and leave off all your vanities but your singing, let me know at my lodgings in Bow-street, Covent-garden, and you shall be encouraged by your humble servant, Roger de Coverley."

#### THE ARCHITECTURAL ASSOCIATION:

##### THE PRESIDENT'S ADDRESS.

The first meeting of this Association for the present session took place on the 21st inst. in the meeting-room of the Royal Institute of British Architects, which has been kindly placed at the disposal of the Architectural Association for its meetings. Mr. John Slater, B.A. (President), occupied the chair, and there was a very large attendance.

Seventy gentlemen were nominated for membership, and Mr. William Emerson was elected a member by acclamation.

The Chairman announced that Mr. P. J. Marvin had been nominated to serve on the Committee in place of Mr. E. Guy Dawber, resigned. The name of Mr. W. J. H. Leverton also being proposed, it was decided to take the vote on a later occasion.

Votes of thanks were passed to those gentlemen who had afforded facilities for the interesting visits made during the vacation. Votes of thanks were also passed to the Entertainments Committee, to Mr. Briggs, and to the various exhibitors at the recent *conversazione*, a special vote being awarded to the Manager of the Hotel Windsor for kindly lending a pianoforte in an emergency without remuneration.

The Chairman then distributed the prizes, of which we published a list in the *Builder* for Oct. 15, p. 525, to which we may now add that the Sketch Book Prize was awarded to Mr. A. B. Pite.

The annual report of the Committee, and the Treasurer's account, were adopted by the meeting, and a special vote of thanks passed to the hon. auditors, Mr. A. C. Bulmer Booth and F. E. Pales.

Mr. Slater, who was very cordially received, then delivered his Presidential address, which was as follows:—

Gentlemen,—My first duty in rising to address you this evening is to express my warmest acknowledgments to the members of this Association, both those who are present and many who are absent, for the honour you have done me in electing me to this position. The feelings of the occupant of this chair on the threshold of his year of office must necessarily

be of somewhat complex character, as mingled with the pride and satisfaction one experiences at having been thought worthy of filling the position of President of the Architectural Association, there must be considerable anxiety as to one's ability to perform its duties in such a way as to maintain the prestige of the Association at the high level which it has attained.

When an association or society is approaching the fiftieth year of its existence, and numbers on its roll nearly 1,000 members, no one can for a moment call in question its complete success, for its position speaks for itself and is beyond cavil. But it appears to me that in this very success lurks an element of danger which, unless it be carefully guarded against by those who have the conduct of the affairs of the society, may at no very distant time threaten the stability of the fabric which has been so carefully reared. This danger is twofold: on the one hand, there is the tendency to point to what has been done and to ignore the ever-changing conditions of the times, and consequently to crystallise; on the other hand is the tendency to ignore the past and to rush eagerly and impetuously along new paths without carefully studying the direction which those paths take. We shall best guard against this double danger in the case of such an Association as our own by occasionally reviewing its history and ascertaining what were the aims and objects of its founders, by seeing how these aims have been varied with the growing requirements of the times and how in the present day they still demand modification. It seems to be the fate of all great undertakings to have their origin wrapped in a certain amount of obscurity, and this Association is no exception to the general rule, as the records of its early years are most meagre; but I believe it to be a well-authenticated fact that it developed from the Society of Architectural Draughtsmen, which was founded in 1842 by a small band of earnest workers. The objects of this Society were threefold.

1. To assist the members in obtaining employment.
2. To foster good draughtsmanship, by making it a rule that every member should furnish quarterly a drawing of some executed architectural subject.
3. The establishment of a benefit fund upon which the members could draw in the event of sickness. I may say in passing that I think it would have been a wise thing if the Association could have retained as part of its functions this last object in some form or other.

The society had some difficulty in getting a firm footing; but in July, 1845, the *Builder* had a short notice of it, stating that "the association seems now to be very satisfactorily organised, and promises to be useful in facilitating communications between its members and the profession generally." The works contributed by the members turned out to be of such excellence and of so much general interest that in September, 1845, the first public exhibition of drawings was held in rooms in Southampton-street, Strand. This attracted general attention, and was of great use in increasing the number of members. On February 3rd, 1847, a most important and, as the Germans would say, epoch-making, paper was read by Professor (then Mr.) Kerr, in which he sketched the outline of an architectural association of students for mutual instruction and improvement. The opening sentences of that paper were as follow:—"When I say that the present system of architectural education is extremely defective, I may appeal for confirmation to the experience of every one of you, and this is so much the case that the architect is perfectly anomalous among professionals." That, gentlemen, was over forty years ago. Looking at the experience that has been gained since then, and making every allowance for the improved opportunities of study which now exist, should we be far wrong in using precisely the same language in this year of grace, 1887? Can we say now that the present system of architectural education is other than extremely defective, or that the architect's position, as compared with that of other professional men, is other than absurdly—I might almost say disgracefully,—anomalous? The result of this paper was the establishment of the Architectural Association, which held its first *conversazione* in Lyon's Inn Hall on October 8th, 1847, the report of which says that "it was held under very promising circumstances, more than 100 gentlemen being present." Compare that meeting with our *con-*

*versazione* a fortnight ago, and you will have some notion of the progress which the Association has made. In November, 1847, it numbered eighty members. The objects of the Association were stated to be,—(1) the development of true principles of criticism in architecture; (2) the advancement of the study of design; (3) the provision of means whereby the student may acquire an aptitude for applying and extending the present materials of the art. The new society soon gave evidence of its vitality by appointing a committee to investigate the question of competitions, which, even then, was a burning one, and in 1849 a very able report was issued. Matters seem to have gone on more or less successfully for the next few years until we come to 1856, which was a stormy year in the annals of the Association. On May 2nd in that year a series of resolutions were moved, the last of which affirmed "that the Architectural Association having been virtually renounced by both the elder and the younger members of the profession, there are sufficient reasons for taking the requisite measures for dissolving the society." I am unable to trace the causes which led to this resolution being proposed,—fortunately it was not carried,—but there had evidently been considerable differences of opinion among the members, much friction between the Association and the Institute, and some very outspoken criticism of the latter's proceedings. The discussion which ensued on the moving of this resolution led the Institute to take what I believe was its first formal recognition of the Association by addressing to its officers a very dignified letter, which contained suggestions for a much closer union between the two bodies, and which finished with these weighty words which I would urge every architect of to-day to take to heart, for they are as true now as ever they were:—"The Council desire to record their opinion that every alienation among its members tends to a lowering of the social weight and position of the profession as a body, and that a policy of affiliation is infinitely to be preferred to one of repulsion and isolation." Unfortunately, the only idea of union which the Institute seemed able to grasp at that time was that of complete fusion, and after a certain amount of discussion, a resolution was passed that this was not expedient. It was evidently felt that the Charter was not liberal enough for the Association. Notwithstanding the internal condition of the Architectural Association in this year, it had just previously done one of the most important services ever rendered to the profession, as, in November, 1855, it memorialised the Institute on the subject of examinations, and begged that body to frame some kind of examination for students, the passing of which should be the outward and visible sign of honest study, hard work, or intrinsic ability. The Association was very urgent in this matter, as although the idea of holding examinations did not find favour with the Royal Institute of British Architects at the time, it was pressed again and again, until at last,—not, however, till six years had passed,—the Voluntary Examination was instituted. It is both curious and interesting at this time to see what matters the Association turned its attention to; for instance, in the next year, 1857, a formal resolution was passed expressing the opinion of the Association "that the privilege of the Saturday half-holiday should be accorded to the pupils and assistants of architects in London and the United Kingdom." You see the immense vitality of the young body: the vexed subject of competitions was not too high for it, nor the Saturday half-holiday too low. An important event occurred in 1859, namely, the removal of the Association from Lyon's Inn Hall to Conduit-street, the first *conversazione* being held there on April 2nd, 1859. It is very interesting to notice that, even at that time, there were such strong sticklers for independence as to oppose this move, on the ground that it must bring the Association too much under the influence of the Royal Institute of British Architects. Notwithstanding all its vitality, however, it is clear that the Association had not yet got into its proper groove, as we find that again in 1860 a resolution was proposed and carried to this effect:—"That the members of the Architectural Association have not afforded and do not afford that practical support in its working which is necessary for carrying out its objects, and that it is, therefore, desirable that the committee should further consider and report whether there is any course short of closing its oper-



ations which they can recommend for the adoption of the Association." A special committee was appointed, and they reported the condition of the Association to be critical, but as its usefulness had been very great they were unwilling to recommend that it be broken up until every means had been tried to restore its efficiency. Most fortunately for us, and for many hundreds of others who have passed through the ranks of the Association, means were found to restore its efficiency; new classes were formed, and a lending library was established, the value of which cannot be overestimated; and from that time to the present, with slight and inevitable vicissitudes, it has gone on increasing its numbers and widening its sphere of action until it has become the large and powerful body which it now is. Now, gentlemen, I have compiled this hasty sketch of the early history of the Association because I think it both interesting and instructive. We are now able to take a judicial view of those years. What is the reason that after completing its tenth year, on two occasions within five years thoughts of closing its operations were seriously entertained? Forty years ago design and draughtsmanship were considered almost the sole essentials for an architect,—the nucleus of the Association, as we have seen, was the Society of Architectural Draughtsmen. Design was its main object. For the first twelve years after its formation the Class of Design was the only class in existence; then in 1859 a class of modelling was formed, which had but a languid existence and finally expired in 1863. The whole scope and objects of the Association were too narrow and were kept too rigidly to the original lines. New ideas as to the necessity of an architect's acquiring some practical and scientific knowledge were gaining ground, and it was by conforming to these ideas, by widening the whole range of mutual study, by the institution of such classes as those for preparation for the Voluntary Examination of the Royal Institute of British Architects, which have gradually developed into the various classes which we now have, by leaving the old tracks and by entering upon new courses, that failure was averted and success assured. May I venture, most respectfully but most earnestly, to beg some of those old and honoured members of the Architectural Association who have done and are still doing yeoman service for it, and who sometimes think that we are venturing upon somewhat risky experiments, to look back on those years, 1856 to 1860, and to bear in mind the words of the American poet, who says:—

"New occasions bring new duties,  
Time makes old things seem unouth;  
They must eye be pressing onward;  
Who would keep abreast of truth."

and by truth I mean the growing requirements of the times.

I do not ignore the opposite danger which I alluded to, that of going too fast and too far in new directions, but you must remember that, although the individual constituents of the committee are constantly changing, it always contains more old than new members, so that there will always be a preponderating inclination towards following precedent rather than towards departing from it; and when any terribly novel course is suggested, as occurred for instance when the daring iconoclastic proposal to raise the subscription was mooted, the conservatism of the general body can always be successfully appealed to to resist innovation.

To turn now from the historic to the more immediate past, it is my pleasant lot to congratulate the members upon a most prosperous session; the meetings have been well attended, the classes have been more numerous than ever before, and the work done has been of a very high order of merit. I cannot refrain from making special mention of the Masonry Class, which Mr. Lawrence Harvey kindly conducted gratuitously, and I feel confident that every member of that class will appreciate the advantages of joining it increasingly as his professional practice enlarges, for nothing gives a man greater facility in designing than a thorough knowledge of form, and I can conceive of no better way of gaining this knowledge than by acquiring practical experience in the various problems of stone-cutting. I trust that this class will not be allowed to lapse, but that many members will avail themselves of Mr. Harvey's instruction at the City Guilds Institution. Mr. Quick's lectures on "Graphic

Statics" also deserve a word of mention, and I would strongly recommend them to the more advanced students. It is much to be regretted that the Class of Colour Decoration has not been better supported, and I cannot help thinking that there are many students whose tastes lie in that direction who would derive great benefit from joining this class; and as an inducement to the study of this branch of our art, I would remind you of the valuable Owen Jones Studentship at the Institute, which is now given for the best design in colour decoration, for which this class would form an admirable practising ground. The lectures will be continued on slightly different lines from those of the past session. Mr. Tarver gives up the History lectures, and the best thanks of the Association are due to him for the immense amount of time and trouble which he has given to these lectures. Other short courses will be given by Mr. Sedding and Mr. Stannus, the latter gentleman taking the Classic and Continental styles, and Mr. Sedding confining himself to English architecture. Mr. Lovegrove, who always gives his time and labours ungrudgingly to the Association, will continue his excellent course of lectures on Construction. In connexion with these classes and lectures, it is worth noting that by the liberality of extraneous donors the list of prizes that can be obtained by students has been much enlarged. This I think a matter for congratulation. Possibly in an ideal community work would always be pursued for its own sake, but I am quite sure ninety-nine persons out of a hundred work better if they have a goal to aim for, and the healthy stimulus of friendly rivalry for a prize is, in my opinion, productive of great good. But this friendly emulation is a very different thing from pot-hunting, which should be guarded against most rigidly, and I believe it is effectually guarded against by our rules. With reference to these prizes, I would specially call your attention to the foreign travelling studentship which Mr. Aldwinckle's liberality has thrown open to the members of the Association, the regulations for which have been slightly modified. It would be telling a thrice-told tale were I to attempt to describe the manifold advantages which foreign travel affords to an architect: it is, in fact, absolutely indispensable. I feel confident many students would be glad of the assistance which this prize would afford them, and I do most earnestly hope that at the close of the current session the Committee will not have the thankless task of informing Mr. Aldwinckle that there has been no worthy candidate for his prize. It is a matter of great regret to the Committee that one prize has not been awarded, owing to the fact that there has not been a single competitor for it: I allude to the Essay Prize. Now this is not as it should be. However clever an architect may be, a little literary grace will never come amiss to him, and the information gained in reading up for the Essay Prize, combined with the practice in putting down the result of your reading in good, nervous, idiomatic English, will be of great value to every student. I do beg of you to bear this in mind, and I hope we shall have good competition for this prize next year. The vacation visits instituted last year have more than kept up their popularity, and serve an important educational purpose, affording students an opportunity of inspecting both old historical specimens of English architecture, like Loseley and Sutton Place, and the new methods of the most able modern practitioners. The annual excursion, which was first set on foot by the late Mr. Sharpe, is still most attractive. In reviewing the past session I must not overlook one very pleasing event, viz., the appointment of an old President of the Association, Mr. Blashill, who has shown the great interest which he still retains in its work in the most practical way by founding a studentship, to the important post of Superintendent Architect of the Metropolitan Board of Works. To another member of the Association, Mr. Colcutt, has been awarded the high honour and the difficult task of carrying out the important buildings of the Imperial Institute, and it is worthy of remark that of the six gentlemen who were selected to compete for this work four are members of this Association.

A word of notice is due to the establishment of the "A. A. Notes," under the editorship of one of the most hardworking, versatile, and efficient officers the Association has ever had, Mr. H. D. Appleton. The work of the

Association is now so extensive and of so varied a nature that some such publication was much wanted in order to keep members *au courant* with what is being done. It offers an admirable medium for suggestions of improvement and for friendly criticism of the action of the executive, and as the subscription is very low, I hope this next session its circulation will largely increase.

One of the salient features of the last few years' history of the Association has been the increase of the *entente cordiale* between us and the Royal Institute of British Architects, the outward and visible sign of which is that we are holding our meeting in this room, and I heartily congratulate the members upon the fact, as I feel sure you will all be much more comfortable than downstairs. I propose to examine this closer connexion between these two bodies somewhat in detail, because I am most anxious that there should be no misunderstanding among the members of this Association as to its meaning. I pointed out to you that when we first moved to Conduit-street some members objected, on the ground that we were getting too close to the Institute, and some may hold the same opinion as to this latest move. Now, gentlemen, I believe I am only stating the literal fact when I say that there is not a single member of your committee who is not thoroughly convinced that anything tending to diminish the independence and freedom of action of this body, anything likely to make the Association an appendage or dependency upon any larger body, whatever it may be called, would be to sign the death-warrant of the Architectural Association. I am one of the strongest advocates for making the connexion between the two bodies as close and intimate as possible, but I am a stronger opponent of anything approaching amalgamation. Each body has work to do which cannot be done by the other, but each can give the other material and valuable assistance. At one time, as I mentioned in the brief *résumé* of the history of the Association, there was a feeling of jealousy and coldness between the two bodies which was most prejudicial to the interests of each, which lost this Association the services of some of its ablest and most hardworking members, and which, if persisted in, would, I verily believe, have wrecked the Association. It would be useless to inquire now as to where the fault lay, but probably it would be found to be on both sides; but those feelings have now gone, never, I trust, to return, and it should be and I believe will be the earnest endeavour of the two bodies to work together for the advancement of education, the furtherance of art, and the general well-being of our noble profession. The proud motto of the Institute, "*Tu tui civium decus urbium*," can only be realised by following the motto of this Association, "*Design with beauty, build in truth*." That there is ample work connected with the architectural profession wanting doing that would tax the energies of any Society or combination of Societies, however powerful, must be patent to any one who has given the slightest attention to the position of architecture and architects at the present time in this country; and this work can only be done, not by frittering away energies in isolated attempts at improvement, not by blaming the executive of this or that institution for not doing more and yet moving never a finger to help them, not by opposing endeavours to obtain increased powers and enlarged means of usefulness, but by uniting hand to hand and shoulder to shoulder, and making the most urgent endeavours to attack the problem as a whole. What the precise form of relationship between this Association and the Institute will be when the latter gets into full work under its new Charter and By-laws is not yet quite clear, but it seems to me that it should be something like that existing between the University and its colleges. These all manage their own affairs entirely and provide for their students the means of obtaining instruction; but the University, by the establishment of degrees and shaping the examinations, and by grants for lectureships, exercises considerable influence upon the curriculum and always avails itself of the advice and co-operation of the executive of the colleges. Of course, the analogy is not complete, as a University has to do exclusively with teaching, whereas a society like the Institute has much to do with practice as well as with education. But the examination which was set on foot by the Institute has shown most clearly that architectural training and education



are the subjects which most emphatically require urgent attention. This examination seems to me to be somewhat like an advanced guard sent forward to examine an enemy's country, and the chief thing that has been discovered is the nakedness of the land. The difficulty of providing adequate means of acquiring professional knowledge for the young men who are coming into the profession every year in shoals is almost appalling in its magnitude. I do not ignore the existing means, rather would I call special attention to them, such as the two colleges in London whose architectural students are presided over by two eminent professors, both of whom are past-Presidents of this Association, and where, as I can testify from personal experience, excellent work is done; and I fully acknowledge the efforts which are being made by Sir Philip Magnus at the City Guilds Institute, and by other technical colleges and schools in the country, and latest of all by the plucky action of two members of this body in establishing a studio; but when you take the average yearly number of students at all these institutions for the past few years and compare it with the number who enter this Association, it is perfectly evident that the institutions I have named do not reach one tithe of those who are preparing themselves for architectural practice. In this matter of education the Association has for some time been well in the van. Since I became acquainted with the inner working of the Association I have been perfectly amazed at the amount of voluntary work which it does, which is most honourable to the Association and the members. But the question arises whether this voluntary work is adequate and whether it is the best. Many of the older members of the body tell us that the voluntary system is the essence of the Association. By all means let it remain so, and there can be no question that there will be ample room for all the voluntary work that can be obtained. But is there any reason why this should not be supplemented by more extended educational work of a higher kind, and which cannot be obtained gratis? There is many an able man perfectly competent to conduct classes, or to give lectures, who simply cannot afford to give his time for nothing, or even for the ludicrously small sum which the Association pays its lecturers, and I confess I can see nothing derogatory to this Association in accepting grants for lectureships, as shadowed forth in the opening address of the President of the Institute last year, supposing funds were available from the Institute; for I really believe that the limit has been very nearly reached of the voluntary work of the Association.

A writer in the "A. A. Notes" has pertinently asked what provision the Association makes for preparing its members for the Institute Examination, and has suggested sweeping reforms in the methods of imparting instruction. It is not a complicated arithmetical problem to ascertain what 1,000 half-guineas amount to, and a glance at the revenue account will show what balance the Association has, after paying the absolutely necessary outgoings, for increasing its usefulness in this way; and for my part I think the suggestions to which I have alluded worthy of the most serious attention. In this connexion may I venture to make an appeal to members of the Association? I believe some old members hold the opinion that after a time they should resign membership of the Association, and leave the work to younger men. As far as the work is concerned, this may be so; but I would remind them that very little can be done without the sinews of war, and I would beg of them to leave their names on the books, and give us their small contributions yearly, upon which so much depends. The committee would willingly do more to assist with the preparation of candidates for the Institute Examination if they could, but I very much fear they have got to the end of their tether. And after all, gentlemen, the question does force itself upon my mind very frequently.—Do we get the best work of one individual in a thousand if it is given voluntarily?

The Institute Examination is so intimately connected with our work that no excuses are needed for referring to it again, although it has been dealt with by every President of the last three or four years. Some people consider the examination a success: these are those who look at it from the outside, and see that a fair number of candidates present themselves;

others, who look at it more from the inside, and have opportunities for judging of the nature of the work done, are sometimes disposed to be despondent and vote it a failure. But I do not think two opinions exist as to the immense amount of good which has been already done by its establishment. *Credo experto.* Ask every candidate who has presented himself, whether he passed the first time, whether he failed at the first attempt and has subsequently succeeded in passing, or even if he has as yet only made the attempt to pass, and I believe every one will tell you that the mere preparation for the Examination has done much to widen his horizon and to increase his interest in everything connected with his professional work. I am not saying that either the general scheme or the details of the Examination are perfect, because I believe both require modification, and I quite hope to see improvements made in it before another year has expired, but what I want to impress upon all members of this Association, whether students or masters, and if by chance any faint echo of these words of mine may reach them, others who are not members of this Association, is this: that passing the Institute Examination, and the subsequent if not consequent Associateship, should be considered as essential a part of the training of an architect as being articulated or learning to design. I do not believe it possible to overrate the value of such an examination if it be made the goal of our early studies in methodising and focusing, so to speak, those studies. I know from personal experience how difficult it used to be twenty years ago, say, how difficult it is for every one of us as we grow older, to avoid being dilettanti or sciolists, and how apt we are to consider superficial knowledge sound knowledge, simply from the lack of some means of putting it to the test. This test the Examination supplies, and I want every student of the Association to make up his mind that it will be in some degree a disgrace not to pass it, and every master to feel it a duty to assist his pupil to pass it, with advice and instruction on the one hand, and by allowing him time to prepare for it on the other. I should like to endorse, as strongly as I possibly can, the recommendation of Mr. L'Anson that the Examination should be recognised by a clause in the indentures of every articulated pupil. And this applies not only to London, but to the provinces also. There are differences in the mode of carrying on practice in the provinces and in London, which prove almost insuperable obstacles to framing rules of practice which should be equally applicable in all circumstances and in all parts of the country; but the necessity of recognising this Examination is equally binding upon all members of the profession wherever they may be established. It is a gratifying fact that although it has only been established five years the Examination has been already held at three provincial centres, and I should strongly advocate increasing the number of centres, even though the candidates were very few at first, because I believe it would awaken an interest in the subject, and open new ground. I see no reason why, supposing funds were available, the Association should not assist in this work. We have for a long time had one country branch affiliated to ourselves, and I do not think it would be difficult to devise a scheme whereby other provincial societies might enter into relations with us, somewhat on the lines of affiliation, to the mutual advantage both of them and of ourselves; in fact, I think it quite possible that this Association may turn out to be the medium for bringing about that consolidation of all branches of the profession which is aimed at by the various suggestions for federation which have been so much discussed during the last twelve months. Instruction by correspondence cannot, of course, be so efficient as by word of mouth, but still it is largely adopted by the Universities, and in our own case I believe the Birmingham members attach great value to the papers which are sent down from London for perusal by the country members of the Construction Class; and this class teaching might be supplemented by occasional visits from the London members, or by lectures on the Institute Examination, or in other ways. These are only suggestions which I throw out as instances of what might be done in the way of additional work. There is, however, one warning which the student should ever bear in mind in reference to the Examination. Look at it not as an end, but as a means; not as the climax of your studies, but as an incentive to

fresh ones; not, as the logicians would say, as a *terminus ad quem*, but a *terminus a quo*; and if you take this view of it, there will be no fear of its becoming anything but an unmixed good. In commenting upon the state of architectural education before an assembly like this, I always have an uncomfortable feeling that I am open to the criticism of carrying coals to Newcastle. I am sure that every one here would endorse my words, but the people who want convincing are the outside public,—the parents and guardians of the youths who are soon to be sent out in a plastic state to be moulded into more or less capable architects. Until the general public are convinced that architecture is a liberal profession, and must be treated liberally, we shall not see the improvement which is so desirable. It is useless to rear a substantial building upon a rotten foundation, and we may go on improving the facilities for architectural education in vain unless the absolute necessity of a thorough and first-rate general education for an architect is fully recognised. It is thought quite natural that before studying Law or Medicine a boy should go through a college course, and after that he would not be expected to earn anything worth speaking of for some years; but many lads are articulated to an architect at the age say of sixteen or less, and are expected after three years to be able to earn their own living. What is wanted is to be known is that such a system as this is not only unwise and ineffective, but that it is extravagant, and that in the long run it will pay better in actual pounds, shillings, and pence, to keep a boy at school for another two years and then give him a course at a technical college or at one of the Universities before he is articulated to an architect. Just look at what is required of an architect nowadays. Not only must he be able to design anything, from a stable to a church, and be fully acquainted with the nature and properties of the materials which he uses, but he must be a bit of a geologist in order to distinguish between alternative sites for a house that are submitted to his decision; he must know enough chemistry to be able to advise on the prevention or cure of decay in timber or in stone; he must be a mathematician and competent to calculate the strains on the various parts of the buildings which he erects; he must have sufficient knowledge of electrical science to be able to exercise a certain amount of individual judgment as to the merits of rival schemes of electric lighting; while as to sanitation, if he is not able to give a good account of his drains, and to justify his scheme of traps, disconnecting chambers, &c., he will be held up to obloquy by some candid critic in the press as being very nearly guilty of manslaughter. In fact, so multifarious are the duties that an architect is called upon to perform that his client seems sometimes to expect him to have a mechanical engineer up his sleeve and a specialist in each of his pockets. You may employ specialists for these various works if you like, but depend upon it if anything goes wrong, you the architect would be the first person called over the coals by your client. And yet, though all these things are required of him by the public, will any one say that in very many cases the public recognition of an architect's services and position is at all what he ought to expect if he be a capable man? And that is a condition which we all should do our best to see fulfilled as far as training can fulfil it.

The practice of architecture used not always to be held in low esteem. Cicero classes the architect as next in importance to the physician, and the Romans generally accounted architecture the most respectable, as it was then the most lucrative, of all the arts. The same views obtained during the later years of the Roman Empire. In the latter part of the fifth century, A.D., the Emperor Theodoric issued a document which appears to be a sort of general instruction to his Government architects, and which proceeds thus:—"It is no slight business which is entrusted to you, since by the practice of your art you have to carry out the ardent desire which possesses us of erecting new buildings. Whether it be a question of beautifying a city or of erecting a pratorium for ourselves, we look to you to give practical embodiment to the schemes which we have in our mind. We wish to have expression given to our ideas in so appropriate and so stable a fashion that the only difference between our buildings and those of the ancients should be their newness. What can be a more honourable employment! what a more glorious function!



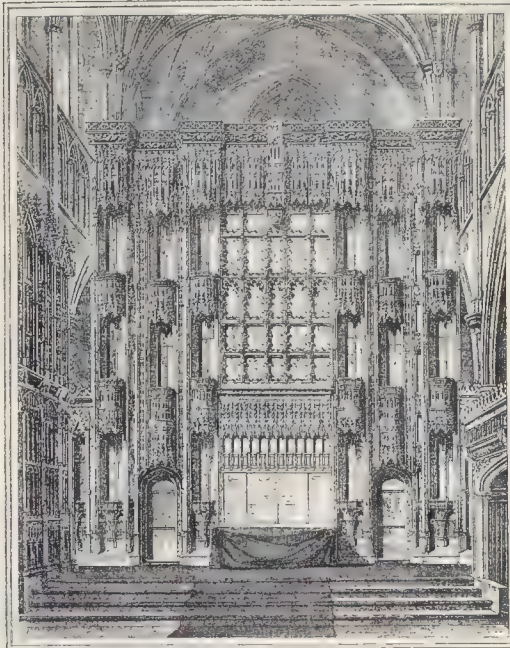
than that of bequeathing to the remotest ages monuments which will assure for you the admiration and the plaudits of posterity. For it is your task to direct the mason, the sculptor, the bronze worker, the plaster modeller, and the artist in mosaic. You have to teach them what they are ignorant of and to solve the difficulties brought to you by this host of artificers who work under your guidance and who must have recourse to your better judgment. See, then, what resources he should have who has so many to instruct. But you will enjoy the reward of your labours, and the success of the operations which you direct will form your eulogy. Observe the distinction which you enjoy. You walk immediately in front of ourselves surrounded by a numerous cortège with the gold wand in your hand, a prerogative which, as it brings you near our person, announces that to you we have entrusted the care of our palaces."\* This was the recognition given to the art of architecture by the rude king of the Ostrogoths, and I fear we shall look long and look in vain for such appreciation now. But, gentlemen, let us bear this in mind, that the recognition of our profession depends upon each individual one of us. The outward display which is so striking a feature of our times and under the influence of which the speculating builder runs up elegant villas with elaborate stone dressings outside and enriched plaster cornices inside, while he builds his walls with bats and shuffe and forgets to purge his flues and to connect his drain-pipes,—this same display has affected the architect, and is seen not only in the palatial exteriors which mark some of our new buildings, but also, I venture to think, in the excessive modern elaboration of draughtsmanship. You must remember that it is not so much elegance of drawing as knowledge of details that is required in practical work; that comfort and substantiality in the erected building will be more appreciated by the client than the appearance of the plan and elevations on paper; so that while not neglecting draughtsmanship,—don't imagine I am disparaging that,—try and make it only a means of assuring more accurate knowledge. Our profession is really a noble one, and it behoves us all never to lose sight of this fact. We have a responsibility not only to our clients, but to ourselves and our colleagues. We should each of us consider that in us as individuals is deposited the honour of the whole body; that a delinquency on our part, a lapse from the high standard which we should set up for ourselves, or even only a manifest display of incompetency in work which is entrusted to us, may do far-reaching harm and is a slight upon the other members of our profession. We should bear in mind, as Bacon says, that we have "as well to create good precedents as to follow them," and although we cannot all be a Michelangelo or a Brunelleschi and hand our names down to posterity "in records that defy the tooth of time," we can all earnestly endeavour to do thoroughly and well the work that comes immediately to our hand, and if this spirit animates us, whether as students in our preparation or as principals in our practice, we shall do what lies in our power to uphold the dignity of our art and to hand on the Lamp of Architecture with its lustre undimmed to those who are to come after us.

[A report of the discussion which followed is in type, but for want of space we are obliged to hold it over until next week.]

**The Surveyors' Institution.**—The first ordinary general meeting of this Institution for the present session will be held on Monday, November 14th, 1887, when the President, Mr. W. J. Beadel, M.P., will open the session with an address. Chair to be taken at eight o'clock.

**Hospitals Association.**—The second evening meeting of the fifth session of the Hospitals Association will be held (by kind permission of the Weekly Board) at the Board-room of the Middlesex Hospital, BERNERS-STREET, Oxford-street, on Wednesday, the 9th of November, at 8 p.m., Sir Douglas Galton, K.C.B., in the chair. A paper will be read by Mr. Keith D. Young, F.R.I.B.A., on "Hospital Construction," to be followed by a discussion. Cards of admission can be obtained, on application, from Mr. Howard J. Collins, secretary, the Hospitals Association, Norfolk House, Norfolk-street, W.C.

\* Cassiodorus Variarum, lib. vii., c. v. "Formula curæ Palatii."



The Screen, St. Alban's: as Engraved by Le Keux after a Drawing by J. P. Neale.

## Illustrations.

### THE SCREEN AT ST. ALBAN'S.

WE give a view in the present number of the celebrated screen at St. Alban's Cathedral, as it has now been restored.

The condition of the screen when it was proposed to restore it is well exhibited in Nash's picture (engraved in Clutterbuck's "History of Herts"), except that the unsightly and incongruous plaster work there shown as covering the place of the cross and the six central niches was removed by the late rector, Dr. Nicholson.

The bases of the four upper niches and the canopies and bases of the lower ones had been shaved off flat to enable the plaster-work to be put on. It removal showed the original face of the stone on the blank space where the cross had been. The top of the screen had served as a thoroughfare from one side of the triforium to the other, and, as a natural consequence, the whole of the cresting, except one small fragment, had been knocked off. All the pinnacles of the tabernacle work had been knocked off, and almost in every case not broken but removed from the leaded sockets. The only part wantonly damaged, if we except the crucifix, was the tabernacle work over the altar, its cresting and the ornamental filling-in of the hollow above the pinnacles having been destroyed, and the pinnacles themselves and the ornamental work of the bases much damaged.

The central portion of the tabernacle work above the cross,—that which corresponds to the "spire" in the Winchester screen,—was apparently an ancient reparation, made by putting together pieces which were not meant to be together. Apparently they were ill-put together, and the whole thing was, in fact, askew and unsafe, and had been supported at some later time by a classical bracket of rather bad workmanship. In this no other alteration has been made than to reset it and make it straight and safe, and to substitute a canopy for the bracket.

The two or three fragments of pinnacles which had not given way at the headings, but had remained fast, though broken, gave an indication for the restoration of the others, and in this the tabernacle work of the smaller niches,

fortunately quite uninjured, afforded great help. The new pinnacles were not servilely copied but independently designed.

The scheme of the screen was evidently a group of the Crucifixion in the centre, over the altar, and at the two sides figures of saints, witnesses in later times to the faith in the religion of Christ, of which His Crucifixion was the crowning act. The group consisted of the crucified Saviour and the witnesses then present, namely, His Mother and St. John, four angels above and four more adorning, in the smaller niches. These ten figures are completed and in their places, but the central figure is not yet put in hand. It is to be hoped, as the work has gone so far, that it will be completed ere long.

The scheme for filling the other niches was this. As the chroniclers had left no record of what figures filled them it was necessary to choose those who were most appropriate, viz., English Saints who bore some relation to the Abbey, foreign Saints who have the same qualification, and Saints in the English Calendar.

In these two classes may be mentioned the Ven. Bede, the historiographer of St. Alban; St. Hugh of Lincoln, in whose Diocese the Abbey was; St. Benedict, whose rule the Abbey followed; and (among the small statues) St. Osyth, who with others here represented had an altar in the Abbey.

There are also included two who were not Saints, King Offa II., who founded the Abbey, and Pope Adrian, the only English Pope, who was born close to St. Alban's.

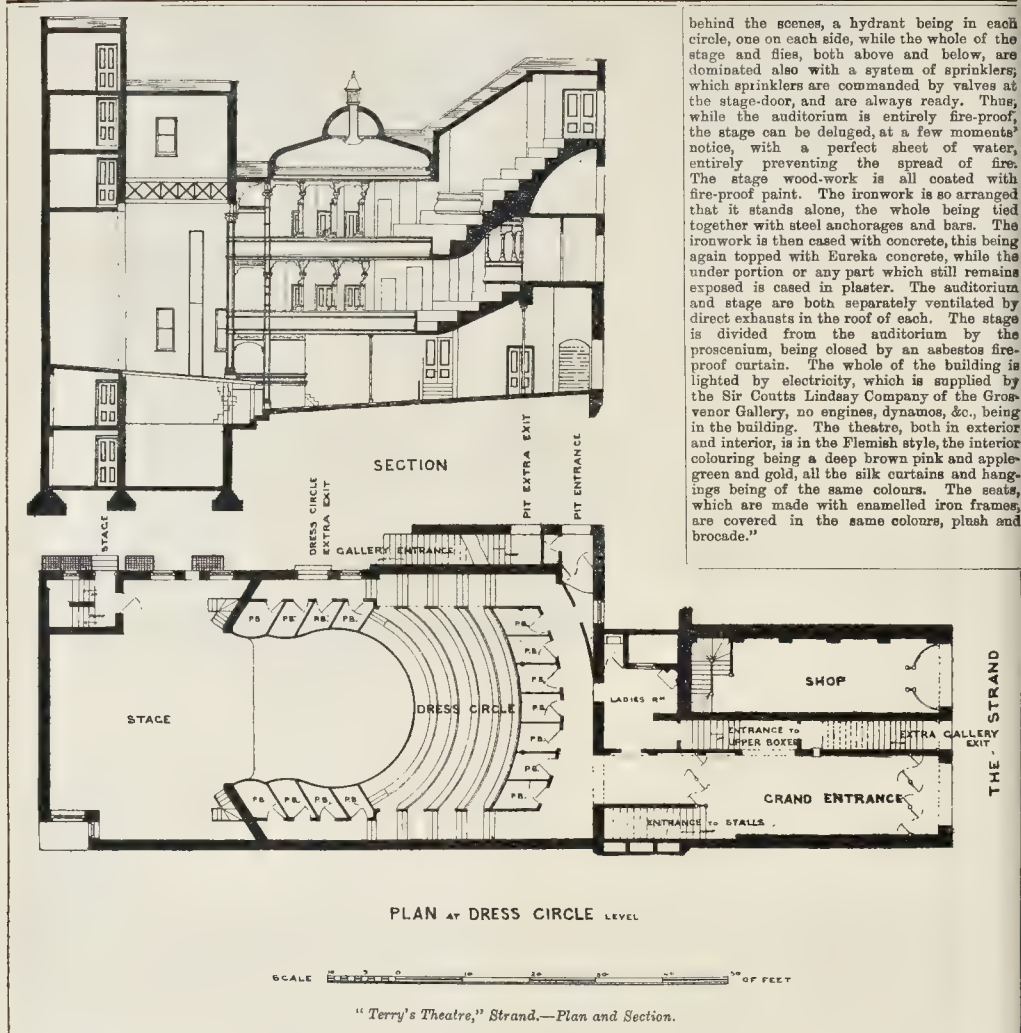
The only statues now remaining to be done are Saints Augustine, Alban, Amphibalus, and Erkenwald (all nearly completed), and the figures of the Annunciation, which will occupy the two canted niches north and south. There are also two of the small niches unfilled.

The material of the screen is clunch, and of the statues Mansfield Woodhouse stone.

The thirteen niches over the altar will contain alabaster statues, about 15 in. high, of Our Lord (in majesty) and Twelve Apostles. Two only are yet in place.

There are twenty full-sized statues, four smaller, and twenty-eight still smaller; the height of the large niches to the soffit being about 6 ft. 6½ in., the second size 4 ft. 3½ in., the third 3 ft. 3 in., and those for the two kneeling angels 2 ft. 9 in.





behind the scenes, a hydrant being in each circle, one on each side, while the whole of the stage and flies, both above and below, are dominated also with a system of sprinklers, which sprinklers are commanded by valves at the stage-door, and are always ready. Thus, while the auditorium is entirely fire-proof, the stage can be deluged, at a few moments' notice, with a perfect sheet of water, entirely preventing the spread of fire. The stage wood-work is all coated with fire-proof paint. The ironwork is so arranged that it stands alone, the whole being tied together with steel anchorages and bars. The ironwork is then cased with concrete, this being again topped with Eureka concrete, while the under portion or any part which still remains exposed is cased in plaster. The auditorium and stage are both separately ventilated by direct exhausts in the roof of each. The stage is divided from the auditorium by the proscenium, being closed by an asbestos fire-proof curtain. The whole of the building is lighted by electricity, which is supplied by the Sir Coutts Lindsay Company of the Grosvenor Gallery, no engines, dynamos, &c., being in the building. The theatre, both in exterior and interior, is in the Flemish style, the interior colouring being a deep brown pink and apple-green and gold, all the silk curtains and hangings being of the same colours. The seats, which are made with enamelled iron frames, are covered in the same colours, plush and brocade."

The small print by Le Keux, of which we give a reproduction, is of some interest as showing a former restoration (on paper), without the figures. In it will be seen the classical bracket before referred to, supporting the central pinnacle.

The restoration has been carried out at the cost of Mr. H. Hicks Gibbs, and under his direction, but with the assistance and advice of an eminent architect.\* The carving and sculpture has been executed by Mr. Harry Hems.

Four of the figures are shown to a larger scale at the sides of the plate; on the left, the Virgin and St. Boniface; on the right, the Apostle St. John, and St. Richard.

#### ST. ALBAN'S SHRINE.

The shrine, of fourteenth-century date, which now stands in the centre of the Saint's Chapel, at St. Alban's Abbey, was found in fragments during the restoration in February, 1872,—some portions having been previously found in 1847. The whole of the main structure is of Purbeck marble, the vaulting and traceried panels inside being of clunch, and still retaining considerable traces of gold and colour. A notice of the shrine will be found in the *Builder* for May 4, 1872. The drawing here given was exhibited in the Royal Academy this year.

R. W. PAUL.

\* The architect does not wish his name to appear, for reasons which it is not our business to inquire into.

#### TERRY'S THEATRE, STRAND.

We give a view of this new theatre, together with a plan and section which will better explain the special arrangements which have been made for exits, and to which we have already referred.

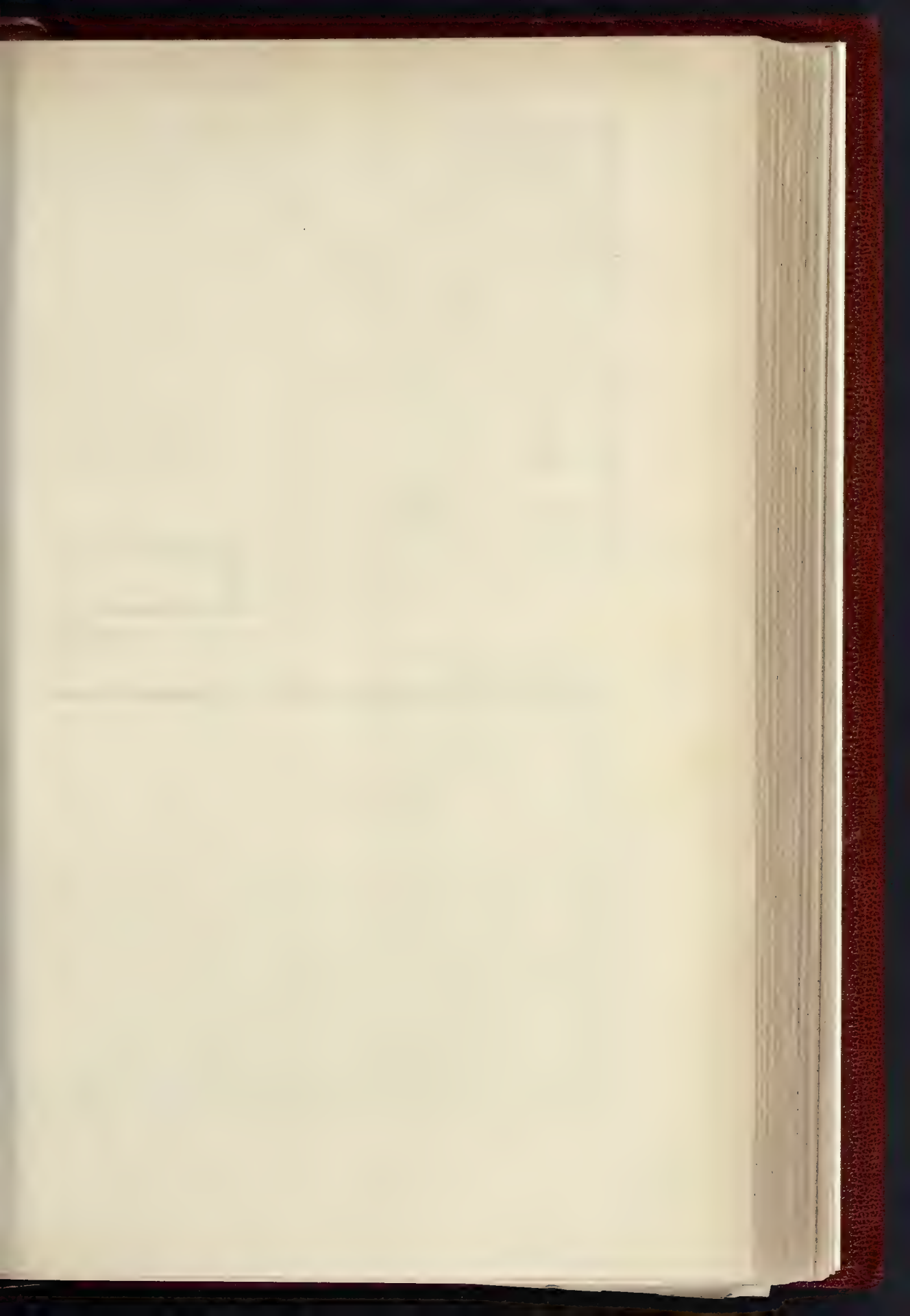
The architect sends us the following description of the arrangement and construction of the house, which has already appeared in nearly the same words in some of the daily papers, but which we may usefully repeat here in immediate connexion with the illustrations:—

"The main entrances to the dress circle, stalls, and boxes are in the Strand, the extra gallery exit being also in the Strand. The extra exit to the dress circle is in Savoy-buildings, as are both the pit entrances, extra exit, and the gallery entrance. There are three tiers, pit and stalls, balcony and dress circle, and gallery and upper boxes. Each part of the house has two or more exits. The total exit accommodation is, according to the regulations of the Board of Works, equal to 3,500 people, while, as before stated, the holding capacity of the theatre is only 800 persons. The whole, including the roof, is constructed of concrete and iron, no wood being used in the auditorium, except for doors and windows, while all the necessary woodwork before and behind the curtain is coated with Sir Seymour Blane's fireproof paint. A thorough system of hydrants in the best available positions is placed both before and

The architect is Mr. Walter Emden, assisted by Mr. George Harrison, C.E., as to the hydrant and water arrangements. The contractors are Messrs. Holliday & Greenwood. The iron-work is by Messrs. M. T. Shaw & Co.; and the water apparatus by Messrs. Rose. The carton-pierre has been executed by Messrs. Battiscombe & Harris, and the furnishing by Messrs. Atkinson; while the tile decorations have been executed by Messrs. Doulton. Mr. E. Bell has executed the painted decorations; Mr. Rust is doing the mosaic paving; Messrs. Vaughan & Brown have executed the gas-fittings, and Messrs. Verity Bros. the electric light fittings. Mr. S. M. Egan has acted as clerk of works.

#### THE NEW UNION CLUB-HOUSE, NEWCASTLE-UPON-TYNE.

This building, of which we publish an illustration, stands upon a plot of ground extending 130 ft. in Rosemary-lane, by 71 ft. in Westgate-road. It adjoins the neighbouring buildings in Westgate-road, and is bounded by Rosemary-lane and St. John's Church on the west, and by new premises on the north. The principal façades are in Westgate-road and Rosemary-lane. These fronts of the building are enriched with oriels thrown out on the first floor, and with balconies and other highly effective ornamental features. The building is constructed







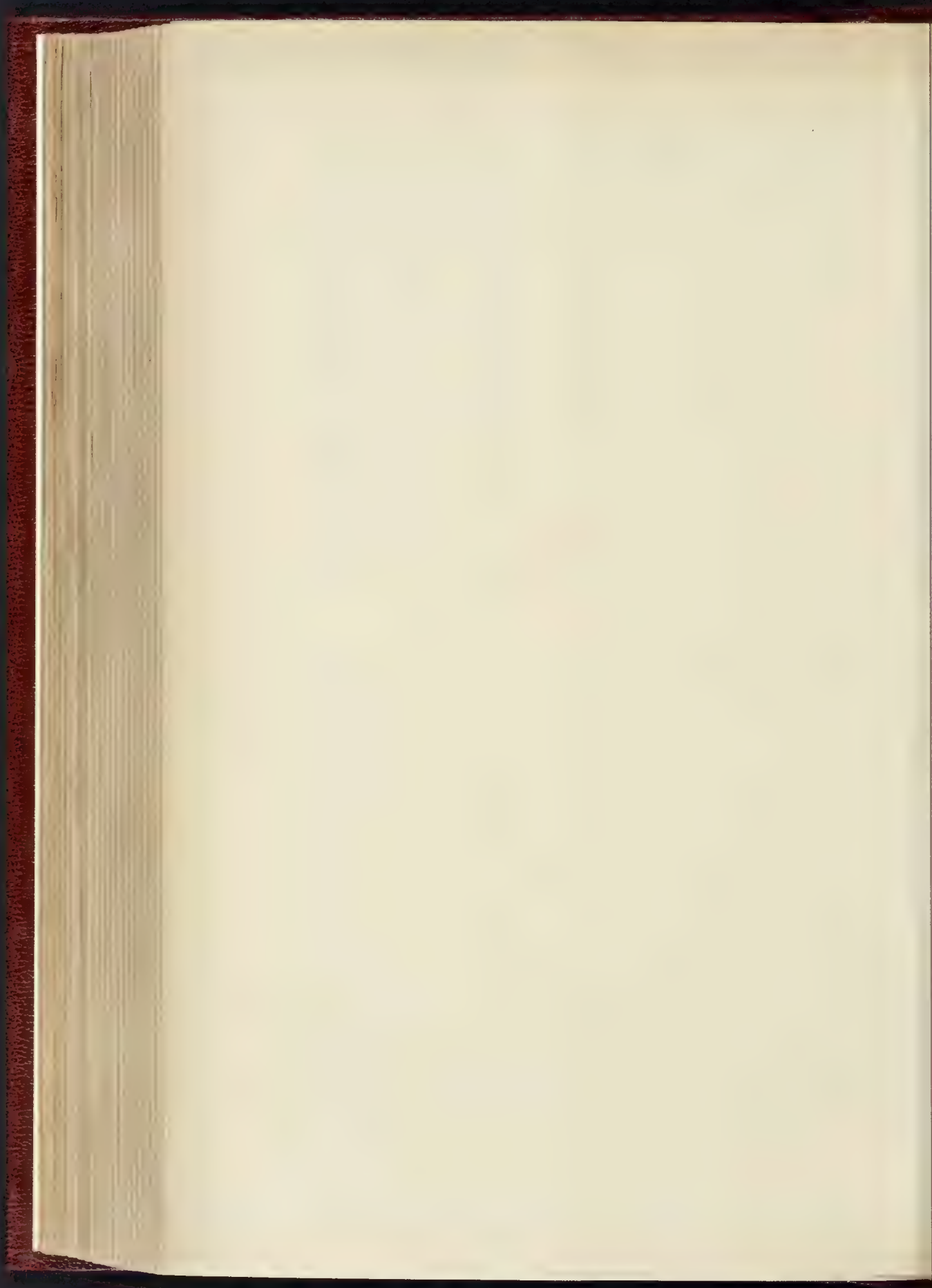
ST. ALBAN'S SCREEN, RES-

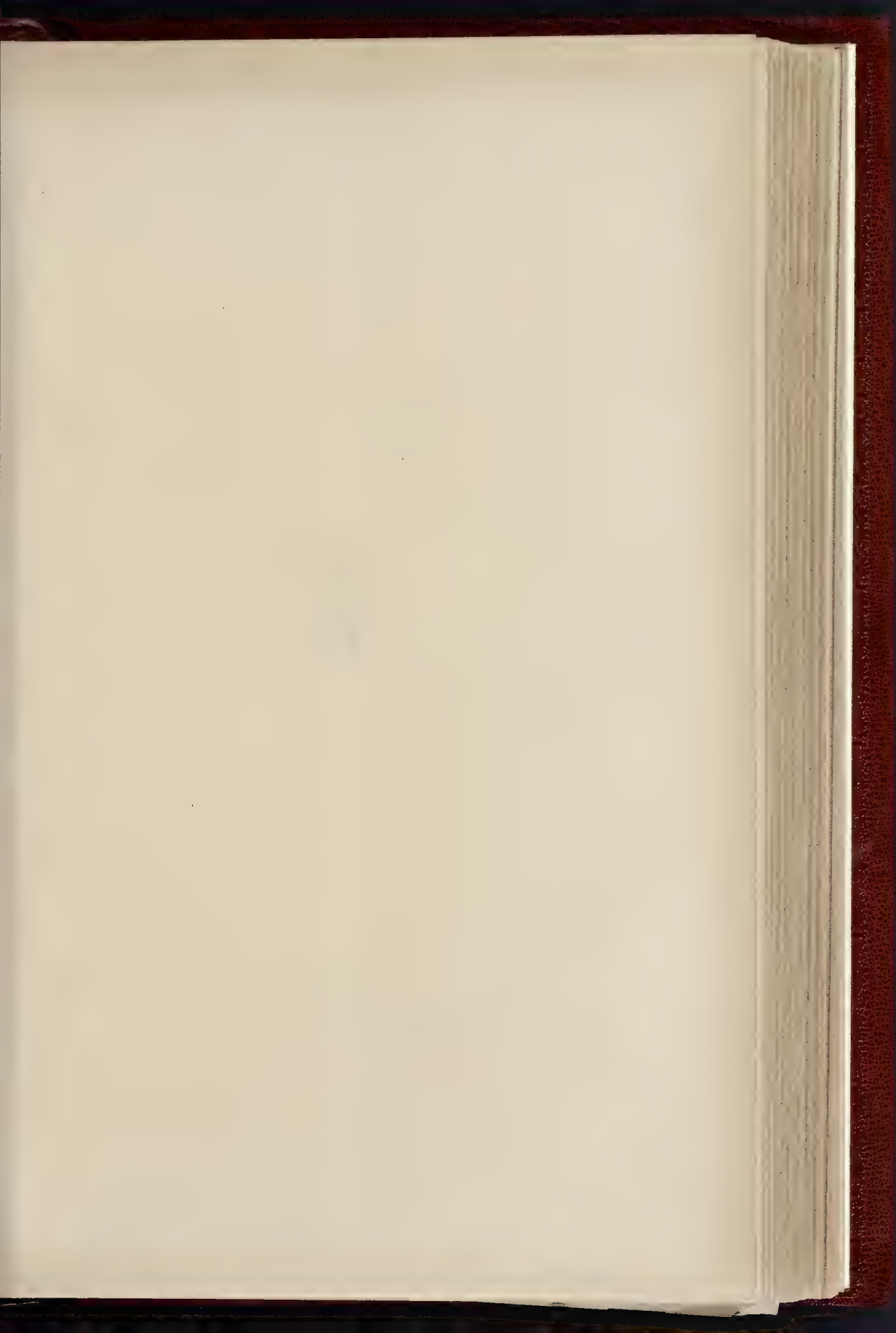




SCULPTURE BY MR. HARRY HEMS.









St Albans Abbey  
Hertfordshire.  
South East View.

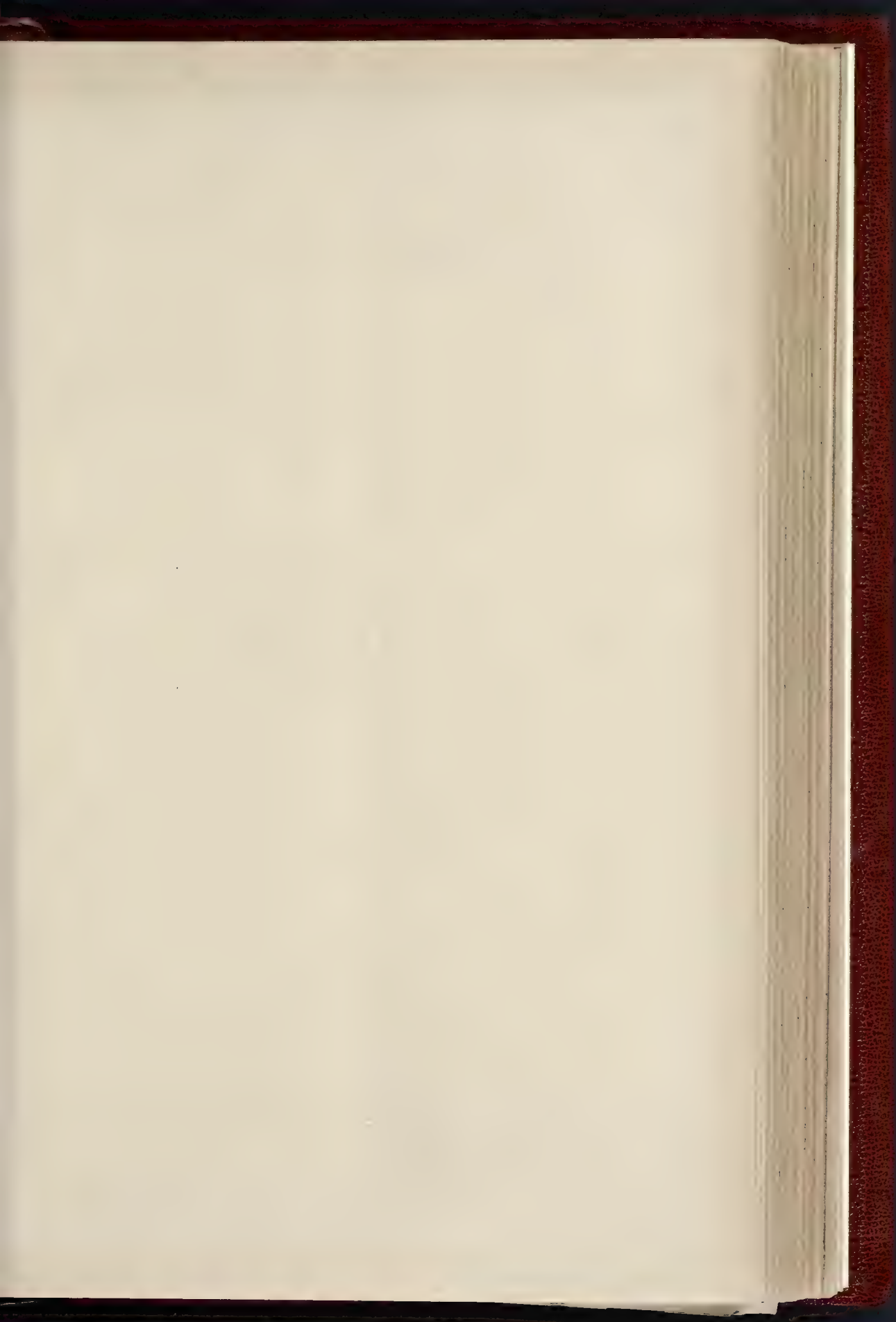




"TERRY'S THEATRE," STRAND —MR. W EMDEN, ARCHITECT

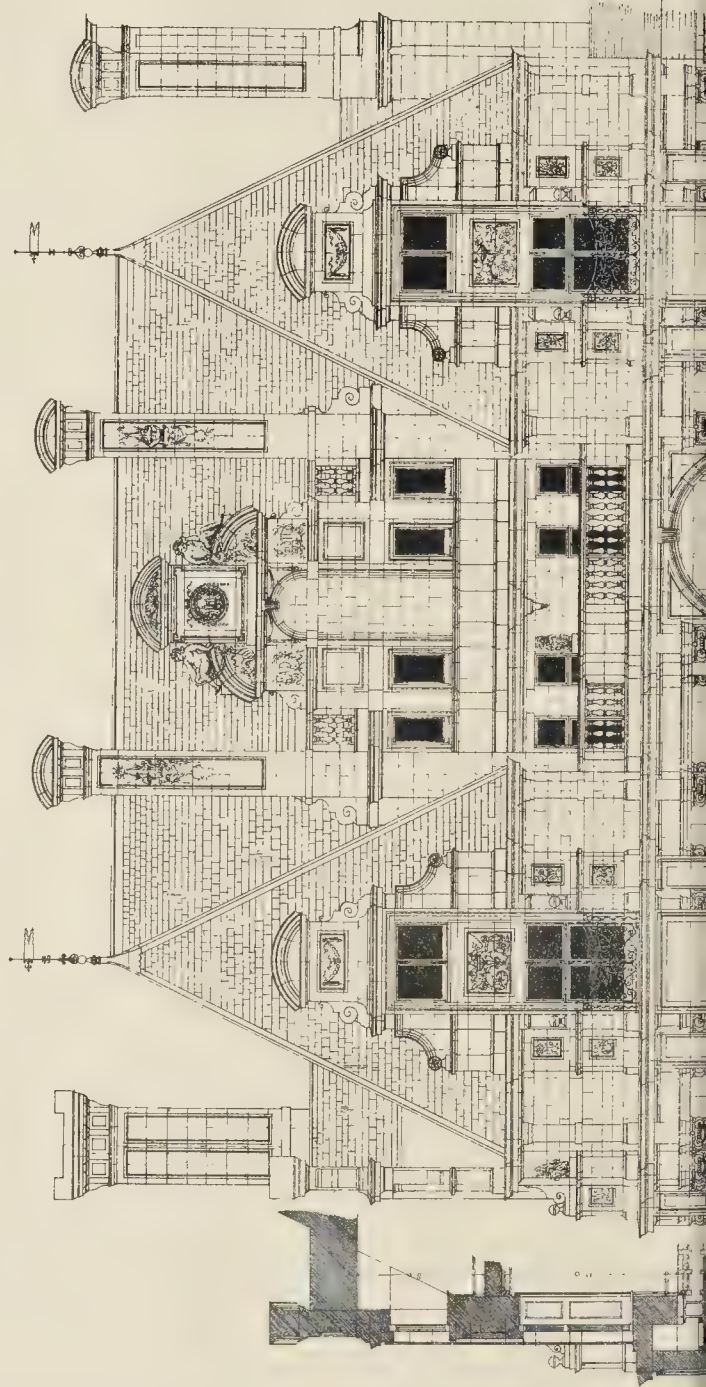


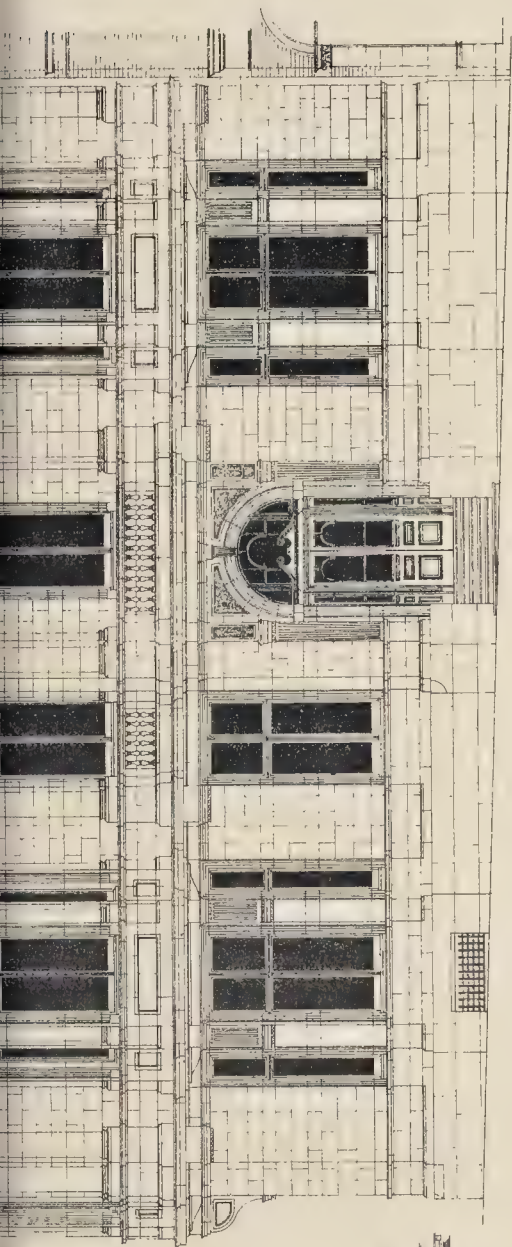




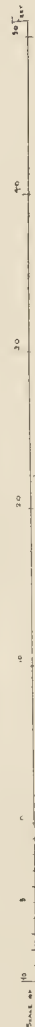


THE BUILDER, OCTOBER 29, 1887.





ELEVATION OF THE SOUTH FRONT



SECTION

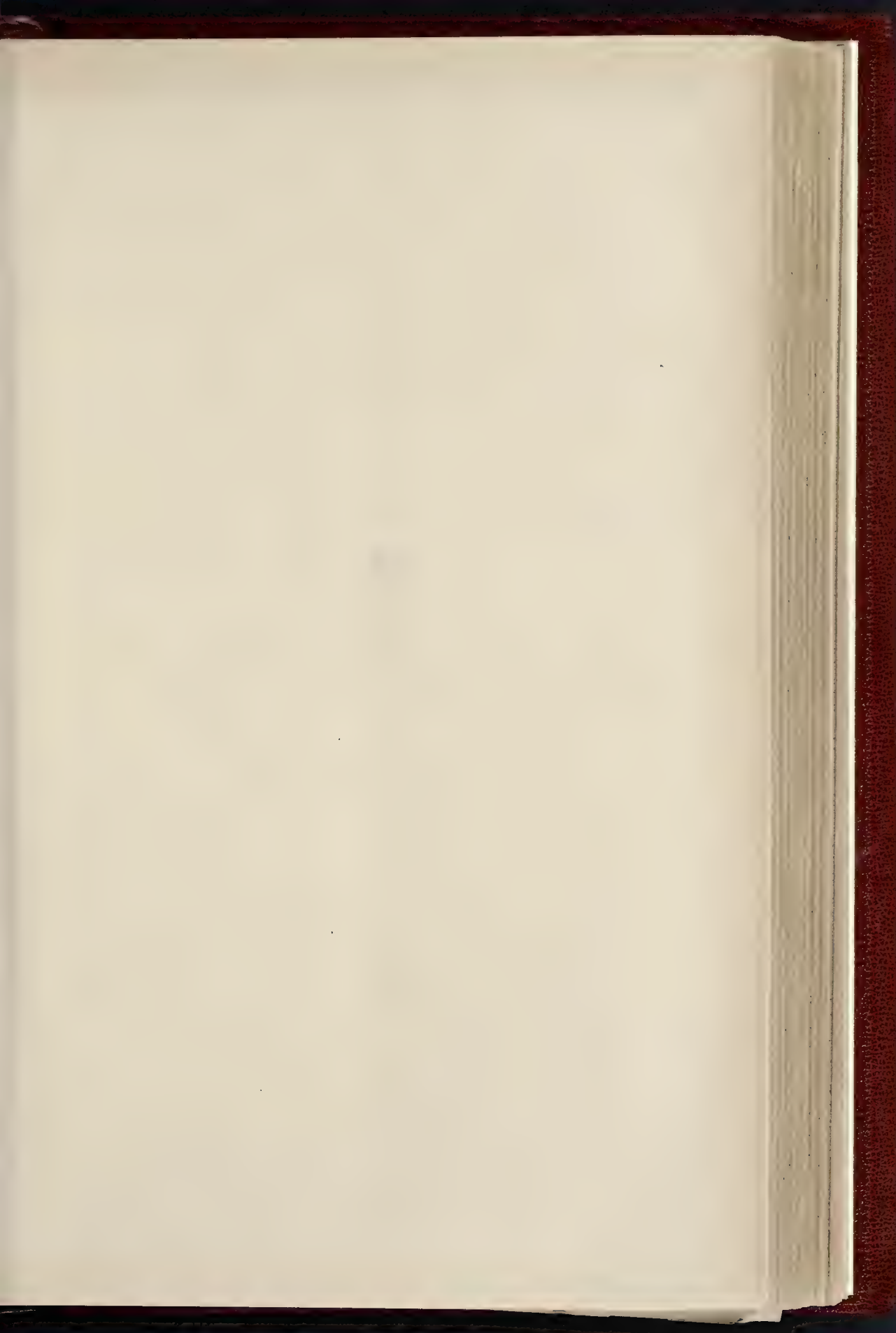
C. F. KEL - PHOTO LITHO.

THE NEW CLUB HOUSE, NEWCASTLE-UPON-TYNE.—MR. M. P. MANNING, A.R.I.B.A., ARCHITECT.

8 FURNIVAL-ST HOLBORN F.C.





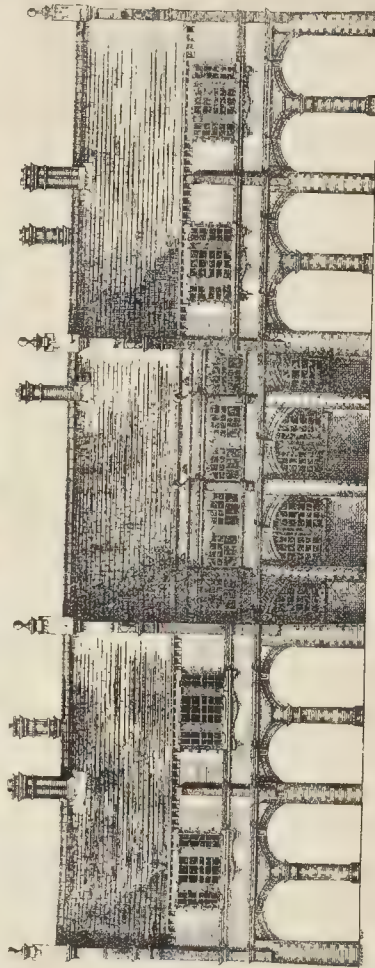




THE BUILDER, OCTOBER 29, 1887.

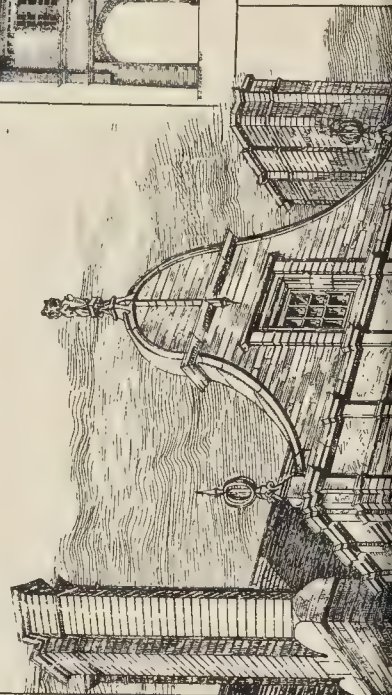


West Elevation

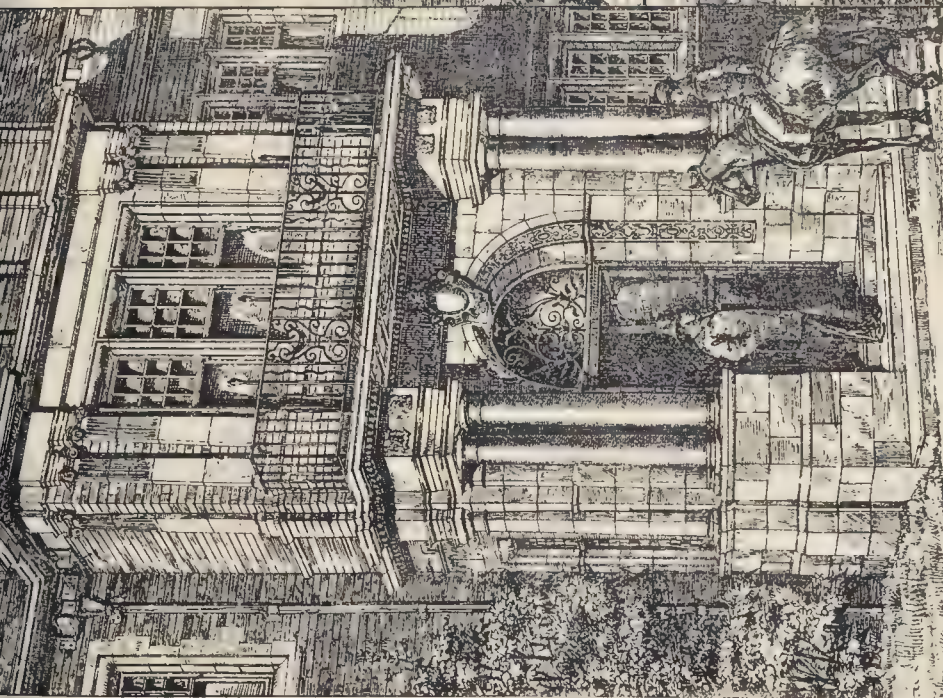


East Elevation

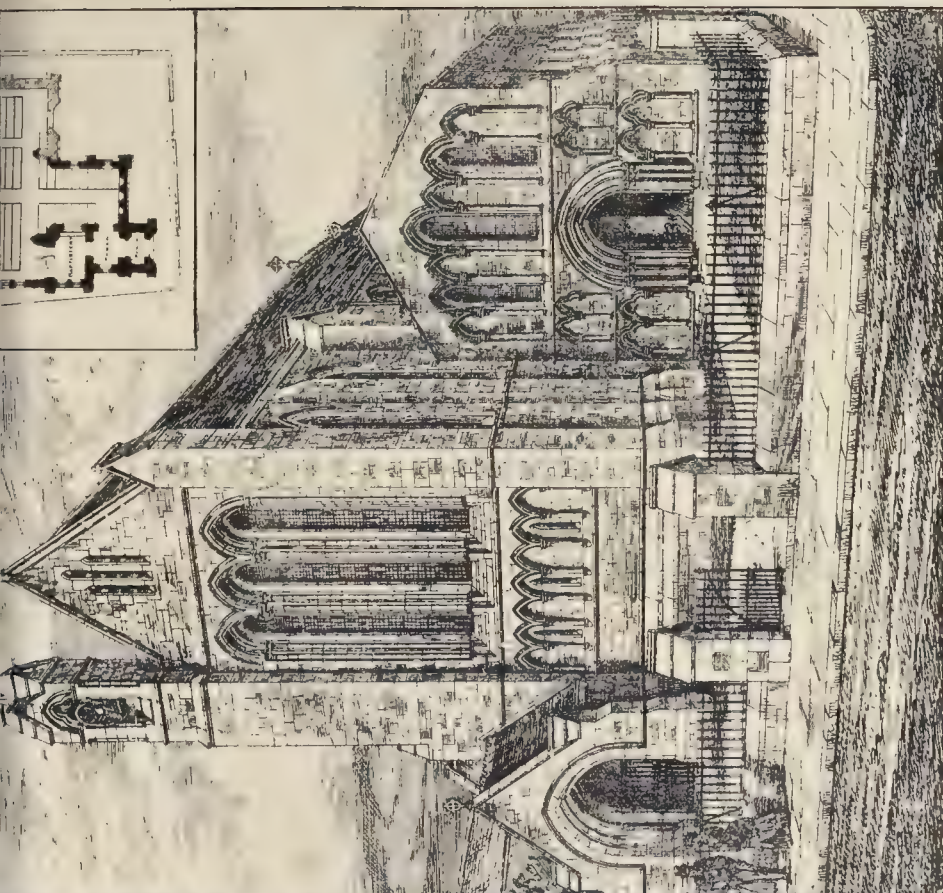
NEWPORT ROAD SCHOOLS, FOR THE LEYTON SCHOOL BOARD.  
MR. J. T. NEWMAN, ARCHITECT.







"EDDESBURY," NEAR LIVERPOOL.—MR. J. FRANCIS DOYLE, ARCHITECT.



HOLY TRINITY CHURCH, GATESHEAD.—MESSRS. OSWALD & SON, ARCHITECTS.

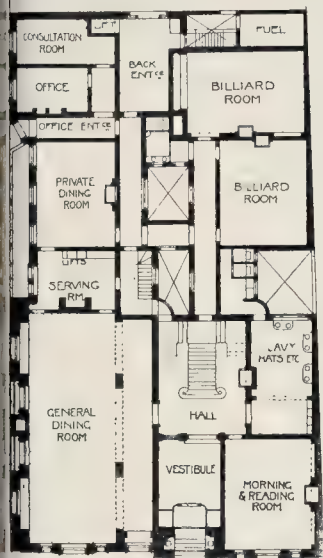




Prudham stone, and stands upon a plinth of grey Aberdeen granite.

The ground-plan shows the arrangement of the building. On the first floor are the drawing-room, smoking-room, and other principal rooms of the club-house. On the second floor a few bedrooms; with the necessary dressing and bath rooms, and above, the usual domestic offices and servants' apartments.

The kitchen, with its offices and accessories, are in the upper story of the wing extending down Rosemary-lane.



The work throughout has been executed by Messrs. Shaftoe & Barry, of York, who were the contractors for the building. The warming and ventilating arrangements are by Mr. W. W. Phipson, the ornamental plastering by Messrs. Jackson & Son, the kitchen fittings by Messrs. Clements, Leakes, & Co., the stained glass and ornamental glazing by Messrs. Powell & Son, the marble mosaic pavements by Messrs. Burke & Co., and the gas service and fittings by Messrs. Stevens & Co., and Messrs. Barkentin & Krall, all of London. The marble chimney-pieces were supplied by Messrs. Walker & Emley, and the stoves and grates by Messrs. Mather & Armstrong, of Newcastle, who also fitted up the system of pneumatic bells. The contract for the whole of the furniture, which has been designed in harmony with the building, has been executed by Messrs. Robson & Son, of Newcastle. Mr. G. C. Davies acted throughout as the architect's clerk of works.

#### NEWPORT-ROAD SCHOOLS, LEYTON.

THESE schools, affording accommodation for 1,040 children, in three departments, have been erected at Leyton, Essex, for the Leyton School Board, from the designs of Mr. J. T. Newman, architect, at a cost, inclusive of caretaker's house, boundary-wall, &c., of 7,910l. The works have been carried out by Mr. James Morter, builder, of Stratford, E.

#### PRINCIPAL ENTRANCE, "EDDESBUURY."

THE illustration is the principal entrance of "Eddesbury," the residence of Mr. James Atham, situated in "West Derby," near Liverpool. The house is built of red Russian brick and red Runcom stone. The roof is covered with green slates of the Tiberthwaite quarries. A considerable part of the internal fittings and finishings is of oak. The architect is Mr. J. Francis Doyle, of Liverpool.

#### HOLY TRINITY CHURCH, GATESHEAD.

THE design illustrated this week, by Messrs. Lept. Oswald & Son, architects, of Newcastle-on-Tyne, was selected in limited competition.

The design is really for the enlargement of

the existing church, which will be utilised as the south aisle of the new edifice. Its west front, shown on the exterior view, is ancient, dating from 1248, and will be preserved absolutely intact. The remainder of the present church, which was restored and re-roofed about fifty years ago, will be interfered with as little as possible, an arcade being substituted for its north wall. The pillars and arches of this arcade are spaced so as to leave the old roof, with its wall posts and corbels, exactly as at present. This roof, although of a different style from the rest of the building, is internally of graceful form, and its retention seems desirable for many reasons. The western gallery will be taken away, displaying internally the full proportions of the window, now partly hidden. With these exceptions, the present edifice will be left practically unaltered.

The walls of the church will be built of local stone, plastered internally, unless (as is hoped) funds are forthcoming to line the interior with stone, which is very desirable, especially in the chancel and nave. The roof timbers will be of pitch pine, left the natural colour, without stain or varnish. The church will be seated with chairs for about 600 persons. The furnishings of the chancel may have to be temporary in the first instance, but will be added gradually as adequate funds become available for permanent reredos, choir-stalls, chancel-screen and gates, lectern, pulpit, &c., of suitable architectural character.

It may be noted that tradition affirms the site of this church to be that of a Saxon monastery, of which records prove the existence prior to A.D. 653.

#### THE FIRE AT WHITELEY'S.\*

THE inquest as to the death of the four persons killed by the fall of the wall at the time of the fire at Whiteley's in August last was resumed and concluded on Monday, before Dr. Danford Thomas, Coroner for Central Middlesex.

Mr. Charles Robert Walker, C.E., of Great Queen-street, Westminster, said that on the 26th of August he received instructions from the Coroner to examine Mr. Whiteley's premises, with a view to ascertain the construction of the ironwork, the relation of the ironwork to the brickwork, and the expansion of the iron under great heat. He had to report that the factory in Douglas-place was a building about 80 ft. from east to west, and 72 ft. from north to south (or facing Douglas-place). It consisted of four floors and a ground-floor,—five in all. The height from the ground to the upper ceiling was about 55 ft. The first floor was said to be a "fire-proof" floor, and all the others were strong wooden floors supported on iron girders. The ceilings were of match-boarding, and the joists appeared to be very strong, and closely laid together, so that the girders were thoroughly sandwiched between timber, which at the time of the fire would be very dry. The iron girders were supported by columns extending from the basement to the roof, except in one case, where a partition wall was carried to the first-floor level, and columns were carried from the level of that wall to the roof. There were three tiers of girders and columns extending from the basement to the roof, and one tier extending from the first floor to the roof. In the provision-shop in Douglas-place, a building of four stories and ground-floor, about 160 ft. long, and varying from 30 ft. to 40 ft. in width, the floors were carried in a similar way; the ground-floor was a "fire-proof" floor. Girders were largely used in other portions of the building in connexion with woodwork, and in some cases in connexion with "fire-proof" flooring, but the girders generally were isolated, and ran parallel to the street. With regard to the construction of the ironwork, in the factory in Douglas-place the girders carrying the floors were rolled iron joists, 12 in. by 6 in., weighing about 56 lb. per foot. They were in lengths of about 16 ft., and were carried on four cast-iron columns. The ends of the girders were bolted to the columns, different methods of connexion being adopted,—one on the ground-floor, another on the first floor, another on the second floor, another on the third and fourth floors. All those methods of connexion had the same effect, namely, that of securely bolting the girders through the column to each other, or making one continuous girder of the whole length, the ends of which con-

tinuous girder were in the wall. The columns varied in diameter (the stronger being at the bottom), and were bolted together vertically, so that the girders with the columns formed three frames about 76 ft. long by 66 ft. high. The fourth frame rested upon the partition wall carried to the first-floor level, and was therefore about 76 ft. long by 46 ft. high. The first or "fireproof" floor consisted of rolled iron joists, 8 in. by 4 in., laid at right-angles to the large girders, and the ends of those joists rested on the wall before mentioned. That wall also supported one end of the short joists carrying the other portion of the first floor. In this floor there were two main girders side by side instead of one, as in the other floors, in order to obtain additional strength for the heavy floor. At the time of his inspection, none of the girders remained fixed to the columns, so that his examination did not show whether they were closely bolted together or not, but he had every reason to believe that they were closely bolted together. The girders in the provision-shop in Douglas-place remained intact at the time of his inspection: they were securely bolted to the columns. There was no allowance whatever for expansion or lateral play; in fact, it might be said in both cases that the walls were tied together by means of girders. With regard to the relation of the ironwork to the brickwork, at the time he made his examination one girder only remained in the western wall of the factory; that girder was bent at right angles about 3 ft. from the wall, and stood in that position. There were five holes in the brickwork from which the girders had fallen. In one of those holes, where the first-floor girder had been, there was a clear impression of the girder on the brickwork at the back of the hole. The hole was about 6 in. deep. Two other holes on the first-floor level were of about the same depth, and the two holes at the level of the second-floor girders were about 7 in. or 8 in. deep. In the western wall seven girders remained fixed, two of which, however, were supported by columns, and five hung from the wall, one girder standing out horizontally from the wall. He could see three holes from which the girders had fallen; these appeared to be about 14 in. deep, and judging from the appearance of one he should think that there was a pocket or space at the back of the end of that girder. As both the girders in the east and west wall remained standing firmly in the wall, he concluded that they were closely and firmly built in, or they could not possibly have remained in such a position. It was not possible for him to have any of the brickwork round these girders out away at the time when he made his first examination. He endeavoured to arrange to see the girders when the men were pulling down the wall; he was unable to do so, but from his examination of the girders after they were taken down they appeared to have been firmly built into the brickwork. He also found that one of the girders on the ground-floor level in the east wall was firmly built in the brickwork, and that the bricks actually touched the back of the girder. In the provision-shop in Douglas-place he was able to examine a number of girders when the wall was being pulled down, and they were built into the brickwork. He had an interview with Mr. Saunders, the architect, who kindly afforded him full information, and went through the detail drawings of the destroyed building with him. Mr. Saunders informed him that "pockets" were not mentioned in the specification, but that instructions were generally given to keep the ends of the girders clear. Mr. Saunders also showed him details of the ironwork, from which he was able to distinctly state that there was no allowance or provision for expansion at the connexion between the girders and columns, except such small play as there might be between a  $\frac{1}{2}$  in. bolt passing through an inch hole in the lug on the column and through a  $\frac{1}{2}$  in. hole in the girder, and that was assuming that the ends of the girders did not butt against the column. On the 30th of September, having arranged with Mr. Saunders to meet his assistant, Mr. Point, he had two holes cut in the brickwork at the back of two of the girders. He found in one case the brickwork built close up to the back of the girder; in the other case a very small space was left, but not a "pocket." In the case of two heavy girders in other parts of the building he found that there was a pocket at the back of the girder, but in all cases the girders were built around and securely to the wall at the face. He felt bound to say, how-

\* See Builder, p. 680, ante.



ever, that Mr. Point, Mr. Saunders's assistant, told him that if any "pockets" were left it was by accident and not by design. With regard to the question of the expansion of iron under heat, in ordinary temperature the expansion was so slight that in building little heed need be paid to it. But the expansion increased in direct ratio to the temperature, and up to 200° Fahr. it was about one eight-hundredth of the length. It was, therefore, necessary to endeavour to ascertain the temperature of the girders during the fire. A great quantity of melted lead was found in the factory, and he had also seen a piece of metal consisting of part of a girder, part of a column, part of a steam-pipe, and other pieces of iron, partially melted and fused together, so that the temperature must have been very great. Many of the girders must have been red-hot, as was, indeed, quite clear from the red scales upon them. In such a case the expansion would be  $\frac{1}{4}$  in. or even  $\frac{1}{2}$  in. per foot of girder. In the case, therefore, of what was practically a continuous girder 80 ft. long, the expansion would be 6 in. or 8 in. over all. It was then necessary to consider how much of that expansion would be communicated direct to the ends of the girders. Rolled iron joists were not very stiff laterally, and in expanding they would probably buckle and arch somewhat, especially as the girders were fixed at the ends. On the other hand, the fact that the columns were bolted together, and that the floors would rest on the girders during the early part of the fire, would help to keep the girders from buckling. He did not think that the whole of the expansion could have gone to the walls, but he believed that about 2 in. of that expansion would be communicated to each end of the girders and against the walls. Though the resistance offered by the ends of the girders being firmly built into the walls might tend to increase the buckling, buckling so caused would not lessen the strain upon the walls. In his opinion the expansion of the girders caused considerable outward thrust upon the walls, and as the ends of the girders were not absolutely free, that expansion would tend to push the walls over. In a small building near the factory, called the "stables," he noticed two rolled iron joists about 30 ft. long had thrust and bulged outwards the brickwork near their ends. He believed that was due to the expansion of those girders under great heat. The bolts which he produced would show that there had been very great expansion in the girders. A short bolt which must have connected a third or fourth floor girder to a column had been bent as with a hydraulic press, the depth from the head to the bend exactly corresponding with the thickness of the lug on the column and from the nut to the bend with the thickness of the web of the girder. In his opinion, that bolt had not been bent by the fall of the girder, like another bolt produced, which showed the manner in which it had been wrenched by the falling of the girders. Two long bolts (produced), which had come from a second-floor girder, also showed evidence of expansion in the girders. In addition to a considerable amount of shafting running both parallel to and at right angles to Douglas-place. It was urged that the north wall of the factory also fell into what is called "Whitely's-mews" and that there were no girders in that wall. The ends of the short rolled iron joists which carried the fireproof floor were said to be in the north wall, and those joists might have communicated the expansion of the longer cross-joists to the wall. The ends of the strong wooden joists carrying all the floors were also in that wall, and when the main girders carrying the joists fell, the joists falling might have overthrown the wall. Iron, when used in a building, could only expand to the extent stated when submitted to great heat, as in a fire. The ends of the girders being firmly built into the walls, the expansion of the girders would cause an outward thrust upon the walls, already weakened by the heat of the fire; and such thrust did, in his opinion, afford a reasonable explanation of the falling of the walls. The walls were well built, and the brickwork was very good indeed. He had no desire to find fault with the building. He believed the ordinary method of construction had been observed, and that there were many buildings similarly constructed.

In answer to questions put by the Foreman

of the Jury (Mr. Mark H. Judge), Mr. Walker said that before he had seen the results of this fire, he should probably have built the warehouse in the same way. He could not give any other explanation of the fall of the wall except that it was due to the pushing forces exerted by the expansion of the girders. Asked whether the walls of a building ought to be tied together by iron girders, and whether iron girders ought to be built tight into the walls, Mr. Walker said where the girders were meant to carry roof floors he would make special provision for the expansion of the girders, but in fireproof floors he did not think that would be necessary.

Mr. W. B. Lewis, M.Inst.C.E., was the next witness. He said he had had experience in iron and brick construction, and that the building which was the subject of inquiry was constructed in the manner usually adopted for such buildings. He could not agree with Mr. Walker in thinking that the expansion of the girders had much to do with the falling down of the wall. The wall was, no doubt, subjected to very great heat. He thought that the tendency of the girders would be to pull the walls in rather than to push them out, but he should attribute the weakening of the walls to the heat to which they were exposed, apart from the girders altogether. In common structures like the one under inquiry it was not usual to make any allowance for the contraction or expansion of the ironwork.

By the Foreman of the Jury.—The expansion and contraction of iron under ordinary temperatures was so slight that it was not necessary to make any special provision for it. In other words, it was only used to provide for safety in such structures under ordinary circumstances. This was not a "fireproof" building, and therefore no special means would be taken to protect the ironwork, notwithstanding that ironwork in the presence of fire was an element of danger rather than of security.

By Mr. Roche (representing Mr. Whiteley).—His belief was that a girder 12 in. by 6 in. would buckle and twist by the heat long before it could exert any effect upon the wall.

Mr. F. W. Shields, M.Inst.C.E., said he had had considerable experience in iron construction, and his opinion was that the iron girders had practically no effect upon the falling of the wall. He thought that the wall fell owing to the operation of an ordinary law of nature. The heat inside the building expanded the wall, which was cool on the outside, and this difference of external and internal temperature caused the wall to buckle, without any pull or thrust from the girders.

By the Foreman of the Jury.—He should, if this had been his own building, have built the girders solidly into the brickwork, for the reason that the girders supporting the various floors of a building were needed for use also as ties from wall to wall. He did not think that the wall could have fallen from the thrust of the continuous length of girder through the application of heat at a distance from the interior face of the wall. Did not know that the wall fell within a very few minutes of the alarm of the fire having been given, and before the fire had itself reached the inner face of the wall. Did not know that immediately the wall fell upon the people whose lives were lost, the firemen who set to work in removing the debris found that the bricks were not too hot to handle, as they would have been had the wall fallen owing to the direct action of heat.

By the Coroner.—The brickwork was very good.

Mr. T. Chatfield Clarke, F.R.I.B.A., said that as surveyor to a large fire office he had had considerable experience of the behaviour of buildings under fire. He had looked at the drawings, plans, sections, &c. of the destroyed warehouse, as erected from the plans of the architect, Mr. J. E. Saunders, and as the result of the examination he was prepared to say that if he (the witness) had had to construct the building, with its particular requirements, he should have constructed it in exactly the same manner as that adopted by Mr. Saunders. As to the strength of walls, that was a matter which was regulated by the Metropolitan Building Act. It was the universal practice to make use of cross girders as ties from wall to wall.

In answer to a question by the Foreman of the Jury, Mr. Chatfield Clarke said he did not consider that the expansion of the girders was an appreciable factor in the destruction of the

wall, and therefore he should not be disposed to alter the construction on that score.

Mr. J. Tavenor Perry, A.R.I.B.A., said that as surveyor to a fire insurance office, and as architect to the Alhambra in Leicester-square, he had had much experience in connexion with the effects of fire upon iron construction, and he had found, in buildings erected as the one under inquiry was, with the iron girders built in as ties, that the tendency of the ironwork was not to expand and force the walls out, but rather, by the sagging of the girders under the action of heat, to drag the walls inwards, the girders sometimes falling inwards from that cause without pulling the walls with them. A case of that kind happened at the burning of the Alhambra, when a large built-up girder, about 50 ft. long by 4 ft. 6 in. deep, which had been put in about twelve months before to carry a considerable part of the weight of the dome, fell inside the building, leaving the walls which carried it intact. That girder rested on stone templates. In his experience, when iron subjected to the action of heat began to expand appreciably, the tendency was to sag immediately.

Mr. J. Howard Colls, President of the Institute of Builders, was next called. He said that as a builder of much experience in the erection of such buildings as the one which was the subject of inquiry, he had never seen it specified that the ends of the girders were to rest free in pockets with room for expansion. It was the usual practice to build in the ends of the girders most carefully, and where that was not done the work would be regarded as having been "scamped." It was most necessary to make use of the girders as ties. If they had not been built in in this particular building, he did not believe it would have stood to be burnt down: it would have fallen down.

The next witness was Mr. E. H. Wallis, M.Inst.C.E. Examined by the Coroner, he said that he could not but conclude, from his examination of the plans, that primarily the girders, from their construction and disposition, had, when expanded by heat, exercised considerable effect in pushing out the walls. In the total length of 80 ft. the expansion would not have been less than 3 in. or 4 in., say,  $\frac{1}{4}$  in. or 2 in. at each end. That might not seem much, but acting on a wall possibly already weakened by the action of fire, it might easily be sufficient to push a wall over.

Captain Shaw, the Chief of the Metropolitan Fire Brigade, was the last witness called. In answer to questions put by the Coroner, he said that while his experience showed that many walls were crippled and weakened by heat, irrespective of the disturbing element of iron construction, there could be no doubt that the expansion and perhaps the contraction of iron was a frequent source of the collapse of buildings attacked by fire. What might have been the precise sequence of causes in regard to the fall of this building he could not say; but it was his experience that, as a rule, the walls of buildings in which the floors, &c., were of wood, stood longer under fire, and more often survived fire, than the walls of buildings in which iron construction was used.

The Coroner having summed up the evidence, the jury retired to consider their verdict. After being absent for about half an hour, they returned the following verdict:—

"That the four deceased persons were found dead and did die from the mortal effects of fractures of the skull and other injuries, arising from the falling of a wall at a time when there was a fire at Mr. William Whiteley's. Although there is not sufficient evidence to show how the fire originated, yet we are of opinion that it was the work of an incendiary or incendiaries."

To this verdict they desired to append the following rider:—

"First, that the present state of the law in regard to fires is most unsatisfactory, inasmuch as it would have allowed the fire at Mr. Whiteley's premises to have passed without any official inquiry but for the deaths resulting therefrom."

Secondly, that provision should be made by law for an official inquiry into the origin and circumstances of all fires."

Thirdly, that such an inquiry would tend to diminish the frequency of fires, by making felony more easy of detection and by bringing public censure, if not punishment, on persons responsible for fires arising from carelessness or want of precaution."

Fourthly, that the information and statistics which would result from fire inquiries would expose faulty and inferior work and thus lead to improvements in building constructions."

Fifthly, that the serious danger which may result from unsound construction where ironwork is largely used calls for immediate attention, with a view to such an amendment in the Building Act as will secure the requisite supervision."



CASE UNDER THE METROPOLITAN BUILDING ACT.

NEGLECT TO GIVE NOTICE TO DISTRICT SURVEYOR.

At the Worship-street Police-court a few days past, before Mr. Bache, the District Surveyor of East Hackney North (Mr. Meeson) summoned Messrs. Brooks, Simpson, & Spiller (Limited), for neglect for having executed works to four buildings without notice.

Defendants' counsel objected that the summons addressed to the old firm instead of the present company, but the District Surveyor produced a copy from the company on the subject of the summons, and the summons was amended by the deletion of the word "limited." The defendants made exemption under section 6, contending that clause was to be construed as "60 ft. from the rear buildings (and ground) of an adjoining tenement."

Included in one alleged offence was the repair of external wall, in which about 100 new bricks were laid on the face of the wall, and the District Surveyor considered this was a repair affecting the structure of the wall, because if the new work had been taken away the brickwork over it would have fallen.

The Magistrate decided that the context of the Act of the exempting clause referred to, as well as the general policy of the Act, shut out the construction put upon it by the defendants; and as the buildings to which the works were done were within 60 ft. of other buildings belonging to the defendants, the District Surveyor was entitled to notice. The Magistrate decided that the work requiring notice, because old bricks were simply replaced by new, and there was no alteration as if stone had been substituted for bricks, or the wall had been made thicker.

The defendants were fined 4s. and 12s. 6d. costs.

THE WALLS OF CHESTER.

SIR,—I have to ask of you the favour to correct me a slight error in one of my letters, in which I copied the name of Mr. Shrubsole with that of Mr. Thompson Watkin, as believing in the Medieval age the Roman sculpture of two figures.

Mr. Shrubsole assures me that he has expressed such opinion. C. ROACH SMITH.  
Strood, Oct. 24.

SIR,—Permit me, in a few lines, to reply to Mr. Brock's last letter. I am told that if the present walls of Chester at the two points I have indicated were built, one in the time of the Commonwealth, and the other in the reign of Anne, the "bill" must be in force, and that if I cannot induce them, "it will show that the work was not done at either of the times" I name.

As we know from Randle Holme and others that the breaches were made at different times in the city during the siege, it follows that they must have been at some time repaired. As the great gate of the city must have been made to the right of the Phoenix Tower, the Parliamentarian army, when they obtained possession of the city, did, as I have before said, rebuild not only this gate, but the others, to mitigate the danger of an attack by the Royalists, by whom they might at any moment be besieged. But if Mr. Brock really thinks that I am to ask me for the "bill" which the Parliamentarian issued, I may as well ask him for the "bill" of the 20th legion inquired, if they built this part of the wall. In neither case would a "bill" be necessary. The soldiers and "in-massed" hands would, in either case, do the work. As to the "bill" for the work done in Queen Anne's time, if Mr. Brock does not believe the inscription put up by the Chester City Council on completion of the work, almost immediately after the buttressing wall, which I take to be part of the work then done, I am afraid he will not believe, "though one rose from the dead" to confirm it. The inscription (which I have previously referred to in my correspondence with Mr. Brock), and on the Cornhill, in the Parish of St. Peter, tells us that in 1708 "divers wide breaches in these walls were rebuilt, and other decays therein were repaired, two thousands yards of the pavement were flagged or paved, and the whole repaired, painted, and adorned at the expense of one thousand pounds or upwards." Here is the amount of a "bill" for the portion executed in Queen Anne's time.

Referring to the Rodee wall and its mortar, Mr. Brock says is Roman, I will merely refer from the report of the City Surveyor, Mr. M. Jones, read at a meeting of the Chester Archaeological Society, February 24th, 1884. He is speaking of the excavation he made in front of the "bill" in the Cornhill at the Kaleyard, and except in two courses just level with the ground at Rodee, mortar in the joints. "This mortar has been well examined, and it is comparatively modern. Mr. Brock speaks of the mortar below the present wall having been 'washed out' by the 'action of the sea.' He may rely upon it that if any washing took place, it would be the soft sandstone that would yield, and not the grand Roman concrete, if it had ever been there.

Finally, he alludes to my use of the word "formidable" with reference to his calculation for labour, and the quantity of stone, &c. My contention was, and is, that if the Parliamentarians repaired the large breach, as I believe they did, the cost, even including that of "the stone," which Mr. Brock says he has omitted, would be comparatively *nil*. With stone at hand from the old ruined wall, Roman ruins, and tombstones close at hand, forced work from the army, and impressed work from the citizens, the wall could be rebuilt both very cheaply and very rapidly.

W. THOMPSON WATKIN.

P.S.—It is, of course, quite possible that in the archives of the Chester Corporation some accounts constituting a "bill" may be found, for the repairs effected in 1708, and also some papers (though I doubt it) referring to the reparations by the Parliamentarian army. But as this would involve a long search, perhaps some of the Chester authorities will try it. As it is *certain* that repairs *did* take place at these periods, it is Mr. Brock's place to procure these "bills," if extant, and disprove the views I have argued by them.

SIR,—I will cheerfully reply to any inquiries of your correspondents relative to the interesting subject of the age of the walls of Chester; but is not Mr. Watkin making needless comments as to whether or not I am correct in calling the wall of the last and the beginning of this century, "fairly recent times"? I think I am right in doing so, but the point to be kept in mind is that two Roman gates did actually stand in the line of two of the present walls, and thus proving their course. He says [p. 582] that there is between him and me "in the question as to who made the stones," acknowledged by both of us to be Roman, which form the base of the wall. In this certainly lies the bulk of the discussion as it stands at present, now that the age of the ecclesiastical-looking figure may be taken as determined. For his opinion, however, that they are not *in situ*, he is bound to believe (1) that the Roman foundations where the Roman wall stood have been entirely obliterated, and the whole mass of the old walls removed, from the position mostly under notice by me, from North Gate to the Phoenix Tower, and wherever else the Roman stones occur as the base of the present wall; (2) that the base of the Kaleyard wall was built *without mortar*, temp. Edwardian; (3) that one part of the north wall was built *without mortar* in Parliamentary times; (4) that another part was built again *without mortar*, temp. Queen Anne; (5) that all the enormous mass of Roman stones was dug from convenient old Roman foundations by the Parliamentarians within the city after the siege, while all the sepulchral stones were found without the city walls; and (6) that the new base was built without mortar, and either the upper part with mortar at the same time, or else the upper part went to decay since the middle of the seventeenth century or later, and had to be rebuilt with mortar. All these improbabilities have to be faced before he can put forth any claim to substantiate his belief. All are avoided by the theory that the Roman stones are where the Romans placed them when the wall was built. I have asked him for proof; none is forthcoming. There is but your correspondent's repeated assertion. I asked him long since to point out an Edwardian building erected without mortar in support of his belief. He has not done so. I knew that he could not. Your readers are aware of the universal use of mortar in all Medieval buildings down to our own days. Yet here at Chester, according to your correspondent, age after age must have built without it. For myself, with a somewhat extended knowledge of the technicalities of building construction, I cannot point to a single instance of any Medieval building in England erected without mortar.

The mere fact, however, of the absence of mortar is, of itself, evidence of high antiquity, and it is surprising that it is not so accepted by your two correspondents. The whole mass of the walling of ancient British hill forts, from Cornwall to Northumberland, from the borders to the extreme end of Scotland, from end to end of Wales, in Ireland, on the Continent, in all these the absence of mortar where walling occurs is universal.

These walls are built of stones far smaller than anything I have seen at Chester, and they still stand in many examples. I have already referred to the feeling for the use of unmortared masonry by the Romans, and your correspondent's rejection of the evidence of Continental examples will not be followed, I feel sure, by the majority of your readers.

Mr. Shrubsole, p. 581, still doubts my measurement. This can readily be determined. I hope to be at Chester shortly, and shall be very happy to meet him, if he will let me, and have a pleasant visit to the spot. We can there measure it together. His belief as to the pooriness of the erection of the unmortared part of the wall, I think, carries its own refutation with it, for if erected as he states, it would certainly not stand. But it does stand. It must be remembered that the earthen supporting bank does not exist along a large portion of the wall, and where it is highest.

The height I have given for the Roman wall is a good working average, at the point named. It would not have been fair to have overstated it, since

it would have increased by so much the already heavy mass of Roman walling I have specified, all of which Mr. Watkin has to account for from his Roman foundations. The discussion of the measurement hardly affects any principle, and I have already acknowledged that in other places the Roman part is higher, at others lower.

E. P. LOFTUS BROCK.

\*.\* We have not space to continue the correspondence on this interesting subject further at present.

PUBLIC APPOINTMENTS.

SIR,—The Shirley and Freemantle Local Board recently advertised for a Surveyor. From a Southampton paper I have just noticed that that body met the same evening on which the applications had to be sent in, and there and then made the final selection out of sixty-six applicants. Does not this look as if the affair had been "cut and dried" and settled beforehand?

I do not complain of the successful candidate (who is no doubt perfectly competent) obtaining what influence he could; but I do think the Board are greatly to blame in advertising and putting so many persons to trouble and expense if they had no intention of fairly considering all the applications sent in. O. E. H. T.

COMPETITIVE DESIGNS FOR WILLESDEN PUBLIC OFFICES.

SIR,—In your issue of last week, under the above heading, the following statement was made, viz.:—"It appears that the design placed first by Mr. Harnor was formally accepted, subject to its being capable of being carried out at a cost of not more than 6,000*l.*—the stipulated limit. It appears that the lowest contractor's estimate is considerably above that sum," &c.

As this matter is still before the Board, and is being considered by them, I do not feel myself at liberty to enter into the question beyond saying that the design has undergone certain modifications, which therefore render any comparison with the original sum named misleading. I can, however, say that, allowance being made for these, the lowest tender is as near the stipulated sum as can reasonably be expected.

EDWARD HARNOR.

October 22nd, 1887.

\*.\* We wrote on the basis of a newspaper report of the proceedings at the Willesden Local Board, which, as Mr. Harnor's letter seems to imply, may not have given a correct idea of the whole case. Of course, we have no wish to prejudice Mr. Harnor in any way, but we have a strong opinion that the conditions under which a competition design has been accepted ought, in fairness to all concerned, to be strictly observed.

TERRY'S THEATRE.

SIR,—I note, in your description of the above, in this week's *Builder*, that you mention the gallery extra exit door on to the street. This door will never be locked at night, or all until after the performance is over. The only reason it has been kept locked during the day time is because the rooms in the Strand block are not quite finished yet.

I may say, with regard to the coldness of the appearance, that this is not a necessary adjunct to a fireproof building; the walls could be papered or coloured as warmly as desired. The reason for this cold colour is that it shall not absorb the light or detract from the stage or dresses of the audience at the same time, as the effect that is given of air makes the audience feel more satisfied as to ventilation.

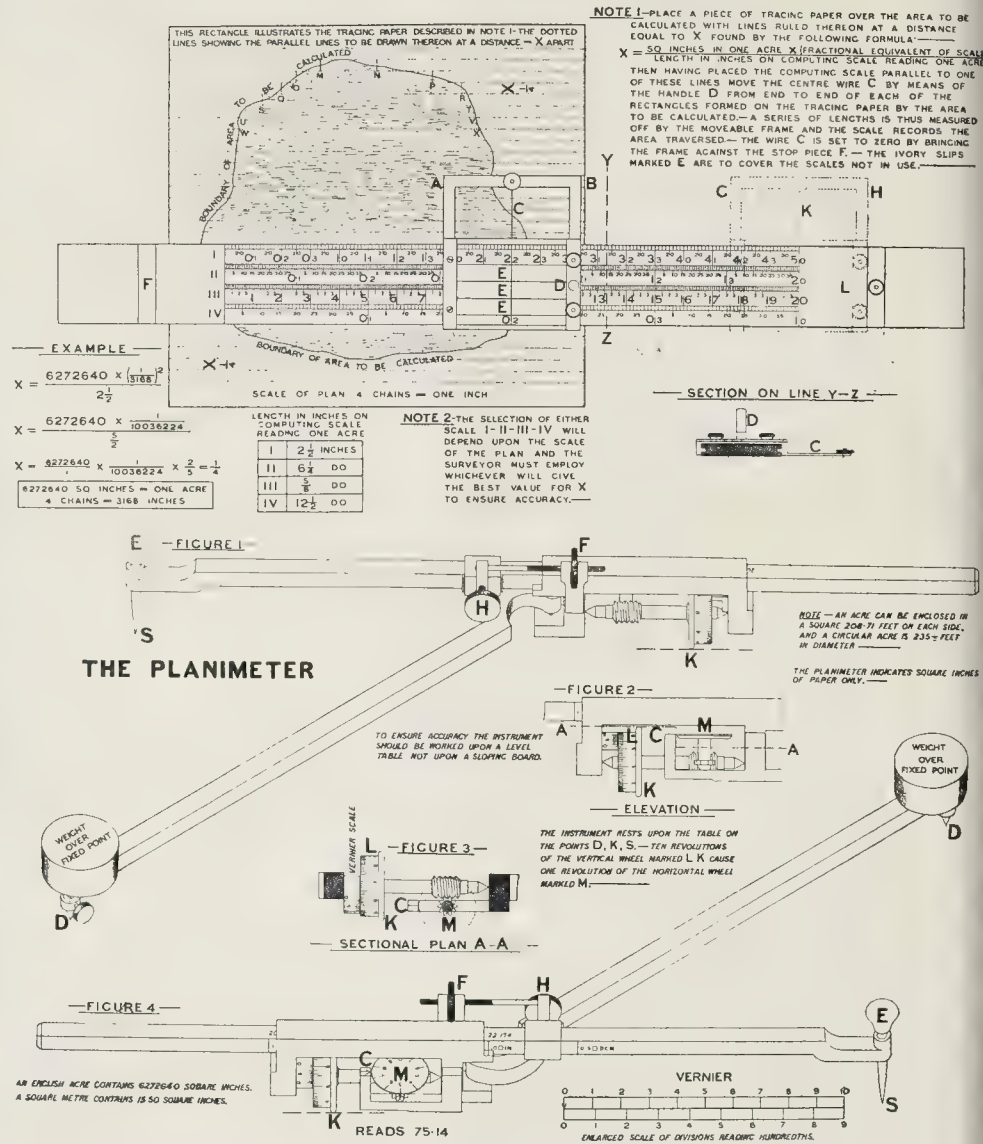
WALTER EMDEN.

Extensions at the Royal College of Surgeons.

—The Royal College of Surgeons, in Lincoln's Inn-fields, is at present undergoing a considerable enlargement by the addition of two floors, which increase the height of the structure by from 20 ft. to 30 ft., the building having now an elevation of about 80 ft. from the ground level. Each of the new floors has nine windows carried across the frontage, the lower floor windows being circular in form. A main cornice and balustrade cover the entire ground area occupied by the building, extending in depth to the rear in Portugal-street. They are intended for professional workrooms and scientific laboratories in connexion with the college. The library of the college is also about to be extended, and one of the houses in Lincoln's Inn-fields, on the east side of the college, has been purchased, and is now undergoing alterations for the purpose of adapting it to library purposes. Mr. Salter, of Woburn-place, is the architect; and Messrs. Higgs & Hill are the contractors.



## COMPUTING SCALE



## The Student's Column.

## LAND SURVEYING AND LEVELLING.

## XVIII.—INSTRUMENTS FOR THE CALCULATION OF AREA.

THE annexed illustration shows a portion of a computing scale usually made to 3 chains to 1 inch. The large figures denote acres, and the subdivisions numbered 1, 2, 3 indicate rods. The perches are engraved upon the ivory scale attached to a movable metal frame, the use of which will be understood upon reference to the drawing of a complete instrument, as shown above, which illustrates the type of computing scale used at the Tithe Commission Office. The application to a plan is explained in note 1. Four scales are shown upon this instrument (see note 2). The example given supposes the plan to be drawn to a scale of 4 chains to 1 in., in which case the calculated distance between the parallel lines upon the tracing-paper is seen to be 1 in.,

when the upper scale marked I is to be employed, and a length of 2 1/2 in. is seen to measure an acre. The wire line C in the frame A B is first so set that the frame rests against the stop-piece F. It is then placed upon the tracing-paper over the area to be calculated so as to start from zero at the line M, with the edge of the scale parallel to the lines upon the tracing-paper, and after carefully moving the frame so that the line C traverses from M to N the instrument is then lifted up and replaced with its edge parallel to the lower lines upon the tracing-paper, so that the wire C starts from O at the same position on the scale as it indicated when at N. The frame is traversed over each rectangle successively from M to N, O to P, Q to R, S to T, &c., by means of the handle D (see section upon the line Y Z), and thus by a series of mechanical additions the area can be read off the scale in acres, rods, and poles. With the use of the upper scale, as shown, when the frame reaches the stop-piece L it indicates that five acres have been traversed.

In Merrett's improved computing scale the screw in the metal frame is made to act as a clamp, and different scales are supplied to the same metal frame, instead of the ivory pieces employed to cover the scales which are not required for use in the instrument adopted by the Tithe Commission Office. The reading edge is also bevelled off against the scale.

In the Planimeter the bar E F can be made either to slide in the box to which the other is attached (see fig. 1) or can be permanently fixed to this box. In the latter case it is constructed to record square inches only. In the former case it will record square inches with the mark upon the sliding box is made to coincide immediately under the mark upon the bar E F which is situated near the figures 22-174 fig. 4. The sliding box is fixed to the sliding arm E F by the clamp screw H, and the marks above alluded to are made to coincide the movement of the slow-motion screw F. The horizontal wheel M records the square units one revolution, the wheel L records square units and tenth parts of a square unit, and the vernier attached outside the wheel L enables

hundreds of a square unit to be read. When needle-point D is placed outside the area to be calculated no account is taken of the figures on the sliding bar E F, but when the needle-point D is placed inside the area to be calculated, the number engraved upon the bar is added to the reading of the instrument after a boundary of the area has been completely reversed by the pointer S, before the finding of the instrument is deducted. We give an example in a future article to show application.

IN.—In the "Student's Column" in the *Builder* October 15th, you give a formula for ranging a line which you illustrate by diagram, merely stating that the proof is contained in the figs. 4 and 5. I have taken the trouble to work out the solution from the said figs., and I obtain the following relation, which you will see differs very much in form from that which you give:—

$$R \sin A = \sqrt{(R-r)^2 - \{R(r-r) - R \sin A\}^2}$$

Would you kindly say if this is not correct, or add you give the detailed analysis of your own notation, and oblige,

RAILWAY ASSISTANT.

\* The geometrical proof is shown in fig. 4. The algebraical proof is illustrated by fig. 5.

Fig. 4.—In order that the circle with the centre in fig. 3, should touch the tangent line E A, its centre must lie in a line parallel to it, at a distance equal to its radius (see fig. 4), and in order that it should touch the circle having its centre at K, its centre must be in a circle having a radius equal to the difference of the two given radii, concentric with the circle D C, which touches the tangent line in fig. 4). Therefore it lies in the intersection of two parallel lines and the circle with a radius equal to the difference of the two given radii. This intersection comes in the point G (fig. 4). The problem, therefore, algebraically resolves itself into the following:—

Let A—the angle P C E=A C H=N C K (fig. 5),

R—radius of original curve,

r—radius of new curve,

N C=r cos A,

M C=r sin A,

M G=N C-K G P,

N K=R sin A,

$$G P = \sqrt{K G^2 - K P^2}$$

$$K G^2 = (R-r)^2$$

$$K P^2 = (N C - M C)^2 = (R \cos A - r)^2$$

$$G P = \sqrt{(R-r)^2 - (R \cos A - r)^2}$$

$$= \sqrt{R^2 - 2 R r \cos A + r^2 - R^2 \cos^2 A + 2 R r \cos A - r^2}$$

$$= \sqrt{R^2 (1 - \cos^2 A) + 2 R r (\cos A - 1)}$$

$$= \sqrt{R^2 \sin^2 A + 2 R r (1 - 2 \sin^2 \frac{A}{2} - 1)}$$

$$= \sqrt{R^2 \sin^2 A - 4 R r \sin^2 \frac{A}{2}}$$

$$M G = R \sin A - \sqrt{R^2 \sin^2 A - 4 R r \sin^2 \frac{A}{2}}$$

Q. E. D. (see *Builder*, Oct. 15, p. 548).

N.B.—The "Railway Assistant" has since then to say that he has found the right solution, and agrees with ours! It is a pity he did not so before giving all this trouble, but as the way may be useful to others, we leave it to him.

## RECENT PATENTS.

### ABSTRACTS OF SPECIFICATIONS.

3,419, Panelling, &c. W. H. Carmont.

In order to prevent the warping of wood, and for other convenience, the panelling is, according to invention, made up of different thicknesses of wood glued or cemented closely together, with the grain or fibres placed crosswise. The wood is pressed in moulds, and the process may be applied to a variety of materials where combined strength and stiffness are required, such as in the manufacture of light furniture, &c., and is especially suitable in cases where the wood is exposed to the weather, for instance in the bodies of vehicles.

4,223, Concrete Wall Construction. J. Tall. According to this invention, in order to effect an easier connection and disconnection of the panels or segments used in concrete building a rotatable bolt is used, which by a half turn in one direction secures panels, and by a half-turn turn in the other direction allows them to be detached.

15,038, Rain-water, Stove, and other Pipes. Gregson.

By this invention, the nails or holdfasts are permanently fixed in the wall, and on the spigot or

fauces, which is made much longer than usual, ears are cast, having holes so made that while the ear is passed over the nail by the lower hole, the weight of the pipe causes it to pass to a second one, where it may be fixed by wedge. The projections are also thicker than ordinary to allow the pipe to stand away from the walls.

15,184, Fanlights, Windows, &c. G. Stierlin.

The fanlight made in accordance with this invention is mounted on spring hinges. The spring catch is pulled, which unlocks the fanlight, at the same time it falls open. It is kept in any position by fastening a link of the chain on a peg at the side of the door.

15,546, Syphon Trap Closet-pans. A. C. Henderson.

The apparatus which is the subject of this invention is inodorous, and is designed to prevent sewer gas entering the house. The trap is in the form of an S, and is connected with the basin. Arrangements are made for flushing both basin and trap, and the form is designed to seal the trap against the inflow of sewer gas.

16,708, Syphon Cisterns. M. Syor.

According to this invention, the tube is flushed with water, and has the confined air acting as a valve to keep back the water and close the water-way; then a small bent tube attached to the syphon cover, charged with water by means of a hole in this small tube, in its turn acts as a valve to keep back the confined air under cover. To this bent tube is connected a small blow or suction pipe, used in conjunction with a "push" arrangement or lever, with sucker or plunger attached. Air is blown into the bent tube, and the trapping water therein is blown or sucked out, thus releasing the confined air, and allowing the water to flow down the syphon tube when all the water in the cistern is syphoned out.

### NEW APPLICATIONS FOR PATENTS.

Oct. 14.—13,928, J. Hind and F. Sharp, Automatically Opening Doors from the Interior of Buildings in Cases of Emergency.—13,946, H. Whiteley, Opening and Closing Fanlights and Casements.—13,951, W. Howitt, Fixing Glass and other Roofing.—13,973, Sir G. Chubb and Others, Strong Rooms and Safes.—13,975, W. Moore, Preventing the Bursting of Water Pipes by Frost.

Oct. 15.—13,979, W. Taylor and G. Holley, Wind-guards for Chimneys and Ventilators.—14,025, Sir G. Chubb and G. Exton, Unfastening and Fastening Doors, &c.

Oct. 17.—14,041, E. Holt, Automatic Drain Cocks or Valves.—14,045, S. Tuddenham, Metal Bars and Frames for Windows, Doors, Panels, &c.—14,056, J. Beaman, Hinge for Doors, Gates, or Windows.—14,078, H. Elliott, Glazing Greenhouses, &c.

Oct. 18.—14,101, C. Gardner, Watertight Fireproof Partition and Drop Screen.—14,113, E. Tarver, Construction of Theatres.—14,167, J. Greenlade, Window Frames and Sashes.

Oct. 19.—14,184, J. Fairbairn and R. Jones, Door and Window Fasteners.—14,205, D. Sorfield, Automatic Draught, Dust, and Rain Excluder for Doors.—14,229, H. Lake, Wood Paving.

Oct. 20.—14,243, J. Dowman, Keeping Window or Door Sashes Raised or Open at any required Height.—14,251, J. Potter, Fireplaces.—14,257, F. Keegan, Fastening Show Case Doors or Window Casements.—14,284, W. Webb, Sewer Sanitation.

### PROVISIONAL SPECIFICATIONS ACCEPTED.

6,368, F. Boushardt, Levels and Clinometers.—12,072, E. Whibley, Cutting Tables for Band-sawing and Fret-sawing Machines.—12,266, J. Bradshaw, Chimney Pot.—12,439, J. Adams, Safety Exit Apparatus for Theatres, &c.—12,420, G. Paxton, jun., Corrugated Sheet Metal Roofs, &c.—12,466, R. Hunter, Door and Gate Locks.—12,538, G. Redfern, Draught, Wind, and Rain Excluders for Doors and Windows.—12,614, J. Hird and J. Ford, Casement Windows and Doors.—5,510, H. & E. Ralle, Machine for Making Pegs for joining together Joistery, Carpentry, Cabinet Work, &c.—11,742, J. Honeyman, Drain Pipes.—12,195, R. & G. Ellis, "Dog" for Fastening together Timber for Temporary Staging, &c.—12,312, H. Lake, Removable Stair Treads.—12,570, W. Foster, Connecting Pipes to Water-closet Basins, &c.—12,603, W. Baird, Fastenings for Doors of Theatres, Halls, &c.—12,775, W. Manders, Red or White Faced Stock Bricks.—12,317, M. Clarke, Fireproof Curtains for Theatres, &c.—13,111, S. Bennett, Hoists or Lifts.—13,207, A. Morley and H. Wilson, Indicators for Electric Bells.—13,329, D. Ratcliff, Safes and Strong-rooms.

### COMPLETE SPECIFICATIONS ACCEPTED.

#### Open to Opposition for Two Months.

16,697, E. Milson, Mantel-board.—16,811, H. House and H. House, jun., Door Checks and Buffers.—8,939, J. and J. Crombie, Concrete Pavements, Floors, &c.—10,461, T. Bray, Syphon Water-waste Preventer Cistern for Water-closets.—12,161, G. Redfern, Water-meter.—12,638, A. Rammage, Flooring or Decking for Bridge Work and Building Construction.—18,847, F. Collins, Door-bolts, &c.—7,983, J. Root, Distemper, Paint, and other Brushes.—12,821, S. Pitt, Weather-guard for Doors, Windows, &c.

## RECENT SALES OF PROPERTY.

### ESTATE EXCHANGE REPORT.

OCTOBER 17.

By Messrs. COBB.

Kent, near Lenham Station—The Wychling House Estate, 339a. 3r. 32p. £4,550

Clapham—50, High-street, 23 years, ground-rent 12l. 10s. 400

By MORTIMER, JONES, & HANBY.

Nottingham, Parker-street—The Royal Oak Beer House 2,400

OCTOBER 18.

By DEBENHAM, TEWSON, & CO.

Hornsey-lane, Dresden-road—A plot of freehold land 180

By F. J. BIRLEY.

Bermondsey—26 and 28, Jamaica-road, 30 years, ground-rent 6l. 10s. 470

Two cottages in rear, 30 years, ground-rent 4l. 300

By C. C. TAYLOR & SON.

St. George's-in-East—120, Corn-wall-street, 78 years, ground-rent 16l. 200

OCTOBER 19.

By T. TURNER.

Harrow-road—28, Bravington-road, 91 years, ground-rent 7l. 300

By BAXTER, PAXTON, & LEPPER.

St. Mary Cray—The Beech Tree Public House, freehold 3,800

By LEWIS, SHARP, & HARRINGTON.

Leytonstone—Four plots of freehold land 140

By J. DAWSON & SON.

Thames Ditton—The freehold residence, Copper Hill 1,220

OCTOBER 20.

By B. BROWN.

Stepney—33 and 34, Rectory-square, 77 years, ground-rent 8l. 700

Canbit-lane—Ground-rent of 83l., reversion in 97 years 1,330

Ground-rents of 56l., reversion in 95 years 1,140

Ground-rents of 73l., reversion in 95 years 1,460

Ground-rents of 30l., reversion in 97 years 612

By J. POCOCK.

Clapham—99 to 105 odd, Leathwater-road, 94 years, ground-rent 28l. 1,160

By C. D. FIELD & SONS.

Blackfriars—53 and 60, Surrey-road, copyhold 400

Bankside—29, Pitt's-place, freehold 150

Bermondsey—45, St. James's-road, freehold 600

No. 1, Collett-road 430

By NEWSON & HARDING.

Kaling—15, Woodville-road, 94 years, ground-rent 10l. 15s. 1,190

Kingland—48, Shackelwell-lane, 77 years, ground-rent 1d. 445

Stoke Newington—9, 10, 12, and 14, Church-street, copyhold 1,760

Bermondsey—Ground-rent of 56l., reversion in 16 years 1,500

Stoke Newington—Ground-rent of 30l., reversion in 75 years 765

No. 108, Albion-road, freehold 515

Clerkenwell—3, Warden-place, freehold 385

Ponders's End Station, near—Freehold rent of 30l. for 37 years 785

Brighton—Ground-rent of 13l. 10s., reversion in 42 years 305

Stoke Newington—45 and 47, Green-lanes, freehold 855

OCTOBER 21.

By RUSHWORTH & STEVENS.

Kingland—87, 89, 91, and 93, Dothan-road, 32 years, ground-rent 1l. 1,340

Pimlico—8, Buckingham-street, 10 years, ground-rent 4l. 4s. 185

## MEETINGS.

SATURDAY, OCTOBER 20.

Association of Municipal and Sanitary Engineers and Surveyors (Home Counties District Meeting at Luton, Beds).—Mr. W. H. Leete on "Luton Sewage, Past and Present." Visits to Pumping Station and Sewage Farm, &c.

MONDAY, OCTOBER 31.

Society of Antiquaries of Scotland (Rhind Lectures in Archaeology).—Mr. Alexander S. Murray, LL.D., on "The Archaeology of Greece." V. 4 p.m.

TUESDAY, NOVEMBER 1.

Parkes Museum (Lectures for Sanitary Inspectors).—Dr. Charles Kelly on "Sanitary Law—General Enactments, Public Health Act, 1875, Model Bye-law." 8 p.m. Society of Biblical Archaeology.—(1) Mr. E. A. Wallis Budge, M.A., on "The Tomb of Amenhotep III. as excavated by Sir F. W. Grenfell, K.C.B. (2) Dr. W. E. Pleyte on "A Papyrus in the British Museum, recording an Egyptian Oracle." 8 p.m.

Manchester Architectural Association.—Address by the President, Mr. A. H. Davies - Colley, A.R.I.B.A. 7.30 p.m.

WEDNESDAY, NOVEMBER 2.

Builders' Foremen and Clerks of Works' Institution.—Ordinary Meeting. 8.30 p.m.

Liverpool Engineering Society.—Mr. Hy. Pooley, Jun., on "Automatic Weighing." 8 p.m. Society of Antiquaries of Scotland (Rhind Lectures in Archaeology).—Mr. Alexander S. Murray, LL.D., on "The Archaeology of Greece." VI. 4 p.m.

THURSDAY, NOVEMBER 3.

Builders' Benevolent Institution.—Fortieth Annual Dinner, at Carpenters' Hall, London Wall. 6 p.m. Royal Archaeological Institute.—(1) Mr. F. H. Griffith on "The Work of the Egypt Exploration Fund in the Spring of 1887." (2) Mr. Herbert Jones "On Antiquities in Brittany, lately visited by the Royal Archaeological Institute." 4 p.m.

FRIDAY, NOVEMBER 4.

Architectural Association.—Mr. J. C. L. Sparkes on "Architectural Modelling." 7.30 p.m. Parkes Museum (Lectures for Sanitary Inspectors).—Mr. A. W. B. Byth, M.R.C.S., L.S.A., on "Metropolitan Acts, Bye-Laws of Metropolitan Board of Works." 8 p.m.

SATURDAY, NOVEMBER 5.

Association of Public Sanitary Inspectors.—Address by the Chairman of Council, Mr. Hugh Alexander. 6 p.m.



## Miscellaneous.

**The Leland Club.**—The four days' proceedings of this wandering body of antiquaries came to a pleasant and successful termination on Tuesday last week, at Mayfield Palace, which interesting old building, said to have been founded by St. Dunstan, was courteously shown to the party by one of the holy mothers of the sisterhood now occupying the historical edifice, which they have converted, with great care of the early work, to their religious uses, and generally repaired and restored throughout. Bayham Abbey, some ten miles distant, had been visited in the first part of the day, when the remains were described and commented on by Mr. John Reynolds, of Bristol, who, throughout the excursion, gave additional interest to the various castles, churches, and monastic buildings visited by the Lelanders by his lucid explanations of their architectural features and history generally. Mr. George Patrick, of Wandsworth, at Mablestead "Round Church," where he read an excellent paper on its history and foundation by the Knights Hospitallers, and at Rochester Cathedral, which he described in a short and telling address, added much to the instruction and interest of his listeners, as also by his paper on Hedingham Castle, and the doings of the great De Vere family, who, as Earls of Oxford, resided in that Norman stronghold in an uninterrupted succession for some 500 years. A word of praise must also be gratefully awarded to Mr. Rendle, who, on the first day of the meeting (Friday, the 14th inst.), gave the above society an admirable paper "On the History of Southwark," in the Church of St. Mary Overy, followed by Mr. Thomas Morgan, F.S.A., and Mr. R. E. Way, with a description of Gower's and other famous tombs therein, and the Roman antiquities still constantly discovered in digging foundations in various parts of the old Borough; many curious objects and several rare Roman coins of his own collecting the latter gentleman exhibited on the occasion. At the Armourers' and Braziers' Hall, which, by the kindly invitation of that ancient and honourable Company, the Lelanders visited the same afternoon, Mr. Charles J. Shoppee, a past-master, gave them a short but comprehensive history of the guild, accompanied by an exhibition of the arms, consisting of valuable suits of armour, rare old swords and other weapons of war, as well as pointing out the many fine old pictures, portraits, and rare engravings, and also exhibiting the rich and curious plate belonging to the Company. In the evening of this day, the members of the above club closed their interesting doings by paying a visit to the French (Huguenot) Hospital, near Dalston, of which Mr. A. Giraud Browning, the Secretary, afterwards gave an account, as he led the members of the club through the passages and chambers of the "Hospice." At Rochester, on Monday, Mr. C. Roach Smith, F.S.A., as an honorary member of the Leland Club, met the party at the railway station, conducting them through the cathedral and the remains of the fine old Norman castle afterwards, at each of which he kindly gave short descriptions of their origin and history, and also of the Roman foundation of Durobrise (Rochester) itself. At "Kit's Coty House," which was visited later in the day, he delivered a comprehensive address upon the nature of such pre-historic monuments.

**A New Cathedral Cloister at Exeter.**—A few days ago Lord Clinton laid the cornerstone of a new cloister, at the south side of Exeter Cathedral. The scheme is to restore the old cloister, with a library, and the former foundation has been traced and the building will be erected according to the original form. The library will be over the cloister, extending from east to west. The total cost has not been estimated, but that of the portion in hand will be 4,000l. The 4,000l. will provide five bays of the cloister, with library, staircases, and lavatories. The architect is Mr. John L. Pearson, R.A., of London, and the builders, Messrs. Luscombe & Son, of Exeter.

**The Society of Engineers' Visit to Acton and Ealing.**—Our account of the Society of Engineers' visit to the sewage works at Acton and Ealing, the refuse destructor at Ealing, and the new storage reservoir at North Ealing for the Grand Junction Water Company, is unavoidably held over this week, for want of space.

**The Office of City Architect.**—At the meeting of the Court of Common Council last week, the Officers and Clerks' Committee brought up a report on the reference to consider the nature, duties, and emoluments of the office of City Architect, which has recently become vacant by the death of Sir Horace Jones. They submitted information as to the extent of the duties which devolved upon the department of the City Architect during the tenure of office by Sir H. Jones from 1864 to 1887. They considered that, looking to the extent and character of the new works executed under Sir H. Jones's direction, it was improbable that for some time to come the necessity for the employment of a gentleman of such acquirements would arise. The committee had, therefore, after very careful consideration, decided to recommend the appointment, at a salary of 800l. a year, of a gentleman of ability and capacity as the head of the department, to be called the City Surveyor, who should be competent, in ordinary circumstances, to undertake the discharge of the duties of an architect, except such as required the highest professional services. Mr. Sly, the Chairman, then moved the adoption of the committee's report, and stated that since the death of the City Architect the work of the department had been carried on most satisfactorily, and plans and specifications of the new City of London Court had been prepared and approved. Major Joseph, as an amendment, proposed that the appointment of an Architect and Surveyor should be continued. The subject gave rise to a long discussion. On a division, the amendment was lost by 79 votes to 71. Mr. Deputy Ashby moved the adjournment of the debate, which was lost, and the report was ultimately adopted by a majority of 11, though Mr. George Shaw at once gave notice of a motion to rescind the resolution.

**The Glasgow Institute of Architects.**—The twentieth annual general meeting of the Glasgow Institute of Architects (Incorporated) was held in the Religious Institution Rooms, Glasgow, on the 18th inst. Mr. David Thomson, President, in the chair. The report of the Council, which was read by Mr. William MacLean, the secretary, gave an account of the work of the Institute during the year. The financial statement, submitted by Mr. T. L. Watson, showed a balance in favour of the Institute of 289l. 1s. 5d. In moving the adoption of the reports, the Chairman congratulated the members on the flourishing state of the society. As to the proposed Registration Bill, he had attended a conference in London, and had expressed the opinion, on behalf of the Council, that they would oppose the formation of a central association in London for the regulation of all professional matters in the provinces.

**Employees' Supper.**—A very pleasant gathering of the employees of the firm of Messrs. Bunning & Sons, contractors, London, who are engaged in the work of restoring the parish church of Folesworth, took place at the residence of Mr. Hughes, farmer, on Monday evening last. The work of restoration being near to completion, Mr. H. Bunning, junior member of the firm, took the opportunity of complimenting their employees for the assiduity and workmanlike manner which has marked their conduct during the somewhat short and forced period (owing to the approach of winter) that the work has been in progress by entertaining them to a substantial supper.

**The Late Lord Idlesleigh.**—A statue to the memory of the late Lord Idlesleigh was unveiled at Exeter on Wednesday, the 19th inst., by the Lord-Lieutenant of Devon (Lord Clinton). It has been executed in Sicilian marble by Mr. J. E. Boehm, Esq., A.R.A., and is described as a most faithful likeness. It stands on a pedestal of polished grey Haytor (Devonshire) granite, which has been executed for the sculptor by Messrs. J. Easton & Son, of Exeter.

**Royal Institute of British Architects.**—The opening meeting of this Institute for the present session will take place on Monday evening, November 7th, when there will be a ballot for new members, and the President (Mr. Edward T. Anson, F.G.S.) will deliver his opening address.

**Bradford Post-Office.**—We are asked to mention that the wood block-flooring at the Bradford post-office (illustrated in our last) was laid by Messrs. M. C. Duffy & Son, Limited, of Bermondsey.

**Mr. Conder's Sewage Purification Process.**—The Rural Sanitary Authority for Surrey has recommended the adoption of this system in connexion with the drainage into Beomond's Watercourse, Chertsey. At the meeting of the Board last week Mr. Durrant presented to the Board a report on the question, in the course of which he said, as reported in the *Surrey Advertiser*:—"I have again visited the Chichester outfall, and from what I saw and the sample of effluent water obtained, I am of opinion that the scheme without proper settling tanks being provided would be of little or no use for the purpose required for Chertsey; or any of our villages in the valley of the Thames. Mr. Conder, who himself visited Chertsey last Saturday, also pointed out another grave difficulty, namely, the uncertain flow of the refuse from the brewery, but this he informed me could be got over by the Sanitary Authority requiring that the brewery refuse should be so purified by the brewers themselves, before entering the main drain, as to be harmless to the scheme. From these facts I would beg to suggest that Mr. Conder be asked to put up his apparatus, and that temporary tanks be provided, so that the scheme can be tested before any other steps are taken." The Board then gave their assent to try the scheme.

**Association of Municipal and Sanitary Engineers and Surveyors.**—The fourth examination of candidates for the offices of Municipal Engineer and Local Board Surveyor, carried out under the auspices of this association, was held at the Town-hall, Manchester, on Friday and Saturday, the 7th and 8th of October, 1887. The examiners in the several subjects were:—1, Engineering as applied to Municipal Works, Mr. E. B. Ellice Clark, M.I.C.E., County Surveyor, Sussex (West), late Surveyor to the Commissioners, Hove; 2, Building Construction, Mr. W. G. Laws, City Engineer, Newcastle-on-Tyne; 3, Sanitary Science, Mr. J. Gordon, M.I.C.E., Borough Engineer, Leicester, President of the Association; 4, Public Health Law, Mr. H. P. Boulden, M.I.C.E., Borough Engineer, Portsmouth. The following gentlemen, having satisfied the examiners, were granted their certificates of competency by the Council:—Messrs. J. Cook, T. E. W. Mellor, J. W. Metcalf, W. Parker, R. W. Smith-Saville, F. D. Ward.

**Appointment.**—Out of 100 applications for the appointment of clerk of works for the outfall sewerage works at Burnham, Mr. A. B. White, of Westminster, has been elected. Mr. Henry Hill, of High Wycombe, is the contractor.

**Cremation in Sweden.**—The first crematorium in Sweden was finished at Stockholm a few weeks ago, and the first cremation in that country was carried out on Saturday last.

## PRICES CURRENT OF MATERIALS.

TIMBER.			
	£.	s.	d.
Greenheart, B.G. .... ton	6	5	0
Task, E.I. .... load	12	10	0
Sequoia, U.S. .... foot cube	0	2	3
Ash, Canada .... load	3	0	0
Birch " .... do	2	0	0
Elm " .... do	3	10	0
Fir, Dantisc, &c. .... do	1	10	0
Oak " .... do	2	10	0
Canada " .... do	3	0	0
Pine, Canada red " .... do	2	0	0
" yellow " .... do	2	0	0
Lath, Dantisc " .... fathom	3	0	0
St. Petersburg " .... do	4	0	0
Wainscot, Riga " .... log	0	0	0
Odessa, crown " .... do	2	10	0
Deals, Finland, 2nd and 1st " std. 100	7	0	0
" 4th and 3rd " .... do	6	10	0
Riga " .... do	6	10	0
St. Petersburg, 1st yellow " .... do	8	10	0
" 2nd " .... do	7	0	0
" white " .... do	8	10	0
Sweden, 1st kind " .... do	8	0	0
White Sea " .... do	0	0	0
Canada, Pine, 1st " .... do	18	0	0
" 2nd " .... do	10	0	0
" 3rd " .... do	8	0	0
" Spruce, 1st " .... do	8	0	0
" 3rd and 2nd " .... do	6	0	0
New Brunswick, &c. " .... do	5	0	0
Baltic, 3rd kind " .... do	4	0	0
Flooring Boards, sq., 1 in. prepared, First " .... do	0	8	0
Second " .... do	0	6	0
Other qualities " .... do	0	4	0
Cedar, Cuba " .... foot	0	3	0
Honduras, &c. " .... do	0	2	0
Australian " .... do	0	2	0
Managua, Cuba " .... do	0	4	0
St. Domingo, cargo average " .... do	0	4	0
Mexican " .... do	0	3	0
Tobacco " .... do	0	3	0
Honduras " .... do	0	3	0
Maple, Bird's-eye " .... do	0	6	0
Rose, Rio " .... ton	8	0	0
Bahia " .... do	7	0	0



TIMBER (continued).			
1, Turkey.....	ton	£. s. d.	£. s. d.
in, St. Domingo.....	foot	0 0 5	0 0 9
Porto Rico.....	0 0 8	0 0 10	
Lat, Italian.....	0 0 8	0 0 6	
METALS.			
Bar, Welsh, in London.....	ton	4 15 0	5 0 0
in, in Wales.....	10	4 5 0	4 10 0
St. Staffordshire, London.....	5 10 0	6 0 0	
British, cake and ingot.....	ton	43 10 0	44 10 0
Best selected.....	45 0 0	45 10 0	
Sheets, strong.....	40 0 0	0 0 0	
Thin, bars.....	39 17 6	41 5 0	
Low Metal.....	lb.	0 0 4	0 0 4
ing, Spanish.....	ton	12 2 6	0 0 0
English, common brands.....	12 7 6	0 0 0	
Sheet, English.....	13 7 6	0 0 0	
TILES.			
English, special.....	ton	16 5 0	16 7 8
Ordinary.....	16 0 0	0 0 0	

METALS (continued).			
Strait.....	ton	120 0 0	0 0 0
Australian.....	120 0 0	0 0 0	
English ingots.....	120 10 0	0 0 0	
OILS.			
Lined.....	ton	19 10 0	19 15 0
Cocunut, Cochin.....	80 0 0	82 0 0	
Ceylon.....	24 0 0	0 0 0	
Palm, Lagos.....	22 0 0	0 0 0	
Rapeseed, English pale.....	25 10 0	0 0 0	
do, brown.....	24 0 0	0 0 0	
Cottonseed, refined.....	20 0 0	0 0 0	
Tallow and Oleins.....	25 0 0	45 0 0	
Lubricating, C.B.....	5 0 0	6 0 0	
do, refined.....	5 0 0	13 0 0	
TURPENTINE.			
American, in casks.....	cwt.	1 4 9	0 0 0
TAR.			
Blackhead.....	barrel	0 14 0	0 14 6
Archangel.....	0 9 8	0 9 8	

LAMBETH.—For the erection of a new library building in the Lambeth-road, to be presented by Mr. Henry Tate, J.P., to the Lambeth Libraries Commissioners. Mr. Sidney R. J. Smith, A.R.I.B.A., architect, No. 15, York Buildings, Adelphi, W.C. Quantities supplied:—			
Portland stone dressings, stone dressings.	Portland stone dressings, stone dressings.	Doubling fittings.	
G. Cander.....	£2,000	£4,900	£200
W. & C. Boyer.....	2,000	2,000	200
W. Smith.....	4,855	4,805	495
Holliday & Green-wood.....	4,747	4,707	397
Hall, Bedall & Co.....	4,880	4,815	635
F. & H. F. Higgs.....	4,817	4,485	390
J. Mills.....	4,600	4,550	450
Higgs & Hill.....	4,530	4,291	374
Nightingale.....	4,270	4,235	393
* Accepted.			

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitomes of Advertisements in this Number.

COMPETITIONS.				
Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Public Building.....	New Barnet Public B. C.	25 guineas	Nov. 15th	ii.

CONTRACTS.				
Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Planning and Making-up Road.....	Beckenham Local Bd.	G. B. Carlton	October 31st	ii.
Superstructure, Liverpool University College		A. Waterhouse	Nov. 1st	ix.
Laying Carriageways, &c.....	Mile End Vestry	J. M. Knight	Nov. 2nd	ix.
Abing.....	Midland Railway Co.	Official	Nov. 4th	ix.
Work to Mortuary Buildings.....	London Local Board	S. S. Grimley	Nov. 7th	ix.
King-up and Paving Roads.....	Wandsworth Bd. of Wks	W. C. Meaby	Nov. 8th	ix.
Hammonds Vestry.....		Official	do.	ix.
Cassians' Workshops, Vegetable Stores, &c.	Met. Asylums Board	do.	Nov. 9th	ix.
Journey Granite Spalls.....	Dartford Union	do.	Nov. 10th	ix.
Escapade Bridges, &c.....	St. George's Union	H. Saxton Snel	Nov. 16th	ix.
Funeral Vestry.....	School Bnd. for London	Official	do.	ix.
Older's Ironmongery.....		do.	Not stated	ix.

PUBLIC APPOINTMENTS.				
Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
District Surveyor, Charlton, Lea, &c.....	Met. Board of Works.....	Not stated	Nov. 2nd	xiv.
Surveyor of Buildings, Public Works, Ireland.....	Civil Service Com.	do.	Nov. 16th	xiv.

TENDERS.	
BARNES (Surrey).—For erecting a mission-hall in Wilby-street. Mr. W. H. Atkin Berry, A.R.I.B.A., architect, 35, Bedford-row, W.C. Quantities by Mr. S. Kennedy, 31, Great James-street, Bedford-row.	
Adamson & Son, Putney.....	£900 0 0
J. Hill, Barnes.....	890 0 0
A. Hale, Barnes.....	786 0 0
A. Hunt, Barnes.....	783 0 0
BIRMINGHAM.—For the erection of two semi-detached houses in the Hampton-road, Birchfield. Mr. G. Price, architect, Birmingham.	
John Hopkins, Birmingham (accepted).....	£740 0 0
BIRMINGHAM.—For the erection of 38 houses and ranges in the Chain Walk, Loddish, for Mr. Ezra Riley. Messrs. G. Price, architect, Birmingham. Quantities the architect:—	
Williams, Aston.....	£5,331 0 0
Hughes, Handsworth.....	4,980 0 0
Hall-rt, Handsworth.....	4,898 0 0
Rhodes, Aston.....	4,881 0 0
Archer, Birmingham.....	4,860 0 0
Buckley, Handsworth.....	4,831 0 0
Bamfield, Aston.....	4,775 0 0
Twigg, Birmingham.....	4,780 0 0
Pritchard, Handsworth.....	3,900 0 0
Johnson, Nechells.....	3,890 0 0
Hopkins, Aston (accepted).....	3,470 0 0
CANTEBURY.—For iron roof of the Greengrocery market, Canterbury. Mr. F. Baker, C.E., Borough Surveyor.	
Hodges.....	£138 10 0
Wiltshire.....	395 0 0
Jukes & Co.....	385 0 0
Roof only.	
Rendle & Co.....	359 10 0
Newton & Co.....	356 0 0
Waller & Co.....	345 0 0
Pocock.....	323 0 0
Goddard & Mayes.....	320 0 0
Wiltshire (accepted).	
DEPTFORD.—For the erection of a warehouse, Newington-street, Deptford, for Mr. G. Beck. Mr. Horace T. Dyer, A.R.I.B.A., architect, 29 and 37, King street, Deptford. Quantities by Mr. C. A. Garrett.	
J. W. Dixon & Co., Hackney.....	£1,121 0 0
J. T. Stevens, New Eltham.....	1,090 0 0
H. Potter, Lower Clapton.....	1,014 0 0
A. Thomas, New Cross.....	974 0 0
T. D. Leung, Deptford.....	944 0 0
S. Schellfield, Deptford.....	918 0 0
H. J. Jerrard, Lewisham.....	789 0 0
H. L. Holloway, New Cross.....	729 19 0
* Accepted subject to modification.	
DRENBURY (South Devon).—For dwelling-house at Drenbury, South Devon, for Mr. Josiah Badcock. Mr. S. Segar, architect:—	
J. Southcombe, Torquay.....	£466 13 0
Sercombe & King, Newton Abbot.....	364 0 0
J. Zealey & Son, Newton Abbot.....	350 0 0
J. H. Paskis, Ashburton.....	336 0 0
F. Barrow, Newton Abbot (accepted).....	328 15 0
EALING.—For the erection of a house in the Hamilton-road, Ealing, for Mr. J. Lee Thomas. Mr. Robert Willey, F.R.I.B.A., architect, 66, Ludgate-hill, E.C. Quantities by Mr. Thomas Nye, Ealing (accepted).....	
£1,720 0 0	
EAST GRINSTEAD.—For the erection of Board room, offices, and surveyor's residence, for the East Grinstead Local Board. Mr. W. N. Martin, architect, Wimbledon. Quantities by the architect:—	
J. Longley, Crawley.....	£211 0 0
J. Carlos.....	888 0 0
A. Foster, East Grinstead.....	852 15 6
R. Pink, Godalming.....	847 0 0
Criswell & Chitty, East Grinstead.....	837 17 0
W. Pledge, East Grinstead.....	789 14 4
J. Beard, East Grinstead.....	757 0 0
J. Morris, East Grinstead.....	740 0 0
Charlwood Bros., East Grinstead.....	685 0 0
* Accepted.	
GOSBERTON (Lincolnshire).—For the erection of a cemetery chapel at Gosberton, for the Gosberton Burial Board. Mr. Joseph Sawyer, architect, Spalding. Quantities prepared by the architect:—	
Thomas Pick, Spalding.....	£474 0 0
J. B. Newton, East Heckington.....	395 0 0
C. A. Watson, Spalding.....	392 0 0
W. H. Lyon, Stamford.....	390 0 0
H. Hobson, Hogthorpe.....	387 0 0
W. Emerson, Stamford.....	347 0 0
W. Greenfield, Boston.....	342 0 0
John Langley, Eirton.....	330 0 0
John Holmes, Wainfleet (accepted).....	328 0 0
James Leafield, Boston.....	321 0 0
GUILDFORD.—For alterations to premises, new stabling, &c., Fitch-place, for Robinson's Trust. Mr. J. W. Hall, Stevens, 21, New Bridge-street, E.C., architect and surveyor:—	
G. Strudwick.....	£263 0 0
Tnbs & Robinson.....	262 0 0
E. Downes.....	242 12 0
E. Grew.....	329 0 0
R. Seaber (accepted).....	256 0 0
HANDSWORTH.—For the erection of one detached and two semi-detached residences at Handsworth, near Birmingham. Mr. Thomas G. Price, architect, Birmingham. Quantities by the architect:—	
Harley & Son, Smethwick.....	£1,630 0 0
Johnson, Nechells.....	1,445 0 0
Twigg, Birmingham (accepted).....	1,440 0 0
Hulbert, Handsworth.....	1,393 0 0

LEICESTER.—For sanitary shed with retaining walls in connexion therewith to be erected by the Corporation of Leicester in the borough of Leicester, on land belonging to the Great Northern Railway Company. Mr. J. Gordon, M. Inst. C.E., Borough Surveyor, Leicester:—			
James Evans.....	£2,336	8 6	
E. B. Pipes.....	2,035	8 6	
Clarke & Garrett.....	2,012	0 0	
S. & E. Bentley.....	2,000	0 0	
John Marton.....	1,988	0 0	
T. & H. Herbert.....	1,964	12 10	
John Bentley.....	1,962	0 0	
J. A. Sharpe & Sons.....	1,915	0 0	
Pyre & Yates.....	1,911	16 0	
J. O. Jewsbury.....	1,899	0 0	
Duxbury & Son (accepted).....	1,877	10 7	
[All of Leicester.]			

LEICESTER.—For boarded fence, together with entrance-gates, &c., to be erected round the Groby-road Sanitary Depot, for the Corporation of Leicester. Mr. J. Gordon, M. Inst. C.E., Borough Surveyor:—			
Alfred Plant.....	£170	0 0	
T. T. Brown.....	155	10 0	
Charles Bass.....	153	0 0	
Gimson & Son (accepted).....	149	8 6	
[All of Leicester.]			

LEICESTER.—For the erection of additional w.c.'s at the Market House, Leicester. Mr. J. Gordon, M. Inst. C.E., Borough Surveyor:—			
J. O. Jewsbury.....	£2139	19 0	
Gelliford.....	110	0 0	
Shurps & Sons.....	119	15 0	
A. Plant.....	108	10 0	
J. Chester (accepted).....	103	0 0	
[All of Leicester.]			

LONDON.—For alterations and new fittings to the Cross Keys Public House, Theobald's-road, W.C., for Mr. Belsey. Mr. A. Saville, architect, Strand:—			
Drew & Cudman.....	£1,495	0 0	
J. Anley.....	1,287	0 0	
Ward & Lambie.....	1,287	0 0	
Yardley & Sons.....	1,287	0 0	
Riley Bros.....	1,231	0 0	
T. Borden (accepted).....	840	0 0	

LONDON.—For counter and pewtering at the Cross Keys Public House, Theobald's-road, W.C., for Mr. Belsey. Mr. A. Saville, architect, Strand:—			
W. Helling.....	£2145	0 0	
T. Heath.....	139	0 0	
Farmiloe & Sons.....	138	0 0	
Yardley & Sons.....	131	0 0	
Watts & Co.....	128	17 0	
G. F. Moody.....	124	15 0	

LONDON.—For alterations and additions to the Queen's Arms, Hackney-road, for Mr. D'Ardenne. Messrs. Williams & Son, architect:—			
Jackson & Todd.....	£1,779	0 0	
Sell.....	1,258	0 0	
Staines.....	1,253	0 0	
Thomerson & Son (accepted).....	1,189	0 0	

LONDON.—For alterations and additions at 21, Berkeley-square, for Mr. A. Guthrie. Mr. B. Seiden Wormun, architect. No quantities supplied:—			
Kingmont & Sons, Paddington.....	£1,760	0 0	
G. F. Kent, 8, W. Kensington.....	1,739	0 0	
Thomas Huxley, South Kensington.....	1,721	0 0	

LONDON.—For re-building the Bedford Arms, East-street, Waltham, for Mr. John Harris. Mr. F. A. Powell, architect, Kennington Park-road:—			
Holliday & Greenwood.....	£2,247	0 0	
Jones.....	2,187	0 0	
Anley.....	2,164	0 0	
Tyerman.....	2,156	0 0	
Knight.....	2,153	0 0	
Gould & Brand.....	2,087	0 0	
Burman & Sons.....	1,997	0 0	
W. & H. Castle (accepted).....	1,873	0 0	

LONDON.—For alterations and repairs, carpenters' and joiners' work, painting, &c., for the Mayfield Sanitary Laundry Company, Gilespie-road, Highbury, N.:—			
B. Blanford, Avenell-road, Highbury.....	£419	10 0	
* Accepted.			

LONDON.—For the erection of a new school for 1,000 children, to take the place of the present Hornsey-road School (Finbury & 27). For the School Board for London. Mr. T. J. Bailey, architect:—			
J. Tyerman.....	£14,523	0 0	
W. M. Dabbs.....	12,417	0 0	
Stimpson & Co.....	11,380	0 0	
W. Johnson.....	11,343	0 0	
C. Wall, Lot's-road, Chelsea.....	10,793	0 0	
* Recommended by the Works Committee for acceptance.			

LONDON.—For the enlargement of the Sydenham Hill-road School (Greenwich A.N.), by 200 places, for the School Board for London. Mr. T. J. Bailey, architect:—			
Kimbro & Co.....	£2,474	0 0	
C. Wall.....	2,353	0 0	
W. Johnson, Wandsworth Common.....	2,345	0 0	
* Recommended by the Works Committee for acceptance.			



**LONDON.**—For alterations and additions to the Hall, No. 2, Old Kent-road, and for the erection of two houses adjoining the Hall, for Mr. H. H. Finch. Mr. A. E. Hughes, architect:—

Faulkner .....	£2,412 0 0
David King & Son .....	2,263 0 0
Drew & Cadman .....	2,231 0 0
Downs .....	2,142 0 0
G. S. Williams .....	2,132 0 0

**MONMOUTH.**—For building two vestries, St. Thomas's Church, Overmonnow. Mr. F. A. Powell, architect, Monmouth:—

W. Simmons (accepted) .....	£233 0 0
-----------------------------	----------

**MONMOUTH.**—For re-building No. 3, Agincourt-square, for Mr. Frederick Wright. Mr. F. A. Powell, architect, Monmouth:—

W. C. Shannon .....	£493 0 0
C. Morgan .....	415 0 0
W. Simmons (accepted) .....	340 0 0

**NUNHEAD.**—For new Baptist chapel, schoolroom, and vestries. Messrs. Chas. Gray Seale & Son, architects. Quantities by the architect:—

L. H. & R. Roberts .....	£5,724 0 0
Wm. Goodman .....	5,555 0 0
Dove Bros. .....	4,436 0 0
Riggs & Hill .....	4,359 0 0
F. & H. F. Higgs .....	4,870 0 0
B. E. Nightingale .....	4,843 0 0
John Woodward .....	4,843 0 0

**PARKESTON (Essex).**—For proposed schools for the Ramsey School Board. Mr. H. A. Wooster Reeves, architect, 14, Devonshire-square, Bishopsgate, and at Colchester. Quantities supplied:—

Kenney, Ipswich .....	£3,998 0 0
Horlock, Manor Park .....	3,350 0 0
Warman, Felixstowe .....	3,319 1 2½
Oldridge, Colchester .....	3,300 0 0
Grimwood, Sudbury .....	3,280 0 0
Bunting, Fenstanton .....	3,169 0 0
Dobson, Colchester .....	3,059 0 0
Gibbons, Ipswich .....	2,860 0 0
Dias, Colchester .....	2,785 0 0

**ST. MARY CRAY (Kent).**—For rebuilding a corner shop at St. Mary Cray, Kent, for Mr. G. Ogburn, Mr. St. Pierre Harris, architect and surveyor, 1, Basinghall-street, E.C. Quantities supplied:—

Hart Bros. .....	£870 0 0
Knight .....	670 0 0
M. M. Ireland .....	652 0 0
Somerford & Son .....	639 0 0
Taylor & Son .....	608 0 0
F. Wood (accepted) .....	583 0 0

**SOUTH SHIELDS.**—For the erection of cemetery chapels and superintendent's house, situate near Westoe, for the South Shields Burial Board. Mr. Henry Grieve, A.R.I.B.A., architect, South Shields. Quantities supplied by Mr. George Connell, Newcastle-on-Tyne:—

Wm. Kennedy, Jarrow .....	£5,130 12 0
Wm. Scott, South Shields .....	4,895 3 7½
R. Brown, South Shields .....	4,519 1 2½
J. Young, South Shields .....	4,398 15 7
F. Mackey, South Shields .....	4,147 13 4
R. Napier, South Shields .....	4,008 2 9½
R. Allison, Whitburn .....	3,987 10 0
Hudson & Co., South Shields .....	3,750 10 8
Atkin & Co., South Shields .....	3,827 0 0
R. Wilson, South Shields .....	3,240 10 0

**SOUTH SHIELDS.**—For alterations and erection of two shops at Nos. 1 and 2 Victoria-terrace, South Shields, for Mr. W. Gosses, M.D. Mr. Henry Grieve, A.R.I.B.A., architect, South Shields:—

B. Sheriff .....	£250 0 0
J. Gillman .....	539 10 0
R. Atkin & Co. .....	498 0 0
W. Scott .....	467 3 0
N. Napier .....	430 10 0
G. Goldard .....	429 4 0
J. Ayre .....	408 0 0
Goodwin & Son (accepted) .....	399 10 0

[All of South Shields.]

**TOTTENHAM.**—For making-up, &c., Bramar-road, for the Local Board of Health, Tottenham:—

Nicholls, Wood Green .....	£247 0 0
Rendall, Walthamstow .....	458 1 10
Bloomfield, Tottenham .....	492 15 7
Trickett & Son, Millwall .....	395 0 0
Adams, Kingland .....	391 0 0
Griffiths, Kingland .....	375 0 0
Bradshaw & Co., Tottenham (accepted) .....	341 11 2

**WESTON-SUPER-MARE.**—For the second section of work to three houses in Wallingford-road, for Mr. R. Fear. Messrs. Barker & Cross, architects:—

Vowles .....	£300 0 0
Durston .....	290 0 0
Williams .....	282 12 10
Pollard (accepted) .....	265 0 0

**\* \* SPECIAL NOTICE.**—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 49, Catherine-street, W.C., not later than 12 Noon on THURSDAYS.

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M. & Sons (your letter seems to be practically an advertisement of a special form of fire extinguisher. For that our advertising columns are open).—H. T. G. (Banks).—F. & B. B. & Sons (your letter is not one that we can print, a great deal of it being entirely uncalculated for anything in the letter to which it professes to be a reply).—T. S. M'C.—J. E.—W. W. (we do not think the architectural profession will accept you as their champion).

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# The Builder.

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SATURDAY, NOVEMBER 2, 1887.

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### Christian Symbolism in Great Britain and Ireland.



HERE has been for a long time a want of a work treating on the Early Christian symbolism of the British Islands, and antiquaries were therefore much gratified when it was known

that the subject had been selected for the Rhind Lectures in Archaeology for 1885, and entrusted to the pen of Mr. J. Romilly Allen, F.S.A. Scot., who had already given proof of his ability to deal with the subject in a manner befitting the needs of the work. These lectures have just been published,\* with numerous illustrations from the author's own drawings, and the work appears before the public with the merit of being unique, concise, and comprehensive. In his first lecture, Mr. Allen treats of the Christian symbolism in foreign countries, by way of clearing the ground for the introduction of the true scope of the design. He defines symbolism as a means of conveying ideas and facts to the mind by representations which are, in the first place, merely pictorial, but by frequent repetition, gradually assume certain stereotyped or conventional forms. Hence it is a system whereby pictures of natural objects, or scenes of which the historical aspect is well known, are made to express allegorically something beyond the apparent fact, and thus set in motion a train of thought which leads us on to the contemplation of those abstract ideas associated more or less directly with the thing depicted. In this way, every religious representation may, in fact, be symbolically treated.

In the early days of art, however, the subjects selected for symbolical reference by the primitive art-workers were naturally limited, and perhaps there were hardly more than a dozen scenes in the life of Christ which found favour in their eyes. If these early and prominent subjects were classified, they would properly fall into several divisions, such as the Historical (chiefly Old Testament history), which symbolise events in the life of Christ, as the sacrifice of Isaac or Moses striking the rock; the Parabolic, already in their very essence used figuratively, and hence merely a transference from literature to art, as the allegorical story of Dives and Lazarus; and so forth.

\* Early Christian Symbolism in Great Britain and Ireland before the Thirteenth Century. "The Rhind Lectures in Archaeology for 1885." By J. Romilly Allen, F.S.A. Scot. London: Whiting & Co., 30, 32, Sardinia-street. 1887.

The Mystic and Supernatural subjects depict, for example, the Day of Judgment, the Binding of Satan, and the Jaws of Hell. Rites and Ceremonies, the Church and her Officers, form another class. The moral and spiritual life of man, the virtues and vices, the conflicts between Good and Evil, the Deadly Sins, and Death itself, comprise another section. Then follow the subjects suggested by the properties of the animal, vegetable, and mineral world, such as the qualities of birds, beasts, fishes, gold, &c., applied in a spiritual manner to Christian doctrines. To these follow the subjects connected with the universe, and with the progress of nature, as the seasons, the Zodiac, the heavenly bodies, and other personifications. Human pursuits, and subordinate objects taken in lieu of the subjects to which they belong,—as the key for St. Peter and the sword for St. Paul,—and monograms, close the list.

If we arrange these things according to their literary sources they fall into the following divisions:—Pagan prototypes adapted to Christian teaching, as the myth of Orpheus applied to Jesus Christ, or the ancient gems engraved with portraits of deities and emperors set in Mediæval rings with Christian inscriptions; Scriptural subjects, which are usually selected from the most prominent features of the faith; Apocryphal subjects, derived from the uncanonical books, which, on account of the attractive philosophical and moral apophthegms they contained, were, nevertheless, greatly admired and frequently quoted in the early Mediæval period; subjects from the lives of the saints, which are, however, rare at the early periods; and, lastly, the scientific subjects, such as those found in the "Bestiaries," or illustrated works of emblematic zoology, so favourite and yet so grossly misunderstood a science in the days of which Mr. Allen takes cognisance.

There are numerous contemporary remains, one might almost say an inexhaustible field, capable of supplying examples to the student of Early Christian symbolism, and, indeed, the only profitable way to understand this symbolism is to examine the literature of the period, and to search contemporary illustrated manuscripts, which alone give the clue to the conventional method of treating particular subjects, and alone enable us to divine the actual ideas of the artists who designed them. The rudeness of the execution of some of the earliest Christian sculptures is shown by Mr. Allen to have been a stumbling-block to many inquirers, who have failed to interpret accurately (as well they might) the meaning of some subjects, by not making sufficient allowance for the want of art-training in remote places and distant times. These

sculptures, like the debased designs on ancient British and Gaulish coins, were copied, barbarously enough, from well-executed classical models, and are often quite as unintelligible as the coins themselves are, until placed side by side with the originals, when the meaning is quite apparent.

The sources of chief importance for the general study of Christian art are, first of all, the paintings on the walls and roofs of sepulchral chambers in the catacombs at Rome; the sepulchral tablets bearing Christian symbols, the sculptured sarcophagi, and the minor objects found in the catacombs. These, which are of paramount importance in this behalf, range in date from A.D. 50 to 400. The peculiarities of Christian art which these catacombs enshrine have frequently been treated of in illustrated works. One of the best and latest is perhaps the new edition of Mr. William Palmer's work on the subject. But we are inclined to believe that as yet sufficient attention to these splendid remains has not been given by those who seek to explain our own earliest national phases of sculpture and illustration. Mr. Allen gives, under this branch of his work, a capital and lucid description of the catacombs and their contents, and here it may be said that we hardly yet properly value the labours of Bosio, Fabretti, Seroux d'Agincourt, and De Rossi, who indefatigably devoted their time and attention to the exploration and explanation of what was in their day a new and unknown branch of archaeology.

From A.D. 400 to 700 we must rely on the second source,—that, namely, of paintings and mosaic work employed in the decoration of the internal surfaces of ecclesiastical buildings in Italy and the Eastern Empire,—the sarcophagi deposited in the basilicas at Rome, Ravenna, Milan, Arles, and elsewhere,—the early ivories, the miniatures in the Latin, Greek, and other manuscripts, engraved gems, coins, crystal objects, and other minor relics. A third period, 700 to 1050, is illustrated by the decorations of churches as before, added to which must be mentioned the pre-Norman sculptured crosses in Great Britain, miniatures in contemporary manuscripts, and some objects, such as belt clasps, which the Burgundian graves have yielded up to reward the patience of the explorer. The last period of which Mr. Allen takes notice, A.D. 1050 to 1200, when the Byzantine style finally retires before the Gothic advance, is more richly endowed with greater variety of objects. Subsidiary portions of churches, as fonts, pavements, capitals of columns, friezes, sculptured alabs, stained-glass windows, ornamented doors, pulpits, screens, shrines, and a vast number of relics, all intimately connected with the church



lend their aid to the student; but almost all of these betray the manifest stamp of imitation of older examples by reason of the conventionalism with which they are replete.

One of the many interesting phases of catacomb art is the admixture of Pagan idea and treatment with the Christian element or motive. This Mr. Allen accounts for in two ways: firstly, the necessity of disguising Christian doctrines during the times of persecution; and, secondly, the difficulty of creating a new system of symbolism without founding it, to a certain extent, on what had gone before. To the former fact it is owing that the elegant and attractive subject of Orpheus charming the beasts with his lyre occurs three times under circumstances which point to its symbolical application to the Saviour's word softening the hardness of Pagan hearts. The representation of the Good Shepherd has, again, been compared by some to the statues of Hermes Kriophorus. Of Old Testament types the most striking and the most tragic are alone selected by early Christian sculptors. Hence occur:—The Temptation of Adam and Eve; Noah and his Ark; the Sacrifice of Isaac; Moses striking the Rock; Moses and the Burning Bush, typical of the Christ delivering sinners; Daniel in the Lions' Den; the three Children in the Fiery Furnace; Jonah (in four scenes); and David with a sling. Similarly, too, the New Testament subjects are by no means numerous. Those most frequently occurring are the Raising of Lazarus, who is generally upright and swathed with bandages, in a niche, with pediment and side columns, almost reminding us of the conventional appearance of the mummified Osiris (typical of the defunct person to whom he is likened) in Egyptian art, whose myth, indeed, has some points in common with the symbolical aspect of Lazarus: the miracles of Changing the Water into Wine, the Loaves and Fishes, Healing the Blind, the Paralytic carrying his Bed, the Feast of the Seven Disciples by the Sea of Tiberias, and St. Peter saved from Drowning. Other subjects, not so frequently found, include the Virgin and Child, the Adoration of the Magi, Herod, St. John baptising Christ, the Wise and Foolish Virgins, and some others.

Of early Christian gilded glass, the British Museum contains several specimens, which will be seen to the best advantage when Mr. Franks opens to the public,—as we hope he will before long,—the new Gallery of Glass and Fictilia, which will prove to be one of the most attractive fine-art additions to that institution. Several inscriptions occur on these relics, one of the most common being "Pie Zeses," a Græco-Latin salutation of "Drink, and long life to thee." Some, at least, of these are said to have served as ministerial chalices, and the inscriptions would then refer to the Eucharist. Those with stains of blood on them are believed to have contained the blood of the early martyrs scooped up at the scene of execution, and piously deposited in the catacombs by their friends; at the same time, it must be borne in mind, although Mr. Allen does not appear to allude to it, that very similar inscriptions are found on Romano-British pottery used for purely convivial purposes; as "Bibe," "Bibamus pie," "vive," "vivamus," "sece," "ito," and so on.

The sculptured sarcophagi in the Lateran Museum have contributed many valuable scenes from the Old and New Testaments. It is curious that while the miracle of the Loaves and Fishes occurs twenty times on these sculptures, and the apprehension of Peter as often, there are only single examples of the Nativity of our Lord, and of the Bearing of the Cross. The Temptation of Adam and Eve, and Daniel in the Lions' Den, occur each fourteen times; Jonah's story, twenty-three times; Moses striking the Rock, twenty-one times; but the Passage of the Red Sea,—no doubt a difficult subject to represent,—only once. The ancient Christian ivories, in like manner, contribute other scenes to make up the tale of Biblical allegories. The best known is probably the

"Franks Casket" in the British Museum, of Scandinavian art, bearing Runic inscriptions, and representations of the Adoration of the Magi, and the Flight of the Jews from Jerusalem.

Manuscripts are so rare at this early period, and the material of which they consist so frail compared with stone, gems, metals, or ivory, that it is not to be wondered at that this class of relics does not contribute so rich a harvest of early Christian pictures to the consideration of the inquirer. There are two Greek MSS. of Genesis, one at Vienna, and the other, much injured by fire, at the British Museum, which between them originally contained nearly 300 miniatures, whereas the Greek Gospels seldom contain any pictures beyond portraits of the Four Evangelists. The Alcuine Bible of the ninth century; the Bible and Psalter of Charles the Bald, of the ninth century, at Paris; the "Codex Aureus" of the same date in the British Museum; the Oxford Cadmon; the Book of Kells; the Duke of Devonshire's Æthelwold, and a few others, belong to this class; but Mr. Allen has curiously enough omitted to cite in this part of his work the Utrecht Psalter, which some have attributed to the sixth century, a literary connecting-link between England and the Continent of high antiquity and remarkable interest, not only for its history and palæographical value, but for its profuse illustrations which bear upon early Christian symbolism.

Mr. Allen's second lecture treats of the symbolism of the Romano-British period and of the Celtic sepulchral monuments, between A.D. 50 and 400. Of the few Christian relics of this period Mr. Allen gives good notices. The cross on the lid of a sarcophagus, found in 1869 during excavations on the north side of

small; a silver bowl, two pewter cakes, a piece of Samian ware, a terra-cotta lamp, and a few similar objects, make up the total on which the whole argument for Roman Christianity in England rests. Christianity, if indeed it were introduced in Roman times among us, must have made little or no progress in those times. Celtic sepulchral monuments, on the other hand, abound with Christian evidences, chiefly the *Chi-rho*, or sacred monogram of the name

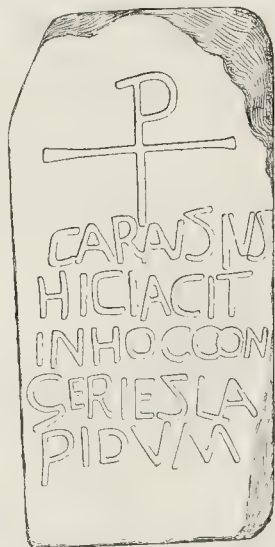


Fig. 2.

of Our Lord, fig. 2, as on the tombstone of Carausius, at Penmachno, co. Carnarvon, measuring 1 ft. 10 in. by 11 in. No one can doubt the remote antiquity of this stone. Many others could be cited, and the author has gathered up numerous examples of early ornamental crosses on sepulchral stones of the Celtic age, as, for example, the six kinds figured by him from slabs at Clonmacnoise; the latter illustration shows what is known as the "window-frame" pattern. Among other conventional remains of the period none yield in interest to the so-called "hog-backed recumbent monuments," found in Scotland and northern England, but not elsewhere. The precise symbolism of these does not appear to be yet clearly ascertained. It may, indeed, be questioned whether they are to be classed with Christian symbolic remains, seeing that they carry no determinative emblems, although they undoubtedly belong to a Christian period, for their ornamental features correspond with those of the sculptured crosses of the pre-Norman period. They are generally about 6 ft. long and 1 ft. 6 in. wide and high; those at Brompton, co. York (fig. 3), are good examples. There are some also, not mentioned by Mr. Allen, at Durham. The conventional form consists of a central ridge running the whole length of the stone, from which the sides slope away. It is highest in the middle, and so possess a "hog-backed" appearance, and the sides are ornamented with marks like scales or tiles. The most remarkable feature is that of the end, which takes the form of the huge head of an animal, or a muzzled bear's head and body. As there is no evidence of a strictly Christian character on them, as we have already said, may they not be a survival of a Pagan form of burial, existent archaically in early Christian times, but before the use of Christian symbolism on sepulchral stones had become universally imperative?

The third and fourth lectures discuss the High Crosses of Ireland and their subjects on shaft and base. These two essays occupy a large portion of the book, and form the best critical account extant on the subject. The rudeness of the design and work, the strict

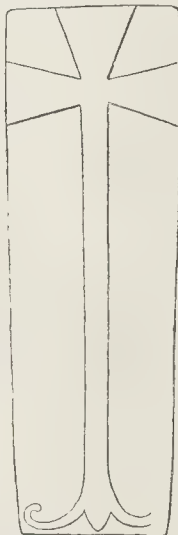


Fig. 1.

Westminster Abbey (fig. 1), with inscription in memory of Valerius Anandinus, is, by some, conjectured to belong to this period; but Mr. Allen inclines to believe that the sarcophagus and its cover, which seems not to fit in every respect, were appropriated by an unknown Christian, perhaps in the fifth or sixth century, at which time the cross was cut. Few, however, will deny the close similarity of the cross with those found, incised or in low relief, on tomb slabs of six hundred years later than the suggested date, and we fear that the evidence for early Christianity in England resting on this relic must be received with very great hesitation. The number of sepulchral remains belonging to the period of Roman occupation which show any Christian traces is, as the author declares, infinitesimally



Fig. 3.



Fig. 4.

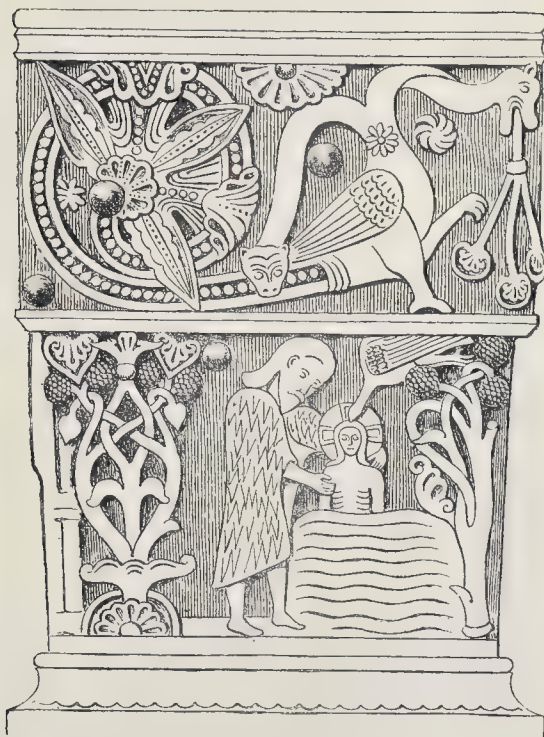


Fig. 5.

conventionality they exhibit, the peculiar feeling which they indicate, may be well gathered from two corresponding designs of the Sacrifice of Isaac (fig. 4); the first on the arm of the Cross of St. Patrick and St. Columba at Kells; the latter on the shaft of the Great Cross at Monasterboice. This type, with but little alteration, lingered on as late as the eighteenth century in some parts of Scotland, and Mr. Allen figures a stone dated 1774, in Logierait churchyard, co. Perth, the sculptor of which has evidently drawn inspiration from, but not improved upon, the first ideas of the Celtic designs. As other examples of this class of art we may mention Daniel in the Lions' Den, the Flight into Egypt, and the Miracle of the Loaves and Fishes on the base of the Moone Abbey Cross, as characteristic of Early Christian symbolism as taught by the Irish Church in the early period under review. There is one subject which Mr. Allen has not clearly explained. It is a bird holding a circular disc in its beak coming down between two persons holding crooked staves, which occurs twice at Kells and once at Nigg, Ross-shire, where the staves are exchanged for open books. The author thinks that this refers to St. Paul and St. Anthony breaking bread in the desert; but the idea is obscure and too far-fetched. It is probably representative of an episode in the life of a Celtic saint. It is not unlikely that this refers to St. Hilda, of Whitby, and St. Aidan. In the seal of Whitby Abbey, in the British Museum, St. Hilda, with staff and book, stands between two tonsured priests, each celebrating the Eucharist with a chalice on an altar. Over each cup is a bird flying down, and holding a round disc, intended for the wafer, in its beak. Examination of the life and miracles of St. Hilda would no doubt throw light on this subject.

Passing over much that is worthy of notice among these Irish symbolics, we find the fifth lecture devoted to the consideration of Norman sculpture, chiefly in the architectural details of churches, from A.D. 1066 to 1200. This is a truly vast field, and really deserved a separate treatment in another volume. It is here introduced with a prefatory examination of Saxon architecture and details of sculpture, and, of course, can only deal with a limited number of the extant specimens. How striking some of them are may be gathered from one example here given, the Baptism of Our Lord, on the font at Bridekirk, Cumberland. There is a Runic inscription on the font, and the peculiar treatment of the foliage points to the eleventh century for the time of its execution (see fig. 5). Of a later date, but of equal interest, is the Norman leaden font with zodiacal signs and monthly employments in Brookland Church, Kent. These subjects should be compared with those found so frequently in manuscript calendars.

The concluding lecture deals with the *Medieval Bestiary*, or Book of Emblematical Animals, so favourite a work in the libraries of old. There are several specimens in the British Museum, nine among them illustrated, as we gather from Mr. Birch's and Mr. Jenner's "Catalogue," and Mr. Allen's list of all the extant MSS. will be of great use to future inquirers. The texts of many have been published, and probably the "Bestiaire Divin," by Hippeau, Caen, 1852, is the most comprehensive work on the subject, but the whole subject awaits comparative and classified treatment. The symbolism which encircles most of the animals in the somewhat limited and fanciful list of *Medieval fauna*, is not difficult to be conjectured; but there are some more abstruse subjects, as the *terrobolem*, or *turrobolem*, two stones which emit fire, that are found in the East on a mountain, one male, one female, and of human semblance, which almost savour of the marvels told by Mandeville and his precursors. These two stones typify firstly the love between the opposite sexes, but metaphorically, those who wish to lead a life of chastity, are hereby enjoined in the accompanying descriptive text to avoid the society of women, and thus escape the temptations which ensnared Adam, Samson, David, and Solomon. These curious subjects occur also on a font at Alne, in Northumberland. The work closes with full



indexes. It fills a want in our antiquarian art literature in a very praiseworthy way, and Mr. Allen will no doubt receive what he really deserves, much credit and advanced reputation for this his latest contribution to archaeological literature.

## NOTES.

**T**HE last number of the *Journal of Proceedings of the Institute of Architects* contains an appeal, signed by Mr. Richards Julian, on behalf of the "Dictionary of Architecture," recalling the circumstances of its foundation, and mentioning that it is necessary to appeal to the old members as well as to new subscribers for funds to complete the work. The unsatisfactory nature of the last volume we have already referred to, and it now appears from Mr. Julian's letter that the whole of the literary matter is at present furnished by Mr. Wyatt Papworth, who was always editor, and appears now to be the sole survivor of those who originally contributed to the Dictionary. Now, with no possible unkindness or disrespect to Mr. Papworth, it is surely only reasonable to point out that no one man can write a dictionary of such a subject as Architecture; and that this is not the method on which an adequate dictionary could possibly be produced. A first-class dictionary of this kind can only be produced by the co-operation of many writers, each treating of the subjects he knows most of, and controlled by a competent and far-seeing editor, who knows what men to go to for each class of subject, and has sufficient general knowledge both of architecture and literature to control and keep up to the mark the whole form of the Dictionary, and to see that scientific and other definitions are given in logical and intelligible language. To suppose that any one man can be editor and all the contributors rolled into one is to suppose what is absurd, and what can only lead to such unfortunate results as those we pointed out in reviewing the new volume of the Dictionary two or three weeks ago. A certain class of articles, such as that on *Serlio* (which is reprinted, as a "specimen," we presume, in the *Institute Journal*), have been done by Mr. Papworth as well as they could be done; we must be grateful for them; they are a class of articles which require a great deal of laborious research; but if Mr. Papworth is wise he will on his own account decline for the future to represent the whole staff of the Dictionary: the position is neither fair to himself nor to the Dictionary. Then we are told in said paragraph in the *Journal* that this state of things was rendered necessary by the decease of the old contributors (a brilliant staff undoubtedly), and that it was found "impossible to replace them." Has any effort been made to do so? We very much doubt it. And does Mr. Julian really expect us to believe that it would not be easy to find men who could furnish better articles than those on Suspension Bridge, Syphon, and others, the absurdity and even absolute incorrectness of which we pointed out the other day? If an appeal is to be made for fresh subscriptions to complete the Dictionary, we hope that the appeal will be met by a refusal of any further aid until the working out of the Dictionary is placed on such a footing as to ensure a very different result from that presented to us in the volume just completed.

**I**T is gratifying to find that the strike at Bolton has terminated in an agreement on the part of masters and men to refer their dispute to a "Board of Conciliation," who are to take evidence upon the rates paid in other towns, and draw up a scale for the Bolton men; but it is a sad reflection that both sides could not agree to a measure of that kind before costing each other this loss of time and work and money, and on one side distress and poverty, which in the case of many will not terminate with the strike. We read in the daily papers that "in consequence of the employers importing men during the struggle, not more than half of the strike hands can find work"—a bitter lesson which, however, to judge by the past, we fear will be read in vain.

**D**R. SCHLIEMANN has obtained from the Greek Government permission to make excavations in the island of Cerigo, the ancient Cythera. It would be too much to hope that he will discover the ancient wooden statue of the goddess Aphrodite in complete armour which Pausanias saw when he visited the island, but unless time has dealt very unkindly with the remains of the temple he will surely be able to restore to us some notion of the plan of this the most ancient precinct of the goddess on Hellenic ground. This temple of "the Heavenly Aphrodite" was, Pausanias says, at once the most ancient and the most holy of the Greek temples to Aphrodite. Further, we may hope at Cythera to come upon many a missing link between East and West. It was an early Phœnician settlement. "The temple of Cythera," says Herodotus (i. 105), "was built by the Phœnicians who belong to this part of Syria,"—i.e., to the part about Ascalon, "where was the earliest of all the temples to the Heavenly Aphrodite." The excavations are to be begun at once.

**O**N the agenda paper for this week's meeting of the Metropolitan Board of Works we see that Mr. F. H. Fowler has given notice of his intention to move:—

"That it be referred to the Works and General Purposes Committee to consider and report on the desirability of the Board proposing the following amendments of the law relating to buildings and streets:—

"That the open space now required by law to be left at the rear of dwelling-houses should be increased, so far as regards suburban districts.

"That a greater width than 40 ft. should be required for new streets in suburban districts.

"That owners of land, when laying the same out for building on a large scale, should be required so to arrange as that a suitable proportion of the land may be left open and unbuild upon in the interest of the public health and comfort."

There is very much to be said in favour of these proposals, as thoughtful people who have witnessed the "development" of suburban building estates must have been long ago convinced. Particularly is this so with regard to the melancholy fragments of ground which, when attached to suburban houses, are called "gardens," albeit they are gardens in which, for want of sun and air, nothing will grow. The way in which what are called the "back-additions" to houses are often made to jut out over the greater part of the so-called "gardens," throwing each other into the shade, and preventing the free access of sunshine and wind to the windows of dwelling-rooms, is something like a satire on our much-vaunted sanitary knowledge. Such houses may comply with the letter of the law, but they evade its spirit.

**T**HANKS to Mr. Ellis Lever's importunity, the miners of Great Britain appear likely to be provided at last with a safer light than they have had all these many years. Although the coal-owner of old times would have been horrified to find that the Davy lamp, by which he set such store, was now condemned as useless, together with several others, such as the Clanny and the Museler, none of these in point of fact gave enough light, and were not safe in meeting an explosive current with a velocity of 6 ft. per second. The new Act, which has been framed with great care, forbids the use of any lamp which will not meet this not uncommon emergency; and this difficulty is claimed to be solved by the Edison Company, which has produced a miner's portable electric lamp, giving comparative safety, and a great increase of light. It must not, however, be expected to insure complete immunity, for the circumstances of each mine differ so much in themselves,—for while naked lights may be used in one without danger, another is so fiery that it is impossible to enter it without safety lamps. Nor must we overlook the tendency of many colliers to unlock the old lamps for the purpose of getting more light. So reckless were some of the men, that false keys made of hard cheese-rind have been found in the pockets of the dead after an explosion. Against such rashness there was no remedy, except the invention of a new lamp which should not offer any temptations for tampering with it.

**T**HE Cambridge Senate has entered into a contract with Messrs. Luscombe for the proposed new buildings of the University Library. The contract price is 13,685*l.*, of which amount 400*l.* is to be expended upon sculpture. The existing library is stored in the upper floors of two quadrangles on Senate House-hill, between Cains and King's, and close to the ancient sites of Milne-street (now represented by the Trinity Hall and Queen's lanes), the church of St. John the Baptist, and the hostels of St. Edmund, St. Austel, and St. Nicholas. The fabric dates from the middle of the fifteenth century. There is extant a highly-interesting list, drawn up in the year 1473, which gives the then classification of the books, and shows the positions of the stalls and desks along the first floor of the southern side of the older quadrangle that overlooked the already-appropriated site of King's Chapel. Thomas Rotherham, Archbishop of York, a bountiful benefactor in kind to the library, erected circa 1475, the Gothic front which appears in the print by Logan. That frontage was replaced with a Classical order about 170 years ago, but its central gateway was preserved and reconstructed for the stable at Madingley Hall, near to Cambridge. This alteration, together with others, was effected to make room for King George I.'s gift to the University of the 30,000 volumes which he had bought for 6,000*l.*—the library of Dr. Moore, Bishop of Ely. The sovereign's donation evoked the well-known epigram in connexion with Oxford and the troop of horse together with Sir Thomas Browne's equally famous rejoinder. Under the catalogue room were held the Divinity Schools, removed, in 1879, to the Selwyn Divinity School building over against St. John's, and designed by Basil Champneys. The library was enlarged twenty-one years ago, at a cost of nearly 15,000*l.*

**F**OLLOWING the example of the managers who collaborate with authors in the production of dramatic pieces, Mr. Henry Irving has collaborated with Mr. Alfred Darbyshire of Manchester, and designed, in conjunction with him, what is, if we may believe the *Daily Telegraph* (which is absurdly effusive on the subject), an absolutely safe theatre. There is very little that is novel in Mr. Irving's theatre, a ground-plan and section of which, to a scale of 32 ft. to an inch, is given in the *Daily Telegraph* for October 29th. The only noticeable novelty is the abolition of the gallery, the audience usually occupying that part of the house being placed on the ground-floor in the rear of the pit. There is only one tier of horizontal division for the accommodation of the public above the pit level, and this is divided into an upper circle and a lower circle. There are two means of exit from every part of the house, and these exits, with the exception of the exits from the upper and lower circle, are arranged on opposite sides. The theatre is detached upon all four sides, which may perhaps represent an ideal theatre, but it is one that is difficult of realisation in London, and, indeed, in most cities, and by imagining the site to be entirely disengaged from the adjacent buildings, many of the difficulties which beset an architect in designing a theatre are evaded, but not successfully overcome. There is a general deficiency of lobby accommodation, which would render the exits, especially from the dearer portions of the house, liable to be obstructed on the audience leaving the theatre.

**I**N connexion with the consecration of Truro Cathedral, which took place on Thursday, the 3rd inst., we have received a small sheet of diagrams forming a key to the scheme of subjects represented in the coloured windows executed by Messrs. Clayton & Bell. The diagram gives the outlines of the great east window, consisting of three long lancets with three shorter ones beneath, the two rose-windows in the transepts, the little lancet lights under the south transept rose, the single lights in the east of the two choir aisles, the four lancets in the baptistery, and of one of



the double two-light late windows in the old church, now called the old choir aisle. The subjects of the east window are "The Church Triumphant" in the upper division, and the life of Our Lord in the lower one. The former is represented by Our Lord in majesty, with the seven gifts of the spirit over his head, while beneath and around him are grouped archangels, the Blessed Virgin, the Holy Innocents, patriarchs, apostles, martyrs, prophets, and The Church. The Gospel story is told in the time-honoured and obvious way by representations of the chief incidents, among which the Nativity, the Crucifixion, and the Resurrection of course have the chief places. The north transept window is called the "Root of Jesse," and is genealogical. The Virgin and Child occupy the centre, round which twenty-four of the earthly ancestors of the Messiah are grouped. The chief places are given to Jesse, David, Solomon, and Rehoboam, the older patriarchs coming next. The south rose window is called "Pentecost," and represents the Holy Spirit in the form of a dove, surrounded by Cherubim and Seraphim, and by the twelve Apostles. In the three lancets under it present incidents in the early history of the Church, commencing with the stoning of St. Stephen and ending with the entry of St. Augustine into Canterbury. In the baptistery windows St. Paul, St. Cybi, St. Constantine, and St. Winnow represent respectively the Church, the Priest, the King, and the Ascetic, the lower divisions of the same windows being devoted to scenes from the life of St. Martin. The two single lights at the ends of the choir aisles are devoted to St. Stephen and St. John the Evangelist respectively.

THE Society of "Painter-Etchers" (a foolish title, the real meaning of which is merely that they are etchers of original subjects and not of other people's pictures) opened their sixth annual Exhibition at 160, New Bond-street, this week. The Exhibition is rather smaller numerically than in some previous years. In other respects it is fully up to its usual level. As usual, there are a good many works which seem to outstep the true province of etching, and show efforts to work up etching after the semblance of engraving; which is only doing what engraving can do with more force, brilliancy, and permanence. The essential powers of etching lie in the great freedom for which it affords scope, and in contrasts,—broad contrasts,—of light and shadow, not weakened by over-working; and though many of the elaborated works show great diligence and delicacy, we confess that we have more pleasure in etchings pure and simple, according to the old creed, where a few free lines and touches are made to mean a great deal. The elaborated etching appeals to the eye; the pure line etching to the mind. As examples of the latter kind of work we may mention Mr. Short's "Shore Entrances, Bosham" (28); Mr. F. Slocombe's "Pastoral Farm" (67); Mr. Short's "Staithe" (133); and Mr. Pen-nell's "Chelsea" (153). The last-named artist gets a brilliant and powerful effect, in the true spirit of etching, in his "Trafalgar Square" (95), in which the opposition of light and shadow is very strikingly arranged, and the column and statue become little more than a dark silhouette against the sky; the only way perhaps, artistically, to remove it from vulgarity. There are a considerable number of architectural drawings, to which class of subjects Mr. C. O. Murray is a large and laborious contributor; and though his numerous works,—the "Pretence Pillar, Roslin" (73), "Edinburgh Castle from Grass Market" (79), "Durham Cathedral" (87), &c.,—hardly exhibit genius, they show artistic feeling, an eye for effect, and conscientious workmanship; the Edinburgh Castle, with the castle showing light above the dark old houses of the Grass Market, is the finest. Mr. A. H. Haig's "Return from the Fair" (48), a very large etching, showing a scene in an ancient town with an old Gothic bridge making a great mass of light in the middle of the picture, is a very powerful thing; Mr. C. J. Watson's "Whitefriars Bridge, Norwich" (50),

and Mr. J. Watkins's "Ponte de Canareggio, Venice" (53), are also fine works of similar type. Mrs. Harry Hine's "Durham" (33) should be looked at. There are a certain number of wonderfully soft-looking pictures which get much of their half-light from dirty stains over the ground, which we do not call true etching, though this is what at once takes the fancy of the uninitiated. Mr. Strang's portraits (20, 22, 23) are good examples of true etching portraiture, the modelling being obtained almost entirely by lines in one direction without cross hatching, a method of representing modelling of surfaces which is admirably adapted to give freedom of effect and retain the appearance of light, and which seems peculiarly adapted to etching; in engraving it would have a somewhat hard and unfinished effect. The President, Mr. Seymour Haden, does not exhibit this year.

WE have received an announcement of an intended exhibition, to be held in London next year (date and place not yet given), of appliances for safety against fire, water, and burglars, or, as it is rather ungrammatically headed in the circular, a "Fire, Water, and Burglar Proof Exhibition." The architects of the country, and especially those devoting their attention to the construction of theatres, will be invited to exhibit their models, "for which substantial awards will be given." The architects of the country, if they are wise, will probably wait to see under what kind of auspices the exhibition is to be carried out, and who are to make the "substantial awards." The thing appears to us rather like an attempt to make capital out of the recent frights people have had about fires. The addition of the contrivances for safety against burglars is an attraction of a separate nature, certainly. It will probably furnish an interesting and useful study to the gentlemen of that profession, and enable them to prepare fresh appliances to overcome the difficulties which an unsympathetic public is disposed to place in their way.

ALARMED by the deplorable loss of life at the Opéra Comique Theatre, Paris, the Italian Government has recently issued a circular to the various Prefects calling their attention to the urgent necessity of protecting the public from the risk of fire in theatres, and promulgating a new and much more stringent series of regulations with regard to the construction of such buildings. These regulations are simple, but effective, and go far beyond any rules that have hitherto been framed for that purpose. Theatre buildings must be entirely isolated on all sides, and have exits on every side opening into a public street. The pit must have at least three principal exits, one at the back and one at each of the sides delivering directly into the street. There must not be more than three tiers of boxes, exclusive of the pit tier, as a general rule, but if a fourth tier be constructed it must be provided with two staircases and two separate exits. A separate exit must be provided at the back of the stage leading directly into the street for the use of the performers. Two staircases and two separate exits must be provided for the three tiers of boxes, distinct from the other staircases and exits. The staircases and exits should be wide and commodious, as well as the corridors, and all doors should open outwards. These regulations are to apply to all new theatres, as well as to those which are substantially rebuilt. The ends aimed at are excellent, but are they always possible? and will not the requirement of isolation of the site prove in some cases practically prohibitory?

THE exhibition of drawings and sketches at 160, New Bond-street, under the title, "Summer Time on the South Coast from Rye to Penzance," by Mr. C. Gregory, contains some pretty drawings, but is hardly of that amount of interest to justify a special and separate exhibition. The fashion for "one-man" exhibitions is developing, but it ought to be understood that rather high powers are required for an artist to render a gallery attractive by an exhibition of his own sketches

only, and that it is not given to every one to achieve this.

THERE is another exhibition of Mr. Ernest George's water-colour sketches of architectural subjects at the Fine Art Society's Gallery, which is, if anything, better than the last one (from an architectural subject point of view, *bien entendu*); more equable in style. This artist has acquired great freedom and facility in the representation of architectural scenes in water-colour, in a manner which is sketchy, but with sufficient indication of detail, and in which a complete balance of effect is preserved, which we thought was not always the case in the former exhibition of his drawings in the same room. It is hardly necessary to pick out any drawings for special mention; the interest of the subject and the merit of execution is so very equable: Mr. George never rises above what may be called architectural sketching, and never falls below a high point of excellence in that. The collection makes, independently of its artistic merit, a very good comparative collection of picturesque architecture, worth the study of all who are interested in the subject.

TERRIBLE things seem to have been happening at the Grosvenor Gallery, as shadowed forth in a correspondence printed in the *Times* of Wednesday, between Mr. Alma Tadema, Mr. Burne Jones, Mr. Comyns Carr, and Mr. C. E. Hallé. The latter two gentlemen, as every one knows, have been for a long time officially connected with the Gallery, but it appears from the correspondence that Sir Coutts Lindsay has been pursuing, or has shown an intention to pursue, a course which is "at variance with the dignity of art," and Mr. Hallé and Mr. Carr will have none of it, and print letters from Mr. Tadema and Mr. Burne Jones to say that they are quite right. This is followed in Thursday's *Times* by a lofty rebuke in the "Grand Seigneur" style from Sir Coutts Lindsay, who implies that his "salaried assistants" have been endeavouring repeatedly to make demands on him to which he could not accede, "accompanied by threats of resignation," and to his regret he has been "obliged to sever the connexion." All this is mysterious and puzzling to the outsider. According to Messrs. Carr and Hallé, they have left Sir Coutts; according to the latter, he has left them; but neither of them gives any hint of the nature of the artistic heresies which have led to this melancholy disruption of ancient ties. Is it Vereshagin that has vexed the souls of the believers? We are not told. The result will probably be a gain to the Royal Academy exhibitions, as far as Mr. Burne Jones and Mr. Tadema are concerned. But where will Mr. Hallé get his pictures hung?

#### LETTER FROM PARIS.

THE rules which govern the Corps des Ponts et Chaussées in France are as those of the Medes and Persians, and no engineer, whatever his standing and position, can override them. Consequently it comes to pass that M. Alphand, who has for some time held the position of Inspecteur-Général of the First Class, having on the 27th of October attained the age of seventy, was the same day placed "en retraite," in virtue of the rule to that effect. But inasmuch as this indefatigable worker is still, in spite of his age, full of energy and activity, the Government has departed from its rule so far as to retain him in an irregular fashion, "hors cadre," as "Directeur des Travaux," and General Director of the Exhibition works, and a unity of administration is thus assured for the present, in municipal operations.

At the Exhibition, the foundations of the Galerie des Machines are completed, and the piers for the Palais des Beaux-Arts and of the "Arts Libéraux" are to be commenced almost immediately. The domes of these two palaces have been commissioned from the "Société des Ponts et Travaux en Fer." In the "Palais des Groupes diverses," designed by M. Bonvard, the covering in and glazing are complete, and the complicated work of the Dome is being proceeded with. This will run to a height of 60 mètres.



The levelling up of the Champs de Mars is in progress, and the planting of trees has been commenced, in order that they may have time to grow and develop into a thick foliage by the year of the Exhibition.

The Eiffel Tower has been in check for a time, whilst the carpenters were getting up the scaffolding, of 42 mètres in height, which was to serve for the building of the arched supports. The base of each pier will shortly be surrounded with a facing of masonry, and the erection is now near the point when the metal bearers for the first platform can be riveted on. After that the scaffolding can be dispensed with, as there will then be the central point d'appui necessary for the erection of the main body of the tower.

The Ministry of Commerce has decided to institute a retrospective exhibition of labour and of anthropological science, which is to present a kind of complete tableau of the history of labour in all times and countries. An exhibition of this kind was vainly attempted in 1867 and in 1878; and it will certainly prove one of the curiosities of the Exhibition of 1889. It will comprise five divisions: anthropological and ethnographical science; liberal arts; art-work and handicrafts; methods of transport; and military art. A committee presided over by M. Jules Simon, and assisted by M. Ernest Renan, has been charged with the preparation and classification of this portion of the Exhibition; among the members of the committee is M. Charles Yriarte.

It had been intended to utilise as a "Salle de Spectacle" the space included between the four great piers of the Eiffel tower, but as this would shut out the vista of the central pavilion the idea has been abandoned, and it is now intended to erect a decorative fountain there, a model for which has been executed by M. de Saint-Vidal, a pupil of Carpeaux. This fountain will stand within a basin of 20 mètres diameter, with five faces accentuated by pedestals bearing statues symbolical of the five continents of the globe. In the centre will be a sphere around which will be grouped statues personifying "History," "Commerce," "Sleep," and "Love." What is the connexion of ideas in this oddly assorted group, it is not easy to understand; one thing is pretty evident, that by the year 1889 Paris will have become a kind of museum of allegorical and symbolical figures. On the sphere will be another figure representing "Night," reclining, and supporting on her right hand a genius who will carry a torch which will be lighted with electric light. The water will flow from among the rocks supporting the sphere, and fall in successive cascades to the basin below. The whole erection will be about 30 ft. high, and will be lighted up at night by variously-coloured electric lights.

Paris has now one more educational building, in the new college or "Lycée" for young girls, opened a few days ago in the Rue de Rocher, and called the "Lycée Racine." It has been built after the design and under the direction of M. Gout, who has produced a façade in the Roman style, sober enough in aspect, but not without elegance. The interior, which has accommodation for 300 pupils, has a fine principal staircase; the planning is good, and there is a successful application of enamelled brick for the decoration of the walls and ceilings of the schoolrooms.

The works in connexion with the Bourse de Commerce are now in active progress, especially the removal of the buildings adjoining the old Halle aux Blés, which is at present standing completely isolated. Amid the ruins of the streets demolished for the construction of the Rue du Louvre, the iron cupola of Legrand and Molinos rears conspicuously its great metallic structure, looking curiously like an enormous pigeon-house. New building is going on at a little distance from it; and, besides the Bourse itself, there are being erected, at each side of its main entrance, two large hotels, adorned with colonnades and galleries, giving accommodation which is much wanted in this crowded and central business quarter. These buildings have been designed so as to harmonise with the design of M. Blondel's central building; not like the new hotel at the Gare St. Lazare, about which we have already complained, and which has ruined the effect of M. Lisch's façade of the railway station, and blocked up a new open space almost before it can be said to have existed.

The Metropolitan Railway, which was believed to be dead, has arisen from its ashes.

M. Heredia, returned from England, is hastening to submit to the Council a new scheme, very doubtful in point of economy, as its cost will exceed by ten million francs that of the scheme already blackballed. As the new project is for an entirely subterranean railway, there will probably be a strong Parliamentary opposition to it, without counting the popular opposition of the Parisian public, who like light and air, and have no love for travelling through sulphur-laden tunnels like those in the neighbourhood of Baker-street and Portland-road.

Among works of smaller size, but not of less interest, we may notice the rebuilding of the fine stone staircase leading to the Chapel of the Cluny Museum. It is sufficient to add that this restoration has been confided to M. Boeswilwald to assure every one that it will be carried out with the greatest care and in a conservative spirit.

Among the many measures taken during the recess to protect the Paris theatres from a calamity like that at the Opéra Comique, may be mentioned the clever manner in which one of the 'most dangerous theatres in Paris has been transformed. We refer to the Palais Royal Theatre, which is now hardly recognisable. We are not speaking of all the compulsory modifications—electric lighting, iron curtain, hydrants, &c. We refer to what has been done externally. In place of the old sombre and mean-looking wall lining the Rue de Valois, and presenting no outlet, there is a brick façade adorned with mosaics, with two galleries on each story communicating with each other by permanent staircases from the roof to the first-floor level, whence a movable stair can be let down to the street level when needed. These stairs and balconies are treated in such a manner as to complete the general design, producing an effect certainly original and not displeasing. M. Paul Sédille was the architect for the alterations.

The crematorium erected in Père la Chaise, from the designs of M. Formigé, has excited a good deal of public curiosity. Until some special legislation authorises the process the crematorium will only be used for the destruction of hospital débris. The Four-Gorini system is employed; a corpse can be burned in two hours, leaving 4 kilogrammes (nearly 9 lb.) of ashes. As to the structure itself, the inauguration of which will take place shortly, the exterior decoration of it is hardly completed; and there is to be added to it a grand vestibule with a room for the reception of families. It has the form of a parallelogram in three stages, and is surmounted by two extract chimneys in white stone. At the back are three domes, each covering a crematory chamber; these rise above an entablature with a sculptured frieze. Bands of red stone are alternated with the white, and the principal façade is to be further decorated with black and white marble.

At Père la Chaise also, a monument is being erected to the caricaturist André Gill, who died some years ago, having enjoyed, in the days of the Empire, a reputation much beyond what his real talent justified. The monument is a very simple one, surmounted by a bronze bust of the artist, executed by Madame Larre Martin Coutan.

We have already mentioned that the Union Centrale des Arts Décoratifs have instituted three competitions, the first for painters, the second for sculptors, and the third for architects. The decision on these was given last month; the architectural competition has had the best results, and the Judges have asked that the premium of 2,000 francs, awarded to M. Houllier, should be raised to 3,000, and that the third premium, awarded to M. Maincent, should be raised from 1,000 to 2,000 francs. As to the painters' competition, the best design, that of M. Mazerolles, did not fulfil the conditions of the programme. In the section of sculpture, the jury premiated the designs of MM. Deloye, Faivre Lindeneher, and Cordonnier.

In the past month there have been two competitions at the Ecole des Beaux Arts, of which the most important, founded by the mother of the eminent landscape-painter Troyon, takes place every two years. On this occasion the prize has been carried off by M. Raymond Moisson, pupil of M. Paul Sédille.

Though writing of Paris we may mention here the competition concluded at Rouen a few days ago, for the erection of a monument commemorative of the Franco-German war. The first premium was awarded to M. Georges Chédanne

architect, and M. Benêt, sculptor; other premiums were also given.

The changes which we announced in the administration of the Beaux Arts have been effected. M. Castagnary has replaced M. Kaempfen at the head of this important "Service," and the latter has succeeded M. Ronchaud as Director-General of National Museums. If one may believe the current reports, M. Castagnary has come into office with his hands full of reforms. One does not think much of these "new broom" professions; we shall be content if he will only carry out the little reform of having explanatory notices affixed to the paintings and statues in the national museums; a little improvement which has been demanded for twenty years, to relieve visitors from the necessity of purchasing a costly and unwieldy catalogue.

The mention of this reminds us that the Municipal Administration of Paris have determined to place on the façades of public buildings, in a conspicuous manner, the names of the architects who have designed them, with the dates of their foundation and completion; a regulation which may prove in the end very useful in regard to the history of the public buildings of Paris.

An exhibition of modern engravings lately opened in the Georges Petit Gallery brings out the curious contrast between the works of the old French masters of the burin, such as Mantouille, Dupont, and others, and the engravers of the new school, in which "l'eau forte" predominates, and which has replaced the old mathematical regularity of hatching by a bold sparkle and play of light and shade of which the old Classic school never dreamed. Among the works of the older school that are exhibited may be mentioned some splendid plates by Pollet, who was also a master of water-colour and miniature; various engravings by Martinet after the pictures of Delacroix; the famous Hémicycle des Beaux-Arts, engraved by Dupont after Delaroche; views of Paris by Méryon, the lithographs of military scenes by Charlet and Raffet, and the humorous subjects of Gavarni and Daumier. Among the works of the new school are those of Charles Jacques, mostly animal subjects full of truth and life; the peasant scenes of Millet, the masterly works of F. Gaillard and Walther, the etchings of Bracquemond, and those of Lhermitte, who is as powerful with the needle as he is with the pencil. This collection is of real interest in its bearing on the history of the art of the last fifty years.

During the month two well-known painters have died. Hippolyte Lazerger had been producing for a long period an extraordinary amount of work. A great many of the provincial museums and art galleries possess pictures by him, among which we may cite especially the "St. Pierre" (Montpellier Museum), the "Chemin de Calvaire" (Orléans Museum), the "Vierge Intercédant" (Limoges Museum). He executed also some important religious paintings at Narbonne, Orléans, Nantes, Rouen, and Fontainebleau; and in Paris he decorated a chapel in St. Eustache Church, as well as a portion of the church of the Sorbonne. Lazerger was also a composer of music. As a painter he studied under David D'Angers. He received medals in the Salons of 1843, '48, and '57.

The painter James Bertrand, whose decease we have also to record, was better known in England than Lazerger. He had very fine talent, with a rather mannered style, and painted elegiac subjects of a pleasing but somewhat melancholy turn, and with a certain monotony of style and subject which ended in rather wearying the public of his works. He had received many medals in various Salons, and exhibited two pictures this year, "Mignon" and "Ste. Cecile."

We hear also of the death of M. Charles Léon Delalande, an architect of talent, designer of the Theatre of Cherbourg, and who built the Théâtre de la Renaissance at Paris in 1874, and that of the Nouveautés in 1879.

The "Service de Architecture" of the city of Paris has also lost one of its best members, Julien Hénard, formerly *censeur* of the Société Centrale, who has died after a long and lingering illness, leaving behind him the reputation of an able designer and a conscientious artist. He was a pupil of Hippolyte Lebas, and obtained the Prix de Rome in 1837, and received medals in various Salons at later dates. The Commission des Monuments Historiques possesses a large



collection of his drawings and studies. His last executed work was the new Mairie of the Twelfth Arrondissement (Bercy), of which, however, he had not the satisfaction of completing the Salle des Fêtes, which MM. Auguste Cain, Barrias, and Delaplanche are to decorate. This indefatigable worker died at the age of seventy-six, poor, but universally respected, and leaving to his son, M. Gaston Hénard (also an architect) the example of a blameless life, and an absolute disinterestedness which placed the objects of his art before all material considerations: one of the highest eulogies we can give to any artist.

#### LONDON WATER-SUPPLY AND REMOVAL.

The seventh annual number of Mr. Alfred Leas's analyses of the accounts of the metropolitan water companies fully keeps up the high character of that excellent summary. It is instructive to be shown at a glance, by comparison with former numbers, the movement of this great industry. Comparing this, the number for 1886, with that for 1882, which we happen to have at hand, we obtain the following measure of the progress in four years,—a period of sufficient length to be significant:—

The average number of houses supplied monthly during the year with water has increased from 633,102 in 1882 to 713,147 in 1886; or by 12.6 per cent. in the four years. The average daily supply per house was the same in the two years, viz., 181 gallons, or between 24 and 24½ gallons per head of the population for domestic consumption only. The number of houses under constant supply rose from 202,443 in 1882, to 345,048 in 1886; or from 31.4 per cent. to 48.4 per cent. of the whole number. It is to be noted that this improvement does not appear, as far as these figures go, to have affected the supply per head.

The total capital employed has diminished from £1,726d. to £7,493d. per 1,000 gallons supplied, or by nearly 7 per cent.; the total amounts being 13,192,713s. and 14,180,697s. respectively, or an increase of 7.6 per cent. These figures show a marked increase in the economy of the capital outlay. The total cost of maintenance and management in 1882 was 2'66d., and in 1886, 2'56d. per 1,000 gallons; showing an economy of 4 per cent. in working cost. The net water-rates were 7'307d. per 1,000 gallons in 1882; 6'842d. in 1886; the profit on trading, 4'689d. in the former year, 4'345d. in the latter. The net dividend per cent. on stock and share capital is not stated for 1882, but was 9.20 per cent. in 1886. Thus the consumers paid, in 1886, 6.3 per cent. less than they did in 1882. The net profit appears to have been 7.3 per cent. less, but it will be remembered that the capital was nearly 7 per cent. less, taking the 1,000 gallons of supply as the unit of comparison. And as the supply of water per individual was substantially the same in both years, the companies may be congratulated on having benefited their customers to the extent of 6 per cent. in the period under review, without any appreciable loss to their shareholders. The cost per million gallons cannot be considered high for so great a city. It is kept down, as an average, by the extraordinary cheapness of the supply of the 155,294 houses of East London, which is at the rate of 4'123d. per 1,000 gallons.

It is instructive to compare the results of the concurrent, if not competitive, working of the water supply, divided as it is into eight independent districts, with those of the enormous concentration of the operations for the removal of this supply from the metropolis when its functions have been discharged. The working expenses of the main drainage system were stated by Sir J. W. Bazalgette, in February, 1884, at 6d. per inhabitant per annum. This was probably for 1882, as there had not been time to work out the figures for 1883 when the paper was drawn up. For 1885 the cost rose to 7.8d. per unit; and for 1886 it was no less than 10.45d. per unit, with the certain prospect of a considerable rise, from the operations contemplated at Barking and at Crossness. Taking the allowance of the Metropolitan Board of Works of 5 per cent. on capital for interest and sinking fund, the total cost of the drainage, and the very imperfect disinfection attempted during last year, came to 2s. 4½d. per unit of the population, as stated by Sir

J. W. Bazalgette in 1884, with an allowance of 2½ per cent. per annum of increment. What will be the cost for 1887 and for 1888 it is not for us to predict, but the matter is one as to the full elucidation of which the ratepayers will do well to be alive. The cleansing of the main and intercepting sewers, which is done by hand, cost 13,000l. in 1886; pumping cost 47,886l.; and "sewerage experiments and deodorising sewers and at outfalls," cost 107,063l. And the Thames is said by those who know it well to have been worse than ever, the water being this year as foul at Woolwich as it was in former years at Greenwich.

The actual quantity of water supplied by the eight companies has risen from 140 millions of gallons per day, in 1882, to 162 million gallons in 1886. The average daily supply during the year, for all purposes, was 30.13 gallons, and for domestic use alone 24.10 gallons per head in 1882; 30.49 gallons for all purposes, and 24.39 gallons for domestic use, in 1886, showing a very slight proportionate increase both in the trade supply and in the domestic supply, in the period compared. The increase has thus been at the rate of 5½ millions of daily gallons per year. The total population supplied by the eight companies amounted to the large number of 4,745,265 in 1882, and 5,348,601 in 1886, showing an increase of 12.6 per cent. in the four years. This number, however, includes the inhabitants of a larger area than comes under the government of the Metropolitan Board of Works. It is thus not easy to obtain that comparison between the water supplied and the sewage removed, which it would be of some value to establish. Rain and subsoil water may be expected to make the outgoing volume considerably more than that supplied by the water companies. But 156,500,000 daily gallons is the quantity of sewage on which Mr. Dibdin's calculations as to the cost of treatment, brought before the Institute of Civil Engineers in January, 1887, are based. Taking this as the outflow for 1885, it is almost identical with the volume of supply, and must, therefore, apparently have been estimated on that basis. Sir Joseph Bazalgette gives a population of 4,000,000, and a water supply of 133,500,000 gallons daily for 1884.

#### THE SOCIETY OF ENGINEERS: VISIT TO ACTON AND EALING.

ON Wednesday, the 19th ult., some fifty or sixty members of the Society of Engineers, headed by Professor Henry Robinson, President; Mr. A. T. Walmisley, Vice-President; Mr. Perry F. Nurey and Mr. Jabez Church, past-Presidents; Messrs. Henry Adams, W. A. Valon, and W. N. Colam, members of Council; and Mr. C. J. Light, Secretary, visited the new sewage works at Acton, where they were received by Mr. W. Roebuck, C.E., Chairman of the Acton Local Board, Mr. C. Nicholson Lailey, Engineer to the Board, and other gentlemen.

Acton, as many of our readers will know, is a large and growing suburban neighbourhood bordering on the metropolitan boundary to the west, and like other neighbourhoods similarly situate, it has been obliged to form a drainage system of its own, quite independent of the metropolitan main drainage system. After consideration of other similar works, the Local Board has adopted the system introduced by the International Water and Sewage Purification Company, which, it is stated, has been successful at several places in France, but which is now being used at Acton for the first time in England on a large scale. The results of full experience in this case will be awaited with great interest, the more so that the whole question is in so unsettled a state at present. We gave a tolerably full description of these works at Acton in the *Builder* for Sept. 3 last, p. 326; but we may here mention that the sewage is treated by a combined process of precipitation and filtration. The precipitant used is magnetic ferrous carbon mixed with compound sewage salts, viz., sulphates of alumina, iron, calcium, and magnesia. This precipitant is gradually supplied to the sewage as it flows in a channel running along one side of the three precipitating tanks, which have a total capacity of 416,500 gallons. After precipitation is completed, the first effluent is drawn off by a floating suction and passed through a filter-bed consisting of 4 in. of ordinary drainage-pipes closely laid in shingle, 4 in. of fine gravel, 6 in. of sand, and 10 in. of magnetic spongy carbon, well mixed

with an equal quantity of sand and gravel. Then comes a layer of sand, 9 in. thick, and on top a layer of 1 in. of coarse magnetic spongy carbon. The second effluent is drawn off from this filter-bed and discharged by an outfall-sewer into the Thames. No lime being used in the treatment of the sludge, it is considered to be of high value for manurial purposes. It is prepared for sale by means of Drake & Muirhead's patent filter-presses, into which it is forced by specially designed duplex steam pumps. The works, as now constructed, can, it is calculated, deal with the sewage of a population of 20,000, but the machinery is capable of dealing with a largely-increased population. The works were designed by and carried out under the superintendence of Mr. C. Nicholson Lailey, the Engineer to the Acton Local Board, upon whom they reflect much credit, the buildings being pleasing in character. The works, as a whole, are entirely devoid of the unpleasant odours which so commonly pertain to sewage works. Dr. Angell, F.I.C., and Mr. Frank Candy, gave some explanation of the chemical aspect of the process, regarding the efficiency of which Professor Robinson spoke in very high terms. He congratulated the Local Board and the ratepayers of the district upon the successful result of what he knew had been a very long and uphill fight. From an engineering point of view, he said, the works commended themselves to all the visitors, for they had been constructed on economical principles, though with an amount of taste in the buildings which the members of the profession might take example by. The working of the particular system of sewage treatment which had been adopted here was in its infancy, but considered in their sanitary aspect, he was of opinion that so far as could be judged at present the works were a complete success. They were being conducted without the slightest smell,—without a trace of the odour which had been hitherto regarded as inseparable from sewage works. From what he had seen of it he thought that this process of treatment was one which had a very great future. This he said as an old sewage "expert," but without entering into details of cost, &c., which were not yet before them, though they hoped shortly to have a paper on the subject, giving full particulars, by Mr. Lailey, the Engineer of the works.

The visitors then proceeded in carriages to visit the refuse-destructor and sewage works at Ealing, where they were received by Mr. Charles Jones, the Engineer to the Ealing Local Board. The refuse-destructor, while generally based on the plan of Fryer's destructor, has some distinctive points, by virtue of which Mr. Jones claims to have attained unusually satisfactory results. The chief of these is the addition of a muffle furnace between the furnace proper and the main shaft, by means of which combustion is rendered more complete. No fuel except the ordinary house refuse is used, and no objectionable fumes are given off. At this depot the sewage sludge of 19,000 people, and the house refuse of 22,000, are being dealt with. It must in candour be said that these works presented a somewhat painful contrast to those just previously visited by the members, both to the senses of sight and smell; but then, as Mr. Jones pointed out, they were never meant for "show" works, and have been in constant operation for twenty-five years. It was admitted by the visitors that to Mr. Jones was due the merit of having been the first to deal practically and effectually, and at the same time economically, with the sewage and refuse of a hitherto unsewered district in the Thames valley; but it was hinted that perhaps the works were now conducted in a somewhat too conservative spirit. The sewage is treated by the lime process of precipitation, and the effluent is stated to satisfy the Thames Conservators, though (judging by the odour which it emits as it falls over the weir at the works) it does not seem to be an altogether desirable liquid to enter the Thames at Kew. The sludge is disposed of in this wise.—The dry-house refuse, contents of dust-bins, street-sweepings, &c., are carted to the depot and tipped into very large compartments or bins. This dry refuse is spread in layers of about 12 in. thick, then some of the sewage sludge from the tanks is pumped on to it, then another layer of dry stuff is spread, followed by another moistening with sludge, and so on, until the bin is full. The whole is then allowed to stand for from six or seven to ten days, according to the



season, and what is not carted away by the farmers or market gardeners for use as manure (they are at liberty to come and take away as much as they want, without charge) is burnt in the destructor. In connexion with the destructor, Mr. Jones's muffle furnace, through which all the fumes from the destructor have to pass, was examined by the visitors. It is said to maintain a temperature of 1,500 degrees, and appeared to be doing its work very effectually. Mr. Jones stated that all the refuse brought to the *dépot* was dealt with at a cost of 9½d. per ton. The visitors cordially thanked Mr. Jones for his explanations.

The visitors were next driven to see the work now in progress for the construction of the new water-storage reservoir of the Grand Junction Water Company at Ealing. This reservoir is a very fine piece of earthwork, involving both excavation and embanking. The visitors were received by Mr. Alex. Fraser, the Engineer to the Company, and by Mr. B. P. Ellis, of the firm of Aird & Sons, the contractors for the work. The reservoir is situated near Hanger Hill, to the north of Ealing, and occupies ten acres of land. The water surface, when the reservoir is full, will be about six acres; the depth of water will be from 35 ft. to 40 ft., and the reservoir will contain about 51,000,000 gallons. The level of the top of this water will be 193 ft. 6 in. above Ordnance datum. The reservoir will be used for the storage of filtered water, filled from the pumping station at Kew Bridge, through a line of 30-in. pipes, which are connected with the principal mains leading to the West End portion of the company's district. At the reservoir this line of pipes will terminate in a well, in which there will be an inlet into the reservoir, and a branch outlet from it, the passage of the water being governed by 30-in. hanging valves and 30-in. sluice valves. The outlet branch is carried under the bottom of the reservoir, and leads from the lower part of a filter or strainer, the water passing in at the top of the filtering material on its way to the district. The filter will prevent leaves or other extraneous matter from passing into the mains. The reservoir will provide for the great increase in the demand for water during the hot weather in the London season, and will at all times prove a great convenience in case of accident to the machinery at the pumping stations, as from its elevation it will command the greater part of the West End district. The ground occupied by the reservoir is on the slope of a hill, the south or upper end being at about the level of top water, while the ground at the north or lower end is at the level of the bottom of the reservoir; the excavated material (about 150,000 cubic yards) is used for the formation of the banks, and there will be no surplus to remove. The banks have been formed with slopes of  $\frac{1}{2}$  to 1, except that at the north end, where the bank will be 65 ft. high, the outer slope will be  $\frac{2}{3}$  to 1. The whole of the ground consists of clay, and the banks are formed of this material; the bottom and internal slopes are puddled and puddled, and covered with concrete 12 in. in thickness, composed of Thames ballast and Portland cement in the proportion of 6 to 1. The internal slopes will be paved with Candy's vitrified bricks on edge in cement, and will be surmounted by a vertical wall 5 ft. 6 in. high, having a coping of hollow terra-cotta blocks. The filter before referred to is circular on plan, 65 ft. internal diameter, and constructed of brickwork in cement, faced with vitrified bricks, and copped in a similar manner to the reservoir. The filtering material will be fine gravel, laid on perforated iron plates. There will be a handrail round the reservoir and filter (from the top of which, it may be mentioned, there is a fine view of the surrounding country, including Harrow and neighbourhood). On the top of the hill a somewhat remarkable geological formation, which has been the cause of considerable trouble and expense, was met with. The ground at this part was full of pot-holes of gravel, resting on sand and silt, into which the gravel appears to have been pressed, possibly, it is thought, by the action of ice. This sand, on being exposed, particularly in wet weather, cannot be made to stand at any slope, and it has been found necessary to construct a heavy wall of concrete at the base of the south slope of the reservoir, to prevent the falling of the surface ground and avoid damage to the public road and the adjoining reservoir. The work is being carried out, under con-

tract, by Messrs. Aird & Sons, the total cost being about 36,000l., including pipes, sluices, and other ironwork. The Portland cement is supplied by the Burham Company, near Maidstone. The ballast is obtained from the Thames, and is landed at Kew Bridge. The vitrified bricks and terra-cotta coping are manufactured at the Great Western Potteries, Torrington, North Devon. The valves are from Messrs. Laidlaw & Sons, of Glasgow, and the hanging valves by Messrs. Oakes & Co., Alperton, Derby.

The day being fine and bright, the work was seen under very advantageous circumstances, and the excellence and completeness of the contractors' arrangements and plant, as well as the remarkable dexterity and strength of some of the navvies and the no less remarkable docility and intelligence of the horses employed on the work, called forth much admiration from the visitors, who for the most part, after thanking Mr. Fraser and Mr. Ellis for their courtesy, returned by train to the City and dined together at the Guildhall Tavern, thus bringing a pleasant and instructive day's proceedings to a close.

#### THE ARCHITECTURAL ASSOCIATION.

The following is a report of the discussion which followed the delivery of Mr. Slater's presidential address\* at the opening meeting of this Association:—

Professor Kerr said:—I have been asked to move a vote of thanks to the President for his address. It is very pleasing to me to see so many young men here to-night, exhibiting so much enthusiasm; and I trust that the applause which has been so thoroughly indulged in will be absorbed into the walls of this room and come out again upon occasions when this room is otherwise occupied (laughter). Mr. President, you have awakened in my mind very pleasing recollections of forty years ago, and perhaps the gentlemen present will excuse me if I say a few words on the subject. The origin of this Association was a demand for education, and for education only. The previously existing Society of Architectural Draughtsmen had no such object in view, and it had become quite effete as regarded its own objects. The rooms in Southampton-street, Strand, were the offices of Mr. Jayne, who was Secretary to the Association of Architectural Draughtsmen. The President of that Society, Mr. James Wyllson, an exceedingly worthy man, who had for many years, I believe, been at the head of Sydney Smirk's office, went to Glasgow to establish himself there, where he died a few years afterwards without having been very successful. When I occupied the chair, which my friend occupies so much more worthily, forty years ago, you must not suppose that I was of his age, because I was one of the younger and more enthusiastic spirits. At that time the old gentlemen who belonged to the Society of Architectural Draughtsmen came in very handy in order to supply that little wisdom of which necessarily we stood in need. We, like yourselves, were looking forward, and not backward, and the "old fogies," as we then considered them, supplied the element of wisdom. The address from which my friend has quoted a few words was an address I delivered to that Society of Architectural Draughtsmen, and we, the younger men, filled the room. Shortly afterwards this Association was founded, not in 1842, but in 1847. We then got a *locus* in Lyon's Inn Hall, where the Globe Theatre now stands, and the first meeting to which reference has been made was a very interesting one. Although a very young man, I had succeeded somehow or other in making a good deal of fuss, and I was bold enough to ask two very distinguished men, as they then were, one of whom is still distinguished amongst us, viz., Professor Donaldson and Mr. George Godwin, to come down and give us a lift. They did so in a kindly way, and it was those two gentlemen who helped to start the Association, because they immediately lifted us up to the level of something like practical connexion with the world of professional business. A short time afterwards I read a paper; I forget what it was about, but I suppose it was something very pretentious, and I was then bold enough to ask, whom do you think? to come down and hear it? Why, Professor Cockerell, the prince of

European architects, and Mr. Beresford-Hope, deceased yesterday. Those two gentlemen came in the kindest way. The older men of those days were, as the older men are now, simply delighted to help forward youth in its enterprise in the direction of education and professional advancement. Professor Cockerell in all his dignity, delivered a fine classical speech to your predecessors. Mr. Beresford-Hope, then only twenty-seven years of age, characteristically contradicted Professor Cockerell. Cockerell's speech was a Classic one, and Mr. Beresford-Hope's was necessarily Gothic, and I well remember the calm Olympian indignation of Cockerell as he said,—"I knew the gentleman's father; he did not hold such opinions." Now, sir, I am obliged to you for allowing me to be a little garrulous upon old times. What you have said about education commends itself particularly to my mind, and stimulates me to impress it upon those gentlemen present, because from that day in February, 1847, up to the present time, this Association has never swerved from its one purpose, viz., to advance the education of the architectural student. That is the one purpose above all others which you are safe in still following, and it is the one purpose beyond which I hope you will not allow yourselves to go very far. The President has mentioned the time when the proposition was made by some one to abandon the Association altogether in 1856. My friend Mr. Rickman was the proposer, and all of you who know him will not doubt that there was very good reason for the motion he made. The reason was this. The young men of that time had not the pluck to go forward, and the same state of things occurred at the other critical period the President has mentioned; but there is no want of pluck now; sometimes there is too much of it, and if there has been a good deal too much of it on various occasions since then, put it to the credit of the Association. Because when they tell me that young men are conceited, I say, "Of course they are, and so let them be encouraged. What is the use of starting life at all if they do not start full of hope and determination?" There is an old Scotch saying that "If you bode for a silk gown you will get the sleeve o't," and why should we grudge you, who are full of animal spirits, and all sorts of exultation and delight, that motive power which lies at the very root of success? Now, gentlemen, I hope you will go forward in this enterprise of encouraging the education of the architectural profession, which is a large one, and one in which great honour is to be gained. I am glad, for my own part, to find from the President, who is one of the Examiners, that there is a little hesitation as to whether the Institute Examination is a success or not, and for this reason, that I am very much afraid of the tendency in your examination of the sort [to go a little beyond the necessities of the case (applause)]. I am happy to find that the young men, in their own way, are indicating a little dissatisfaction in that precise view of the case. Let me tell you what the Examination of the Institute ought to be. It ought to be the simplest and plainest test to draw the line between the young man who is educated sufficiently and the young man who is not educated sufficiently (applause). Nothing further than that; it ought to be nothing else and nothing more. The Institute has no right to establish an academical standard that is in the least degree above the requirements of the profession, or more than is necessary for the drawing of that line of demarcation (applause). It seems to me, in taking that view of the case, that one of the next steps the Institute must take is to establish examinations in such a way that they may be conducted in writing and drawing in all parts of the country without involving the necessity for the examinee to come up to London or to any other centre of civilisation in the land. I may tell you that I have a peculiar mode of examining my class in King's College, which I find to be exceedingly successful. I never charge the memory with anything, and I never set a catch question (applause). I never suppose it possible that any student can in any way compromise his honour (renewed applause). I say, "You may bring your notes and the library of the British Museum, if you like." I give them so many questions periodically; they take the questions home with them, and in the course of ten days they return the answers, and I seldom have had

\* Printed in *extenso* in the *Builder* for last week (see p. 594).



any opportunity of complaining of the quality or of any suspicion of collusion as regards the production of them. Why, then, should the Institute,—and I do not say it is so,—why should the Institute have any suspicion of the honour of the Architectural students throughout the country? I would send the Institute Examination paper all over the country to whomsoever desired it, and if he duly answered the questions on his Examination paper, certified by some proper authority, I should give him his degree upon it. I see no reason whatever for young men to be expected to come to the large centres. I may be a little before my time, but it seems to me it must come to that in the end. From what I read in the journals, and from the illustrations more particularly, it has become apparent to me of late years that the quality of the architects who are working in the recesses of the kingdom,—not in the centres of industry, but in the smaller country towns,—is vastly superior to anything that any class of architect possessed in my day. The draughtsmanship, for instance, seems to me wonderful. I do not know where the young men acquire such accomplishments. In my day there was no such draughtsmanship possible; and so it is in the papers we read, and in the questions and answers we read in some of the journals. It is evident that the standard of education has risen vastly within the last few years, and that not alone in London, Liverpool, Manchester, and Glasgow, but all over the country (applause).

Professor T. Roger Smith.—I ask permission to rise for the purpose of seconding the vote of thanks which has been proposed in so able and interesting a speech by my old friend and colleague in this Association, and in many other works,—Professor Kerr. And, in doing so, I am placing myself in a very difficult position, because, having listened to the brilliant address which he has given us, I am asking you to hear me or two words which I know will not possess anything of the same brilliancy, though they will be uttered with equal goodwill. I have much pleasure, Sir, in congratulating you upon occupying the very important position you occupy as President of this Association. We have been associated together in various ways for a considerable number of years, and it is a great pleasure to me to see you in that position. But I am equally glad to be able to congratulate the members on having secured you as their President (applause). As I have just said, I have known Mr. Slater in various capacities or a good many years, and I am quite sure that there is no man among those who could aspire to the position of President of the Association who, in my judgment, more likely to be useful to you, and to acquire himself better in the duties he is called upon to fulfil (applause). I am not about to go back over old ground, though I feel very much tempted to do so, but I should like to say that I was one of those who had something to do with the Association at and after the period of the second idea of giving up which has been referred to. We did not give up, but went on through a stroke of good fortune, and that we did go on successfully I think was very much due to the kindness of several of the elder members of the profession, who, at my request,—I being President at the time,—came and gave us a series of excellent papers on subjects of great interest. Sir Gilbert Scott, Mr. Ashpitel, and others, came among us, and the mere effect of what they put before us was an immense stimulus and attraction, and was one of the most important agencies which helped to re-start the Association on the course which has culminated in so large a meeting to-night. But I should like to say one word with regard to the future, which is impressed upon me by the fact that there is, if I may use the phrase, "something in the air." The time seems to have come, or to be coming, when a very considerable change ought to be made, and, I believe, will be made,—some change which one can hardly quite grasp,—in the professional education of men training for our profession. I feel perfectly sure that if the Examination goes on,—and go on it must,—there will very soon be a feeling that systematic preparation for it is essential. It strikes me that it is for you, as members of the Association, and for those directing your affairs, to look this fact in the face; to find if it be a fact, and to do the best you can to make such changes, such advances, and such reorganisation of methods as may fairly secure to yourselves a large share in any change in the system of education which we in the Association are fairly

entitled to expect. This Association has been the educating body of the profession for many years, and I should be sorry to think that if any change took place it would be in the direction of taking away from the interest and value of its work. I do not think it need be: I do not think it ought to be; but I do think it will be right for you during the next few years to look the necessities of the case very fully in the face, and to do your best to systematise and render more thorough and complete the system of education given here. I do not mean to say that individual things are to be better taught, because I believe that many individual things are as well taught as they could possibly be in an organisation of the sort; but I do think it is possible that the whole scheme could be more complete, and I really think such greater completeness is wanted in order that a larger number of men should feel themselves fit year by year to present themselves for examination with courage and with the confidence of securing success. I have no doubt that in the future an increasing number of the members of the Association will present themselves for examination, and will secure success, and reflect credit both upon themselves and upon the society. I will not detain you longer; I wish you a very prosperous session, and every possible success in the educating work of the Association during the year (applause).

Mr. T. M. Rickman, F.S.A., said that his name had been mentioned as having proposed a resolution, many years ago, for winding up the Association, and he would therefore like to explain the circumstances of the case. Mr. Cates and he, finding the Association to be in a bad way, and that no interest was being taken in the papers read, proposed a series of ten or twelve resolutions. That had precisely the effect he had expected. The whole of the resolutions up to the last one were passed unanimously, as no one could doubt the statements brought forward, but when they reached the last resolution the answer was, "No, we won't." That was just the answer Mr. Cates and he had anticipated. The members then put their shoulders to the wheel, and the result was, as the President had explained, that the Institute shortly afterwards began to take an interest in the Association, which progressed better from that time onwards. The members of the Association since he had had to do with it had been devoted to self-help and helping one another. Several views might be taken of architectural education, but, so far as his experience went, the greatest assistance that the young architect could receive was from his fellows in the office. Those therefore who studied in connexion with the Association had the advantage of meeting others who had things fresh in their minds, and he hoped that state of things would always continue (applause).

Mr. E. C. Robins, F.S.A., said he wished to note the fact that the future Examinations would be carefully looked after, in the interest of the members, because their President was one of the examiners. The suggestions made by Professor Kerr would also receive most careful attention. He did not believe that they, the examiners, got the credit they deserved, and he, for one, would be willing to make the Examination as easy as would be wise in proving those who passed to be worthy of the confidence of the public generally. With that reservation, which was of the utmost importance, he was delighted to hear the true and liberal expressions of opinion which had been given that evening. He also wished to say a word in regard to the elder members of the profession, who still maintained their connexion with the Association. He felt considerable pride in being one of them, because he always took great interest not only in young architects, but in rising men generally. Those who had had to make their own way must know that the difficulties of doing so were nowadays, perhaps, rather increased than diminished by the large demands made by the public, and by the enormous number of persons who were ready to answer those demands. He did think, therefore, that the elder members of the profession might do something more than pay their ordinary halfe-guinea with the rest of the younger men. As had been shadowed forth from the chair, there was a hope that some means would be forthcoming for establishing paid professorships, and he trusted the elder members of the profession would come forward and aid in the work; for himself he would be most

happy to help (applause). Perhaps the reason that had not been done before was because the question had never been mooted. There was a feeling that the work had been well done in the narrow way in which it had been carried out, but, under the advice of such a man as Mr. Slater, any educational scheme would necessarily be a well-considered one. It would be all the better if it made them quite free from the necessity of appealing to the Institute, which had a large work of its own that it ought to be doing. The members of the Association had the means of teaching themselves and their fellows, as well as of extending that education by finding proper teachers of a higher quality than they had yet been able to acquire.

Mr. J. Douglass Mathews said that he joined the Association when it was just emerging from the shadow of darkness into the light which had continued increasing year by year, each year being a greater success than the one preceding. To his mind the great advantage of the Association had been the elastic way in which it had been ruled and the manner in which it had afforded to all its members the opportunity of improving themselves by establishing those classes which were necessary to that improvement. During the twenty-eight years in which he had known the Association there had never been anything that might be termed a drastic alteration; things seemed to have gone on one after another, and necessities were met as they presented themselves. He could not help thinking that if the same policy were still adhered to the Association could be as useful in the future as it had been in the past. They had never sat down and said,—"We will simply do what we have been in the habit of doing, and we won't move"; but they had moved with the times, though not, perhaps, so fast as Professor Kerr would have liked. At the same time they had always been on the look out to provide for the things that were wanted. Those who were as old or older than himself would admit that the present was very different to the past. Complaint had been made by many that they were very much behind the age, and that they required many things they had not got. The Examination was the result of combined perseverance on the part of the Association, and would never have been brought into existence but for that body. If, then, the Examination had necessitated other requirements which the Association did not possess, they would doubtless be provided. At the same time he should look with a great amount of jealousy upon the original scheme of the Association being lost. They had hitherto been working almost wholly from a voluntary point of view, and when they looked at the great success that had been attained, they might take pride in the amount of voluntary work done. He dissented from the President's remark that the limit of voluntary work had now almost been reached. On the contrary, the work was increasing, and with the increase men were ready and willing to help it forward. Therefore, if they once gave the "cold shoulder" to voluntary work, the doom of the Association would be sealed. With respect to the Examination, he was sorry to hear it implied that it was not so successful as might have been anticipated. He could not help thinking, considering the short time that had elapsed, and the great amount of opposition to it in the first instance, that the result had been fairly satisfactory. When the matter was first proposed it was an understood thing that the Examination should increase in stiffness as time went on. He might say that never had a catch question been set, nor had there been any desire on the part of the examiners to prevent the passing of any man. Their desire had always been to assist young men in every shape and way, and if, as constantly happened, little slips occurred, opportunities were given for correction in the course of the Examination. At the same time, as Mr. Robins had said, the standard of the Examination must be kept up if it was to be of any good at all (hear, hear).

The vote of thanks was then put, and carried by acclamation. The Chairman, in replying, said that Mr. Mathews had misunderstood him in supposing that he did not think the Examination a success. What he had meant to convey was that some people thought so, but he agreed with Mr. Mathews that, considering the number



of men who had come up during the short time that had elapsed since it was established, they had every reason to be satisfied. Prof. Kerr appeared to be somewhat in advance of the times. He (the speaker) had had some little experience of the kind of examination referred to by the Professor, because in certain classes of the Association questions were set which the candidates had time to answer to the best of their ability. No doubt some of his hearers had read Mark Twain's book describing a journey to the Holy Land with a number of people, who, whenever they saw a veiled female, invariably exclaimed, "What a Madonna-like form!" At last, Mark Twain said,—"I know what's coming; I know where they get their sentiments from"; and he (Mr. Slater) was bound to say that the answer to the queries, in too many instances, showed where they were obtained. Such a system would not do for the Examination, but he could endorse what Mr. Mathews had said, that there were no catch questions, and that the desire of the examiners throughout was very much greater to pass the candidate than to "pluck" him (applause).

The proceedings then terminated.

#### ARCHITECTURAL SOCIETIES.

**Leeds and Yorkshire Architectural Society.**—The twelfth session of the Leeds and Yorkshire Architectural Society was commenced on Monday evening at the rooms in Infirmary-street, Leeds, when there was an exhibition of prize drawings, and a *soirée* in connexion with the Sketching Club. The President (Mr. C. R. Chorley) occupied the chair. The following prizes, gained during the last session, were distributed by the President:—A. E. Dixon, 3l. 3s., for the prize for design of monument to a statesman; 1l. 11s. 6d., being half the amount of prize, for drawings illustrating construction of church roofs; 2l. 2s., for best set of drawings executed for the Associated Sketching Club. F. W. Bedford, prize of 1l. 1s., for designs executed for the winter session of the Associated Sketching Club. F. Mitchell, prize of 1l. 1s., for essays during winter session of Sketching Club. The President then proceeded to give his inaugural address. After referring to the prosperous condition of the Society, he said that among the discouraging circumstances attending the work of the Society was one which, he regretted to say, formed an ever-insoluble problem to those who were interested in the rising generation of architects. He referred to the apathy of architectural students respecting the serious responsibility of their future, and their great disregard for the demands which their profession makes on them for continuous and systematic study of the information required in acquiring a mastery of their calling. The instances of this culpable neglect to avail themselves of the opportunities afforded them for improvement had been more than usually noticeable of late. The courses of lectures on construction, to be given at the Yorkshire College by Professor Barr, which were supported by the Society, and which had the widest publicity given them amongst architectural students throughout the county, had failed to elicit anything like the response that might have been expected. On the motion of Mr. J. B. Fraser, seconded by Mr. H. Perkins, a vote of thanks was given to the President for his address.

**Liverpool Architectural Society.**—The first meeting of this Society for the present session was held at the Royal Institution, Colquitt-street, on Monday evening last, when the opening address was delivered by Mr. Edmund Kirby, A.R.I.B.A., the President. In the course of his address, Mr. Kirby referred at some length to the important question of the safety of theatres, which, he said, deserved the earliest attention of Parliament, and he trusted it would not be long before we had compulsory and comprehensive legislation passed to incorporate the rules of the construction not only of theatres but of every public assembly room within the scope of the ordinary Municipal Buildings Laws throughout the country. In the discussion which followed, Mr. G. E. Grayson, Mr. Thomas Cook, Mr. J. M. Hay, Mr. H. B. Baro, Mr. Alex. White, and Mr. C. Aldridge took part, and a vote of thanks was given to the President for his address.

**Manchester Architectural Association.**—The Manchester Architectural Association held its

first meeting of the session 1887-8 on Tuesday last, when there was a large attendance. There were several new members nominated, and the secretary handed in a large number of books which had been received for the library. The President (Mr. Davies-Colley) presented the prizes to the successful students in the Classes of Design and Construction (Messrs. Ernest Farrar, A. S. Chadwick, and R. Booth). Mr. Mould, the hon. secretary, announced that Mr. John Slater, B.A., the president of the London Architectural Association, had consented to read a paper on November 29th, on "Modern Architectural Education." The hon. secretary also read a number of communications, among them being one from the Royal Institute of British Architects, dated October 12th (which was received with applause), thanking the Association "for the excellent step taken" of forming a reading-class for the examination in architecture, and stating that in consequence the Royal Institute had decided to hold the examination in Manchester next February. The preliminaries disposed of, the President delivered the opening address of the session.

#### Illustrations.

##### CHURCH OF ST. ANNE, ROATH, CARDIFF.

**T**HIS Church, which was partially opened for service on the Eve of St. Michael and All Angels will, when completed, consist of a nave, with north and south aisles, a choir of considerable dimensions, shallow transepts on either side of the western portion of the choir, a morning chapel on the southern side of the sacrum, and a clergy vestry on the northern side of the same. The choir vestry will occupy the lower part of the north transept, while the upper part will contain the organ. The total length of the church internally will be 99 ft., and the total width across the nave and aisles will be 48 ft., while the height from the nave-floor to the underside of the curved ribs forming the internal roof-line will be 41 ft. 6 in.

As will be seen by reference to the plan, the site for which the church had to be designed was very confined, and the only means of obtaining sufficient length between the street to the east and the already-existing school to the west, was to start the east wall right against the pavement at the one end, and to allow the west wall to stand as close as possible to the school building at the other. This shortness of the site will also force the morning chapel and the clergy vestry up to the pavement line, and it will make it necessary to shorten the north aisle at the west end.

In order to give due prominence to the western entrance, which otherwise would be entirely hidden behind the school, a narthex will be added whenever the completion of the church may be taken in hand: at present only the choir, including the *apêche*, together with the lower portion of three bays of the nave, are finished permanently; but the nave has been extended to the west wall in a temporary manner, and the whole has been covered with a temporary roof at the level of the string-course below the clearstory windows.

The church will be seated with chairs, and will accommodate upwards of 400 people.

As far as possible a dark-grey local stone has been used for the exterior of the building, but where freestone was necessary, Box Ground Bath stone has been employed. Internally, the dressings are of Corsham Down stone, and the remainder of the wall-surfaces are plastered.

The choir will eventually have a curved boarded ceiling underneath the rafters; the chancel arch, and the arch at the steps leading up to the sacrum, are composed of double wooden ribs, with panelled soffits between. The nave-roof will be of the same form, but open, and it will be divided into bays by single ribs over each pier. From the nave-piers to the aisle walls will occur stone arches springing from a lower level than the nave arcade; these transverse arches will support the clearstory buttresses, which further east are taken by the walls of the transepts.

The executed work has been efficiently carried out by Messrs. Shepton & Son, of Cardiff.

The drawing from which the illustration is taken, was in the last exhibition at the Royal Academy.

J. ARTHUR REEVE.

##### ST. CECILIA WINDOW, CHRIST CHURCH, OXFORD.

**T**HIS is, perhaps, the best known of the Burne Jones windows in Christ Church, Oxford. White glass is largely employed, the draperies of the three large figures being entirely white, and very delicately shaded. There is a certain sculptural simplicity about the design very suitable to the material it is wrought in. The drapery is everywhere carefully thought out, and not a series of folds put in mechanically to fill up the design, as is frequently the case in glass painting. The flesh is matted over with red, and tells warm against the drapery. The wings of the angels are pale blue. The lead lines are used as far as possible to emphasise the design, but where they are introduced to meet the exigencies of the leading, no attempt at concealment is made, which is as it should be, a glass-painting being a glass-painting without attempting or pretending to be anything else.

The three small compartments below, representing episodes in the life of St. Cecilia, are richer in colour than the upper portions of the lights, a greater variety of tints being introduced, and yet so delicate are the colours, and so skilfully are they blended, that they present no harsh contrast to the more important portions of the window.

##### PALACE COURT, BAYSWATER.

**T**HIS residence is now being erected on the site of the old Shaftesbury House in the Baywater-road, for Mr. J. J. Fellows, the Agent-General for New Brunswick. The designs of the architects, Messrs. W. Harvey & Bernard Smith, were selected in a limited competition, and immediately put into execution.

The building is faced with dark red Rowland Castle bricks 1½ in. in thickness, the cornices and dressings being in stone from the Synnoge Quarry, Matlock Bridge.

The contract for the carcass is being carried out by Mr. Bush, of Gower-street, at a cost of about 10,000l.

The drawing from which the illustration is taken was exhibited in the Royal Academy of this year, but has been slightly modified for publication, and the plans added.

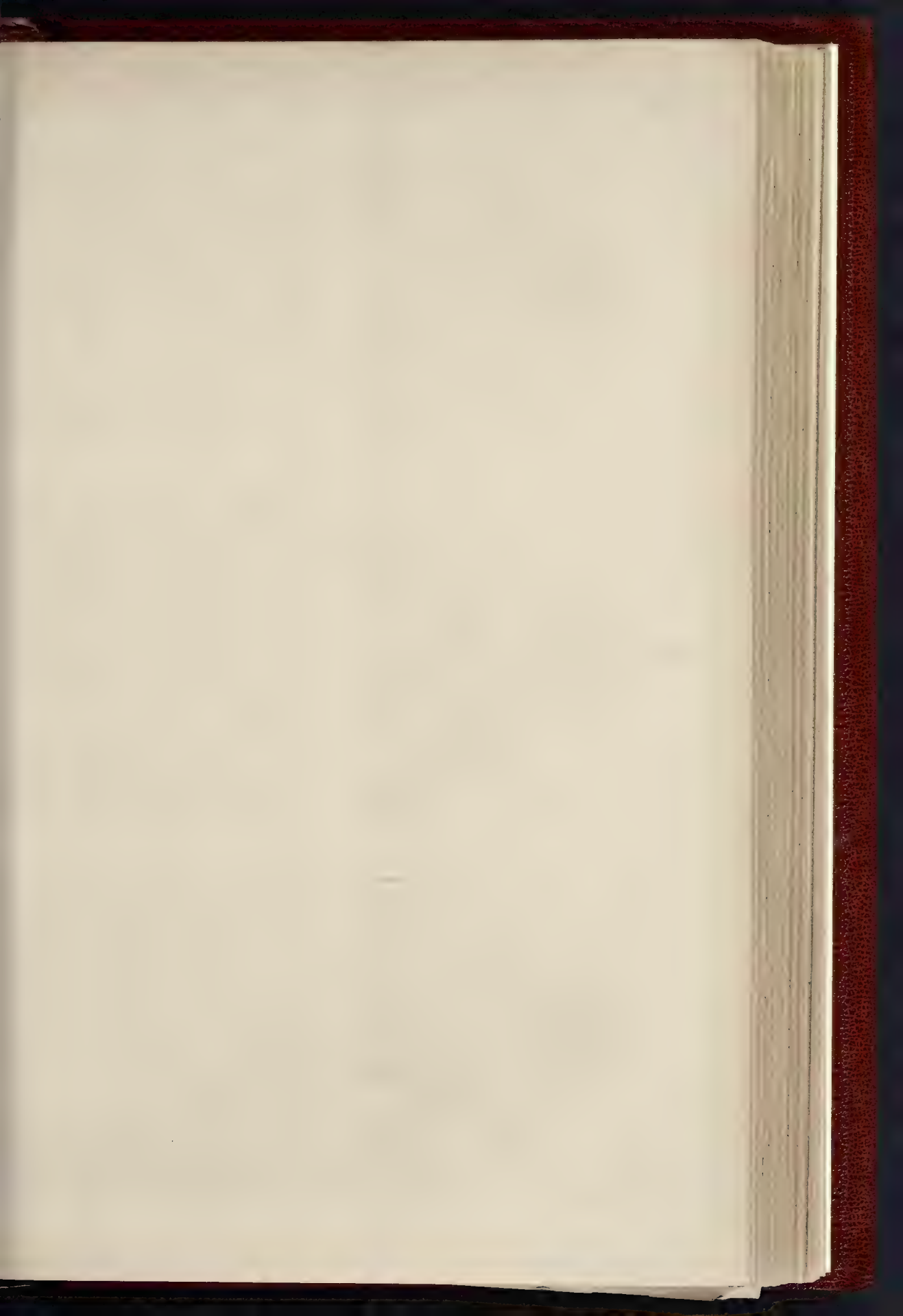
##### SEDILIA, HECKINGTON CHURCH, LINCOLNSHIRE.

**T**HE beautiful sedilia in the chancel of this church, of which we give an illustration in this number, have undergone sad mutilation in bygone times. Many of the figures are either broken or entirely gone, but the grandly designed foliage is almost perfect. The crockets are extremely rich and diversified, and are boldly carved. The caps to columns are, both in their foliage and moulding, somewhat different, giving indications of a Transitional spirit.

The illustrations are from drawings by Mr. Lionel Littlewood.

##### Liverpool Engineering Society.

**T**HE usual fortnightly meeting of this Society was held at the Royal Institution, Colquitt-street, Liverpool, on Wednesday last, November 2nd, Mr. John J. Webster, M. Inst. C.E., President, in the chair. A paper was read by Mr. Henry Pooley, jun., entitled "Automatic Weighing Machines." The author commenced by giving a short account of the earliest form of compound lever weighing machine, and its subsequent improvement by the addition of steady and weights. The further introduction of the steady without loose weights was then dealt with, together with the circumstances which led to the adoption of self-indicating machines. The attempts to make self-indicating machines of high capacity on the spring-balance principle were referred to, and the reasons for their failure given. The invention by Messrs. Roberts & Stroudley of the combined lever and spring indicator was then described, and an account was given of the experiments with the machine and the further invention of the hydrostatic indicator. Automatic weighing apparatus for dealing with grain in bulk, rice, seed, &c., were then dealt with, and the author concluded by describing the arrangement and working of the equal-beam weighing machine and hopper.





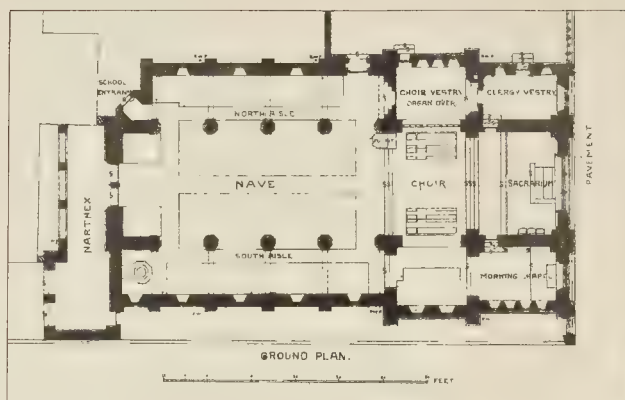
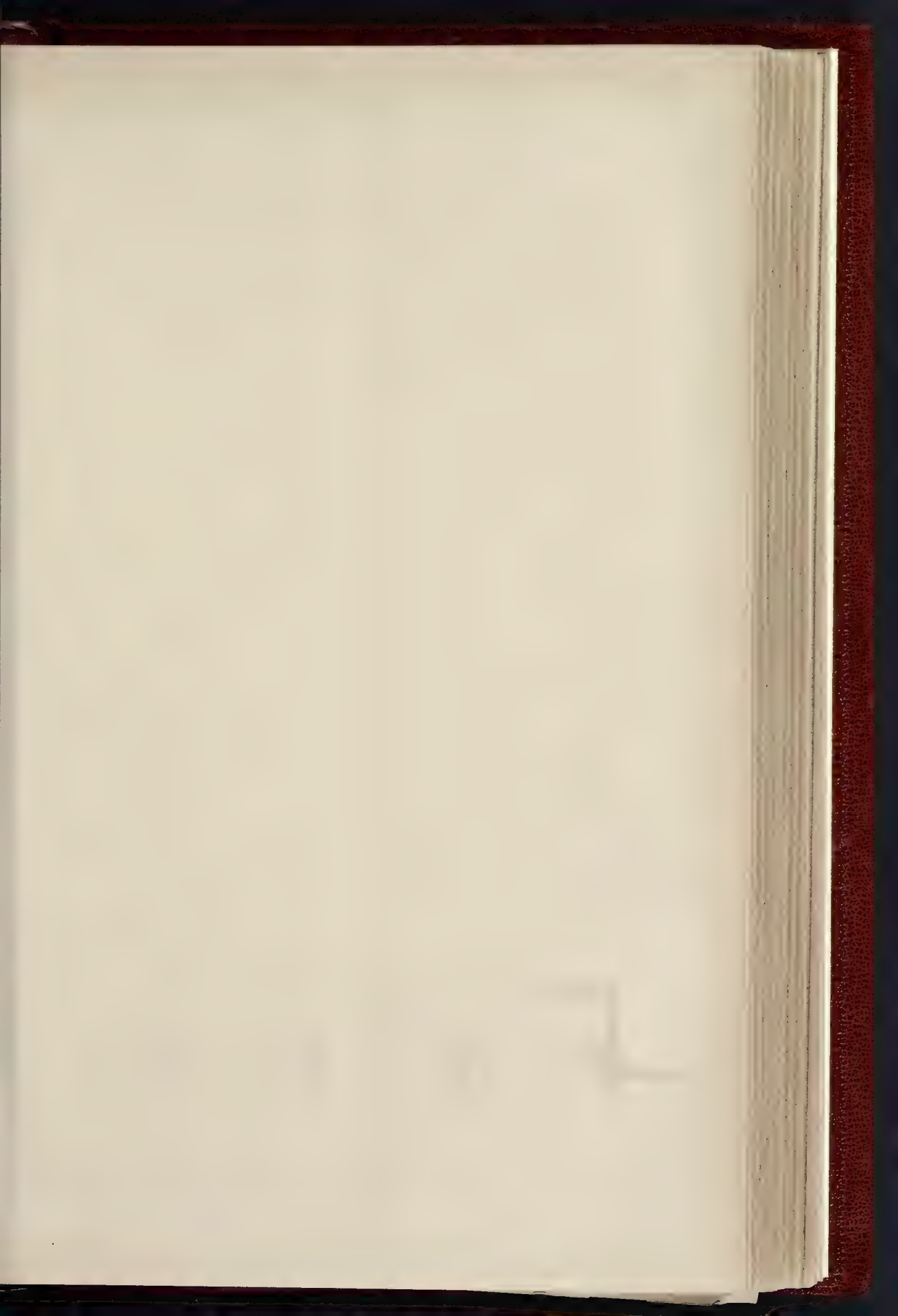




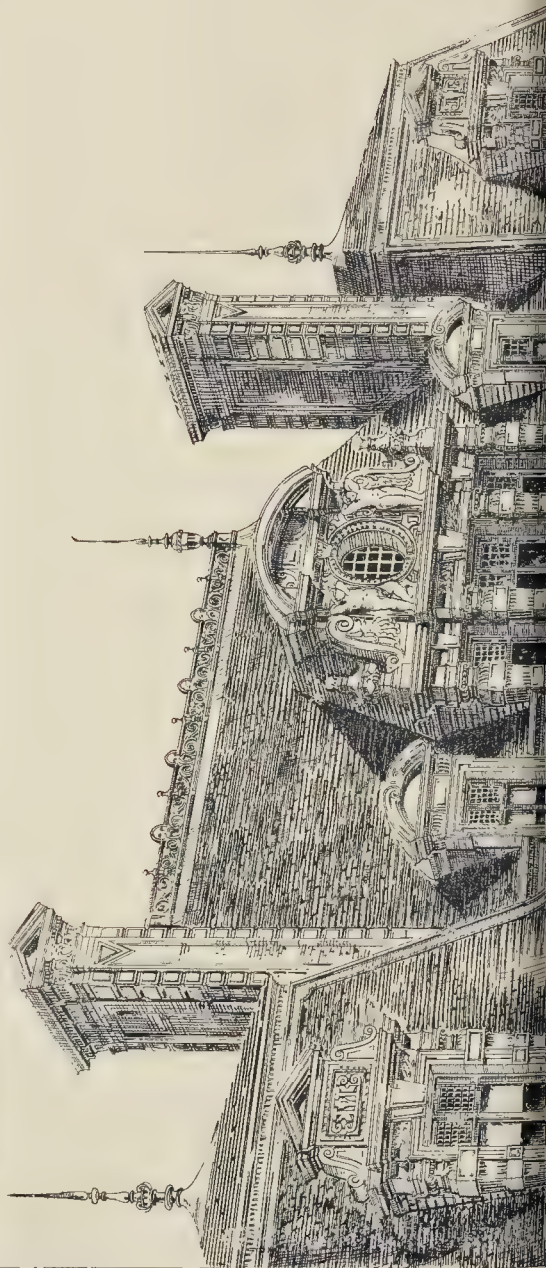
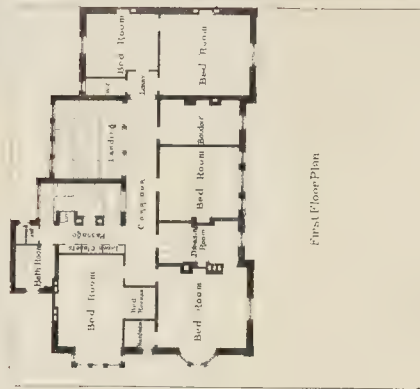
PHOTO L. TWO "FRASER & CO." 28, MARK LANE, LONDON E.C.









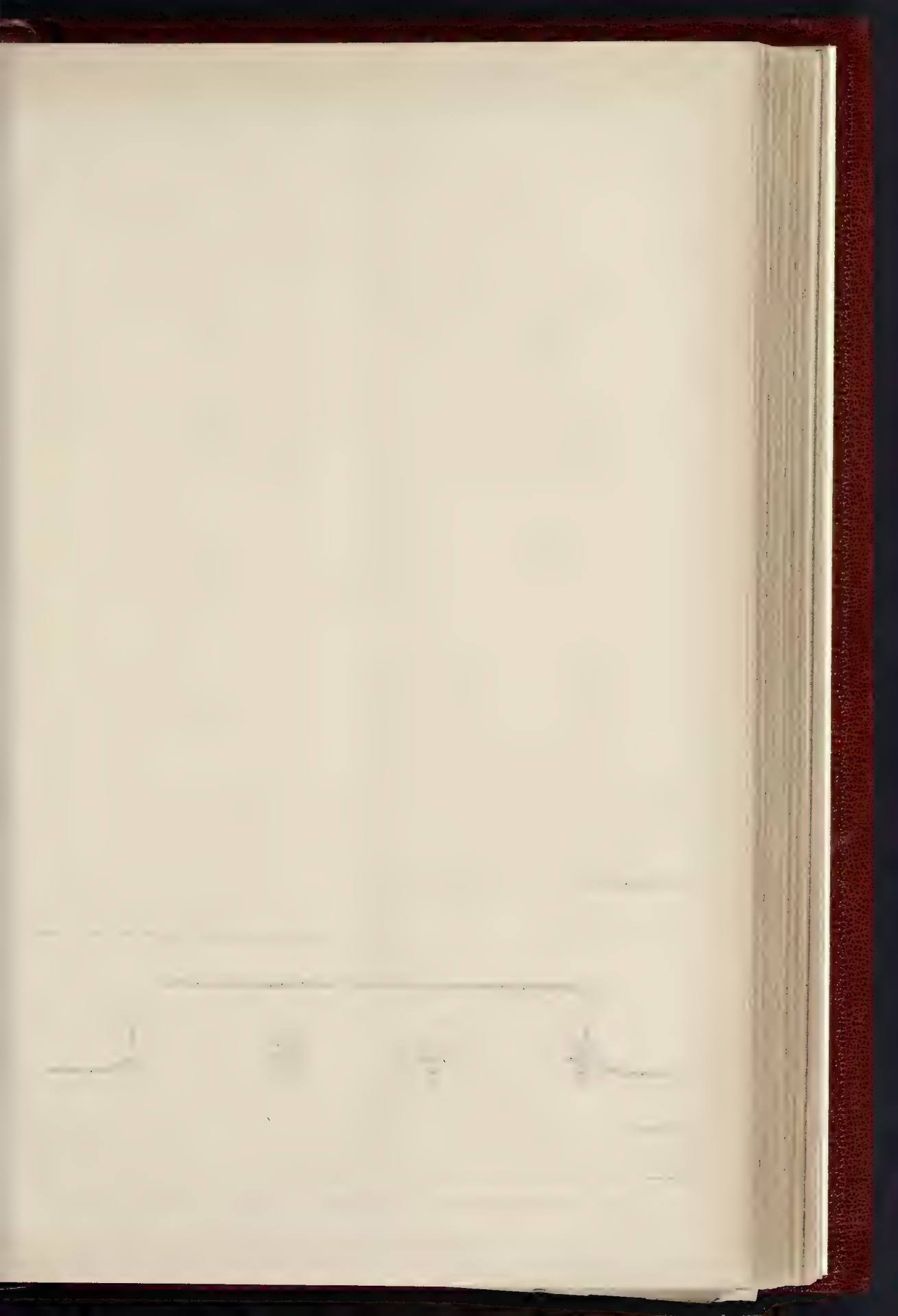




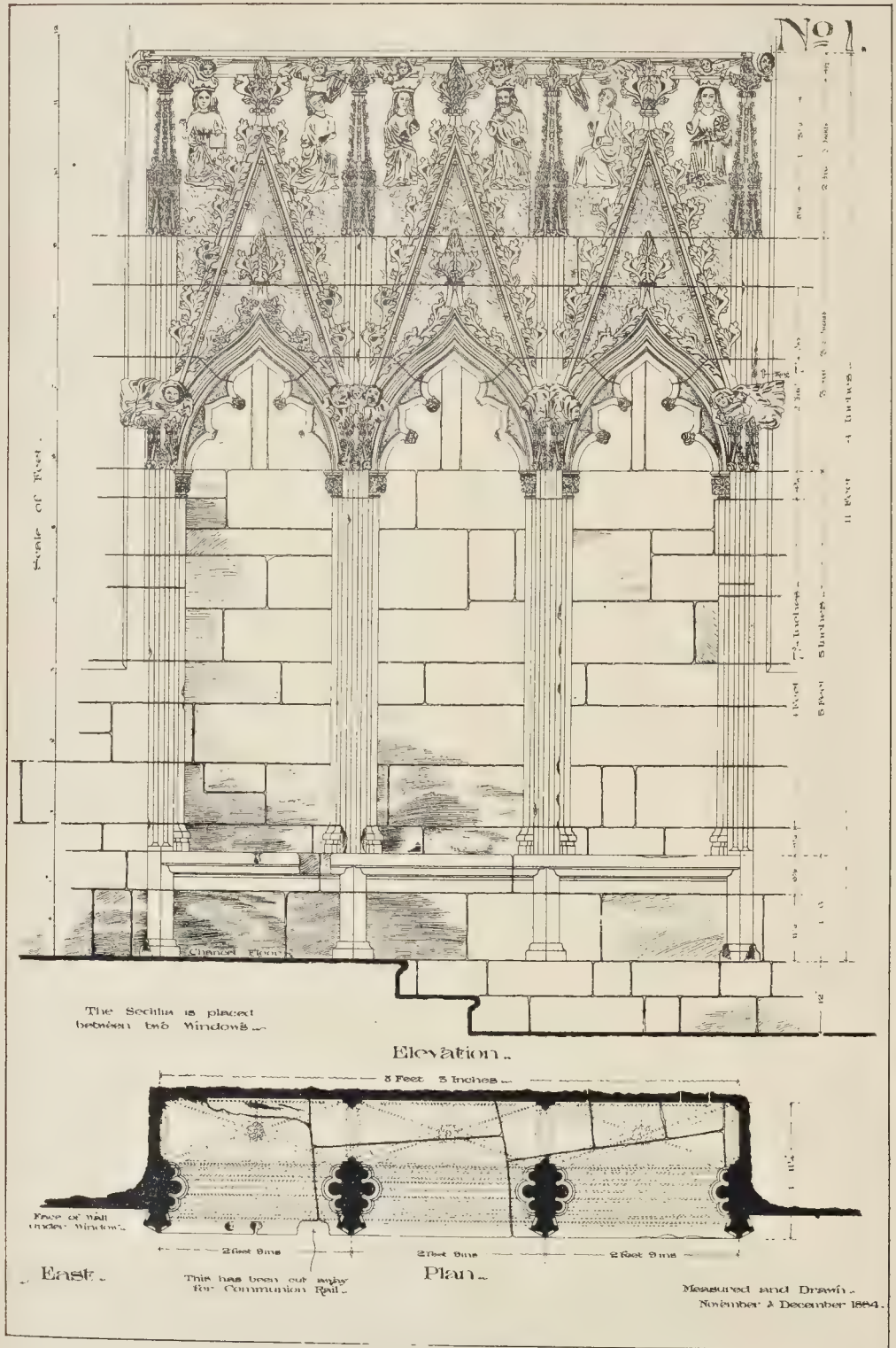




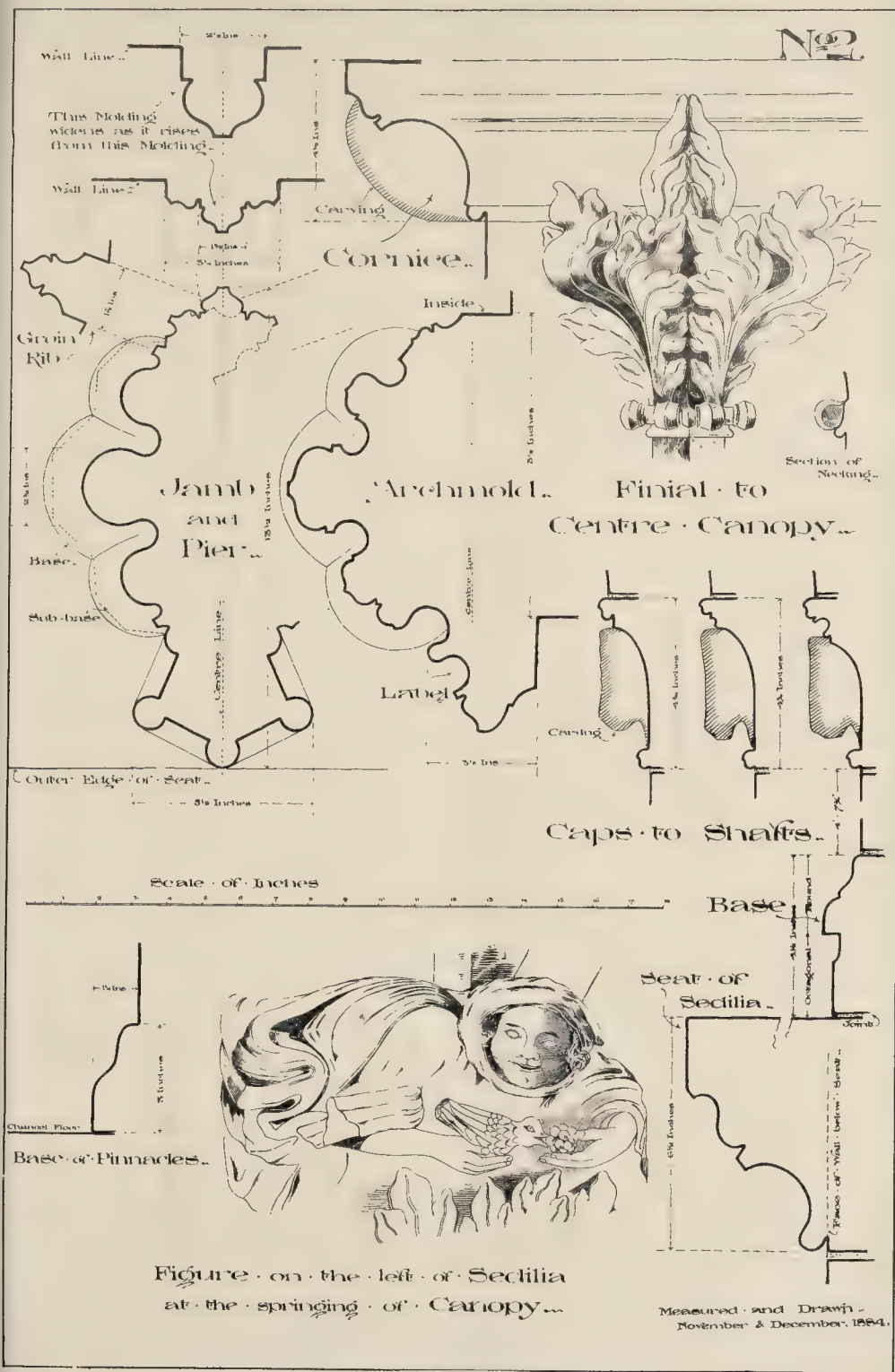








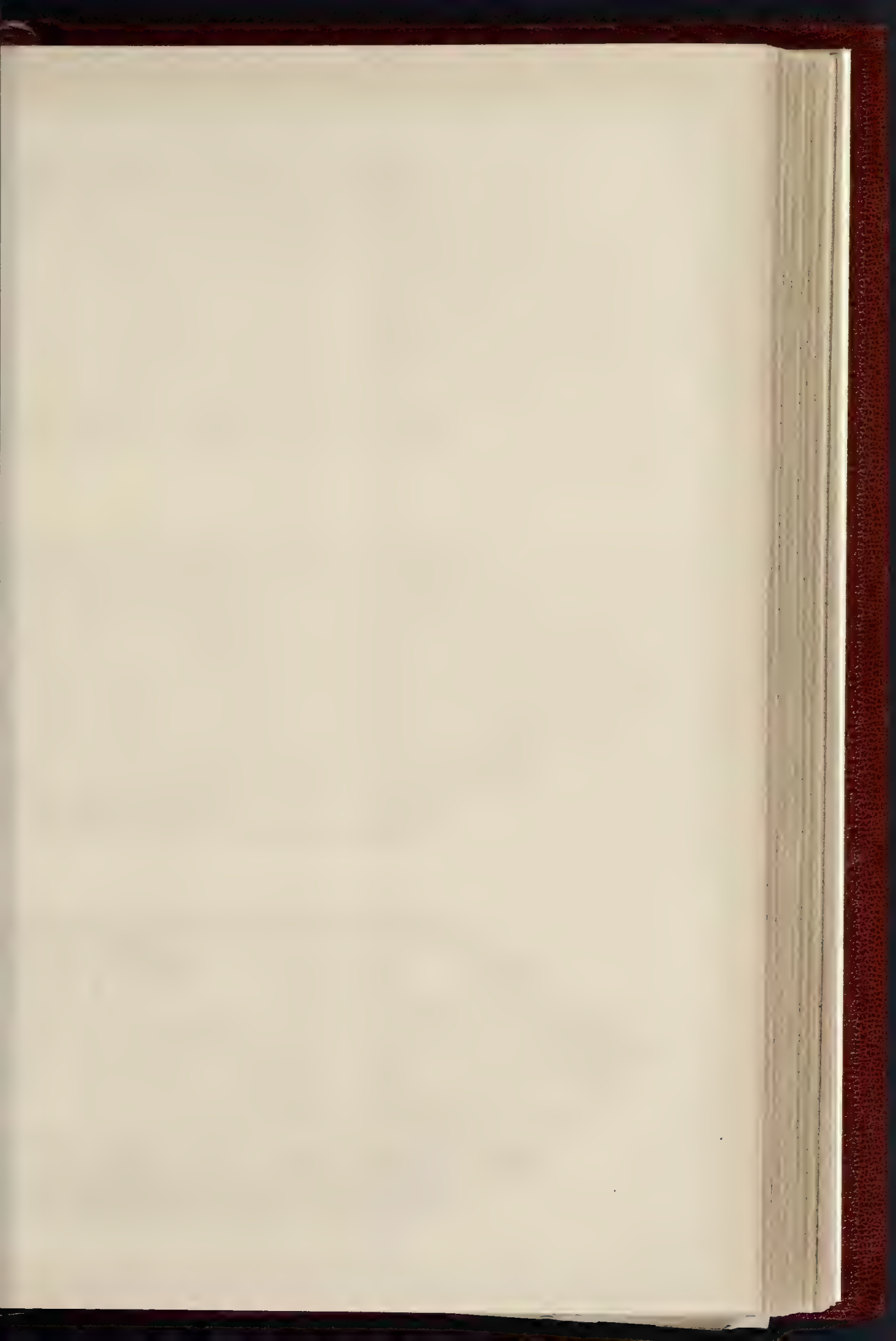
SEDILIA, HECKINGTON CHURCH, LINCOLNSHIRE. —FROM DRAWINGS BY MR. L'ONEL LITTLEWOOD.



SEDILIA, HECKINGTON CHURCH, LINCOLNSHIRE.—FROM DRAWINGS BY MR. LIONEL LITTLEWOOD.















C F Keil Facsimile & Printer



WINDOW, CHRIST CHURCH, OXFORD.

EXECUTED BY MESSRS. MORRIS AND CO., FROM THE DESIGNS OF MR. E. BURNES JONES, A.R.A.



8 Castle St Holborn London E.C.



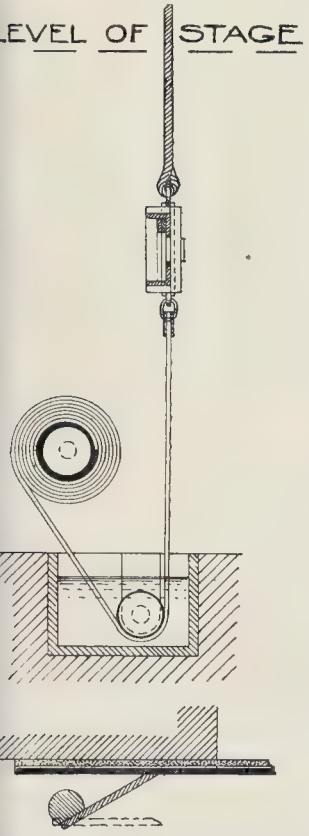


HEATH'S FIREPROOF CURTAIN FOR THEATRES.

We have had two opportunities of witnessing trials of Heath's patent fireproof curtain for theatres. Although, for obvious reasons, the trials have not been conducted on other than "model" scale, except as to the thickness of the curtain itself (which in the experiments has been of the same substance,—something less than  $\frac{1}{2}$  in. thick,—as would be used for a full-sized theatre curtain), the ordeals to which the curtain has been subjected, as detailed hereafter, have been very severe.

The curtain is made of canvas on the auditorium side, lined with Bell's spongy asbestos cloth on the side next the stage, both fabrics being quilted together. The roller on which the curtain is rolled is placed in the cellar of the theatre at the back of and close to the footings of the proscenium wall, and below any opening in the wall.

LEVEL OF STAGE



The upper edge of the curtain is fastened to a light iron lattice girder, extending about 6 ft. beyond the proscenium opening on either side, the ends of which slide in grooves and are mounted with friction wheels; from these ends chains or wire ropes pass upwards and over pulley wheels, and at their extremities are attached counterbalance weights exceeding the combined weight of the girder and curtain. In the cellar, and below the roller on which the curtain is rolled, is situate a tank or trough of water the length of the roller, and containing another roller (see diagram); and the curtain is carried under and round this roller and through the water, so that on rising the whole of the curtain is wet. Longitudinal traps are formed in the mezzanine and stage floors immediately over the curtain girder. The curtain is wound round the roller by simple friction and gearing, and kept in its place by a pawl dropping into the gear-wheel. At the ends of the proscenium iron flanges extend the whole height of the curtain, and when the

curtain has risen, these instantly and automatically pivot and close the edges of the curtain, clamping the sides and preventing the escape of smoke or flame (see lower part of diagram, which is a plan showing one side of the proscenium opening and one edge of the curtain clamped or pressed against the wall). At the same time the girder engages a lever which opens a sluice-cock in a water-main, which extends along the inside of the top of the proscenium opening, and is perforated with jet-holes, so that the curtain is kept wet all the time that it is up. This water can, of course, be supplied from a main or cistern.

The action of the whole apparatus is as follows:—On an alarm of fire being given, by merely touching with the finger a trigger which moves the pawl, the counterbalance weight descends instantly, and the girder and curtain rapidly rise from the trough of water through the traps in the mezzanine and stage floors to the top of the proscenium opening, the iron pivoted flanges on either side clip its edges, and the water main is turned on.

The model by which the apparatus was tested is, we were informed, one-eighth the size of Drury-lane Theatre, and the curtain is raised in one second and a half. In the actual theatre it would rise 40 ft. in about four seconds, with scarcely any noise or vibration, and could be returned to its normal position in about three minutes. The model is made of strong plate iron, strengthened by angle and tee iron so far as the stage is concerned; and of thin wood, painted, for the proscenium and front part of the stage. Between the stage and the front there is only the curtain. On the occasions of the experiments the iron stage part of the model has been filled with wood and shavings, sprinkled with petroleum, and when lighted an intense fire has been burning for more than half an hour at each trial, making the iron structure in parts red hot, while the temperature in front within 1 in. of the curtain has not exceeded 90°. After the trials the curtain remained intact.

We may add that it is proposed to paint the canvas or auditorium side of the curtain in oils, so that it may be made to look like a pictorial drop scene. But it appears to us that the tendency to shrinkage on the part of the constantly wetted canvas, tethered to its unshrinkable lining of asbestos cloth, will somewhat interfere with this proposal. It is further proposed, and rightly so, that the curtain shall be raised and lowered at least once or twice in the presence of the audience during every performance, to the end that it may be kept in proper working order, and become familiar to the audience. A question that occurs to our mind, however, is whether a large expanse of wet canvas (whether painted or not) would not have a decided tendency, if left exposed to the auditorium for any appreciable interval of time, to chill the house and to induce colds?

So far as could be judged from witnessing the trials referred to, the invention is one of much practical value. It appears to be only a question of mechanical arrangement to cause the curtain when drawn up to be closely clipped to or pressed against the proscenium wall. Daily use of the curtain, and frequent inspection of the water supply arrangements,\* should go far to ensure the safety of an audience, by preventing unreasoning panic in the event of a fire breaking out on the stage of a theatre. The new curtain, as it seems to us, will resist fire for a much longer time than would be necessary for the orderly and even leisurely clearance of the auditorium; but we are not so sanguine as its inventor when he confidently said that where his curtain is used insurance companies will be able to insure the auditorium of a theatre at 1s. 6d. per cent. They would probably be unwilling to do so, for, although the curtain might for an indefinite period, so long as it remained intact, resist the spread of fire to the auditorium, there is a possibility that a falling beam or girder would rend or tear the curtain, and thus impair or destroy its effectiveness. But this consideration notwithstanding, the invention is one well deserving attention by architects of theatres, theatrical managers, and authorities and officials more or less responsible for the safety of theatres.

\* It should be mentioned that the jets of water arranged as described to pour down the inside of the curtain would not come into play every time the curtain is raised, but only in case of fire. The water would be turned on simply by pulling the lever further over than would be required merely to raise the curtain.

CASE UNDER THE METROPOLITAN BUILDING ACT.

NEGLECTING TO GIVE NOTICE.

At the Marylebone Police Court on October 26th, Messrs. Dixon & Dows, of 31, Westbourne-terrace North, Builders, were summoned by Mr. H. Gundry, the District Surveyor of Paddington, for neglecting to give him notice of a building in the rear of 36, Hatherley-grove, for Mr. W. Owen, of Westbourne-grove. The defendants pleaded forgetfulness.

The District Surveyor said that he pressed this case from no motive of pique or profit, but to perform his duty. The defendants had in previous cases neglected giving notice of buildings, and he read copies of letters of complaint he had addressed to them on those occasions. In reply to the magistrate, the District Surveyor said he had not prosecuted the defendants in those cases. He further said that several of the works done for Mr. Owen in the conversion of private houses into business premises required great care and attention, as no other professional surveyor was employed. In one case the first information conveyed to the District Surveyor of works to the foundations of two of these houses was the news that they had fallen into the street. The defendants were not the builders employed on that occasion.

Mr. Mansfield imposed a fine of 3l., and 23s. costs.

"SHONE'S EJECTORS IN THE RECENT RAINSTORMS."

THE following letter was sent to us too late for publication last week:—

SIR,—I avail myself of your kind offer to accord me space in this week's issue of your paper, to reply to Mr. Donaldson's letter which appeared in the *Builder* on the 15th of October.

1. The ratio of power to work is strictly according to the theoretical calculations, and is very moderate for low lifts, but somewhat greater than for direct pumping for lifts above 45 ft.

This ratio is greater than is shown by calculations which were made public by Mr. Donaldson some time ago. He did not then, however, take into consideration that air compressed adiabatically cannot be credited with a larger volume than air compressed isothermally, because the larger volume is entirely due to the higher temperature, which, in cases where the air compressors and the ejector stations are widely apart, disappears before the air gets into and out of the pneumatic ejectors. So far as my experience goes,—and I may say that Mr. Donaldson has never had any practical experience of my system,—it entirely confirms theoretical calculations as to all possible losses. Where these losses exceed the calculated losses, they must be due solely to bad workmanship and materials, as every practical engineer will be aware.

Mr. Donaldson's statement, therefore, that "the excessive value of the ratio of power to work which Mr. Shoue, after about ten years' experience, has found it necessary to adopt, proves conclusively, &c." is the creation of his own imagination. It has no foundation in fact.

2. Mr. Donaldson's statement as to whether or not I was the responsible engineer, requires no answer.

3. It is not stated in the pamphlet presented to the Members of the Imperial Legislature that the 12-in. pipe connecting the manhole with the metropolitan sewer would "act automatically as a storm-water overflow when the pumping-power is overcome."

There is both a reflux valve and a sluice valve on this pipe, which are kept shut, and the 12-in. pipe is also syphoned, so that it is not possible for the "sewer gas of the city sewers" to flow back into the palace sewers, neither is there any free communication between the palace sewers and the metropolitan sewer, by means of this 12-in. pipe.

4. The height of the sewage in the metropolitan sewer and in the subway close to the ejectors can be distinctly seen by the water-marks left behind. Even comparatively clear river or sea water will leave a distinct high-water mark; and sewage-marks are quite unmistakable. But independently of such marks, the height in both cases can be correctly ascertained by the special apparatus provided for the purpose,—vide my pamphlet\* just issued.

Apocryphal of this aspect of Mr. Donaldson's criticism, let me quote what he himself wrote to the late Lower Thames Valley Main Drainage Board when he was urging the adoption of my system for the whole of the Lower Thames Valley drainage district. He wrote as follows:—"By the use of the ejectors the two following most important advantages are gained."

(a). "No reservoirs for the temporary storage of the sewage will be required either within the limits of the drainage area, or at any point between those limits and Bixley Moor."

(b). "Directly the sewage reaches the ejector stations it flows into the ejectors, which discharge it, whilst quite fresh, into the sealed iron mains, so that, in a sanitary point of view, the system we shall recommend will be absolutely perfect."

E. & F. N. Spon.



5. The maximum air-pressure used, so far, is about 11 lb. per square inch.

6. Mr. Phillips stated the acreage correctly; and I believe that he is right, too, in putting the maximum rainfall of the 17th of August last at the rate of over 1 in. per hour. This is the rainfall, he observed, which Mr. Donaldson stated at the meeting of the Society of Engineers on April 3rd last would yield 3,000 gallons per minute for the ejectors to deal with; and this is the rainfall which he prophesied would disable the Shone installation, submerge the subway, and inundate the basement of the palace. And, Noah-like, in his letter to you, he warns the officials to be on the look out, lest any valuables should be damaged when the deluge does come. But, unlike Noah, his prophecy as to what would follow the deluge proved to be false.

The facts as regards the rainfall of the 17th of August last are briefly these:—Mr. Symons, in his instructive monthly *Meteorological Magazine* for October, says, "As mentioned in our last issue, the thunderstorm which occurred over the metropolis on the evening of August 17th was one of exceptional intensity, and the most severe for several years. . . . At Camden-square rain commenced at 5.50 p.m. and ceased at 9.15 p.m."

In 1 hour, from 7 p.m. to 8 p.m., 1.24 in. fell.  
In 30 mins. " 7 " 7.30 " 45 "  
In 30 " " 7.30 " 8 " 79 "  
In 22 " " 7.42 " 8.4 " 66 "  
In 10 " " 7.46 " 7.55 " 50 "

According to the above record, in 30 minutes .79 in. of rain fell; or, at the rate of 1.58 in. per hour, or 37.92 in. per day of 24 hours; and in 10 minutes .50 in. fell, or at the rate of 3 in. per hour, or 72 in. per day of 24 hours. If this is not phenomenal and tropical for England, as stated by Mr. Phillips, I should like to know what is.

If we only add the 1.58 in. per hour, as above, to the .59 in. per hour recorded by the Meteorological Office in Victoria-street (whose facilities for gauging are not, I understand, as complete as Mr. Symons's are), and take the mean of the two quantities, we have a rainfall of 1.08 in. per hour; and yet the Shone installation did not fail. The subway was not submerged, nor did a drop of rain find its way on to the basements of the palace. These are hard facts which Mr. Donaldson cannot, and will never be able to, calculate away.

Mr. Donaldson is now compelled, reluctantly, to admit that the inlet-pipes to, and the outlet-pipes from, the ejector are 6 in. and not 5 in. in diameter, as persistently stated by him, and upon which latter size his conclusions as to the capacity of the installation, viz., 1,000 gallons per minute, as given to the Society of Engineers, was based.

His assumption that the area of the valve passages of the ejectors is not equal to two-thirds of the area of the 6-in. pipe is quite erroneous. It is, in fact, 2½ times greater than the area of this pipe.

He also over-estimates the friction in the pipes. It is quite certain that the co-efficient of friction diminishes very sensibly as the velocity increases, which hydraulic fact, apparently, Mr. Donaldson ignores.

Moreover, Mr. Donaldson seems to be ignorant of the fact that the gas engine is, as a rule, worked at half power.

The turning of a handle makes the air-compressing cylinder single-acting, and even this single and only compressing air half the time, as the action of the inlet valves is stopped automatically as soon as the standard pressure is reached.

When, therefore, Mr. Donaldson states that he observed that the 500 gallon ejector occupied about forty-five seconds in discharging its contents, it must be understood that owing to this mode of working, the air pressure sinks quickly when the 500 gallon ejector discharges; and when two ejectors discharge together or immediately after one another, the pressure goes down to about 5 lb., and then the sewage is not discharged any quicker than the compressed air is supplied, i.e., at the rate of from 150 to 200 gallons per minute. The power exerted by the gas engines is not constant, but varies according to the work done. No wonder, therefore, Mr. Donaldson's calculations should give erroneous results when they are based on erroneous data.

7. I specified a 500-gallon ejector because I felt sure that the head of water available during a thunderstorm would be sufficient to force sewage through 12 ft. of 6-in. pipe at the rate of 1,000 gallons per minute, and a pressure of 11 lb. per square inch, steadily maintained, is sufficient to force it out at the same rate. I deny that the 500-gallon ejector will discharge no more than the 350-gallon ejector.\*

8. The power of a gas engine is, as already stated, not constant, but varies according to the number of explosions in the gas cylinder. Anyone familiar with steam engine trials will know the difficulty of obtaining correct results with one single motor, working continuously, and will understand the extreme difficulty of obtaining trustworthy results with a plant of gas-engines, air-compressors, and ejectors, each of which is working intermittently.

\* The minimum lifts are not exactly alike in both ejectors, and, owing to the shape of the larger one, a greater volume of sewage is ejected with the same air-pressure than is the case with the smaller one; and, as it is absurd to say that the discharging capacity of the larger is only equal to that of the smaller ejector,

As near as I have been able to ascertain, it takes sixteen indicated horse-power to lift 1,200 gallons of water 25 ft. high, which is equal to doing 9-h.p. actual work.

The question is, where is the pump that will give better results at one pumping station? To set aside for the moment the sanitary aspect of the question, so admirably explained by Mr. Donaldson in (4) herein, I may state that I have never yet seen a pump that will take 10 gallons or 1,000 gallons per minute of raw unscrubbed sewage automatically at one pumping station on the old lines, and certainly I have never yet seen or heard of any apparatus which can be actuated as my ejector can be at a dozen, more or less, stations one mile or more apart, without necessitating the erection of more than one pumping station, the work being done with a degree of economy almost equal to that which is obtainable at one pumping station on the old lines.

9. With regard to storing rain-water in the old sewer: the new 12-inch sewer is laid at an average gradient of 1 in 179. It is also well ventilated and flushed, and is not, and never will be, foul.

The contamination of the rain-water flowing through it is inappreciable, and the subway or old sewer is only used for storage when the rainfall is enormously excessive.

The ordinary flow of sewage is only 50 gallons per minute, and 1,200 gallons of water can be stored in it, would, therefore, dilute the sewage twenty-four times. Sanitary engineers consider that sewage when mixed with four times its volume of clean water is practically harmless and fit to turn into rivers, &c.

If the subway were filled with such water, it would only take the ejectors about one hour and a half to take the water out of the subway, for such empty, so that there would be no time for the waters to become offensive. But, before the old Palace sewer was altered by me, this subway formed the major part of the sewer, which was always more or less submerged with foul sewage waters flowing back from the metropolitan sewers in periods of heavy rainfall, and especially so in periods of moderately heavy, but steady rain, for some time.

(10.) With regard to the ventilation of the subway, I must repeat what I told Mr. Donaldson at the meeting of the Society of Engineers, viz., that the air in it is as sweet as in any ordinary room. The gratings in the courtyards are not air outlets, but air inlets, and fresh atmospheric air is drawn through them into the subway and is carried away by the upcast shaft in the Clock Tower.

Nothing but a radical reversal of the law of gravitation (or some malicious act) can alter this state of things. I say, therefore, it is absolutely untrue that foul air proceeds from the ventilating holes in the gratings on the manhole cover over the pockets of the subway.

The Office of Works are now busily engaged in altering and building anew a number of the old drain connections, with the new 12 in. main sewer, and possibly smells may have proceeded from some of these, with which I did not interfere, and with the condition of which I am consequently in no way responsible. But to state that the smells, if any, proceed from the subway, and from the new 12-in. sewer, is to state that which is absolutely false.

In conclusion, I desire to say that if this correspondence should happen to be seen by any one really and honestly interested in my hydro-pneumatic system, I wish he or they would put my veracity, as set forth in the letter, to the test.

My firm (Shone & Ault) is prepared to undertake the designing and carrying out of engineering works on the Shone system, on the distinct understanding that they shall not be paid their commission until the results calculated by us in the first instance have been verified by actual work done. More I cannot do in support of what I have advanced in this letter against Mr. Donaldson's subtle and uncalled-for criticisms of me and my hydro-pneumatic system of house and town drains.

4, Westminster Chambers.

ISAAC SHONE.

#### ON THE SIZE OF HOUSE DRAINS, AND THE USE AND MISUSE OF TRAPS.

SIR,—Anything coming from Mr. Honeyman is bound to command attention, and so will the paper he read to the Bolton Congress of the Sanitary Institute, as published in the above heading on pp. 492 and 509 of the *Builder*, (October 1st).

I am sorry to find, however, that I cannot agree with much that he says. He seems to me to sacrifice the practical to the theoretical.

Mr. Honeyman says that thirty years ago he blamed the sewers for the frequent recurrence of epidemic diseases in the dwellings of the West-End better-class citizens of Glasgow, which were highly elevated. It so happened that about ten years ago a cry was got up against the sewers here from the same quarter, and I am not sure but damages against the city were called for. I thereupon published in one of the Glasgow papers that there was no use of these highly-elevated West-End rich people blaming the public sewers for bad smells in their houses, as these, in my opinion, arose from defects in their own drains. Most or all of the houses have had their drainage improved since, and I think it was found that if there were faults connected with the sewers, the private bad drainage was, perhaps, the

chief cause of the evils complained of. It was generally easy to look off the air of the public sewer from the house by means of a good disconnecting-trap, but it often cost a good deal to sort the leaking drains and soil-pipes, &c., on the house side of the said trap.

It is not ventilation of the public sewers, as Mr. Honeyman's words seem to imply, that has made our high West-End houses healthier now than they were ten years ago: so I think Mr. Honeyman's deductions here are fallacious.

As to what is said on p. 492 about the oxygen in the atmosphere destroying microbes, we must take this *cum grano*, as we elsewhere read lately that the spores or eggs of some would come to life after passing through strong acids and hot or boiling water. I therefore think it is a mistake to suppose that by merely enlarging the house-drain in the manner Mr. Honeyman shows on p. 509, any escape of air from it into our houses would do no harm. In my opinion, the stinking air and particles from and off his lower 4-in. pipe would, in the course of time, foul the whole inner surface of his upper 12-in. drain, and so, in the long run, matters would be worse instead of better, while the expense of this extra large and peculiarly-shaped pipe would be enormous.

If an alteration is wanted in the present round drain-pipe, that of 6 in., or Craig's 6-in.,—less or more,—egg-shaped pipe with a flange at the surface, fouling than the style shown by Mr. Honeyman, and could be nearly as easily used as the ordinary drain-pipes.

On p. 509, Mr. Honeyman asks a very important question in saying, "Do we in practice ventilate our drains sufficiently to secure the best results?" He thinks not, because the drains are not large enough. Now the great point here is, what are the "best results"? In reply, I say what is safest for the inmates and best for the general health of the community. In this view, making the drains larger would do more harm than good. The extra ventilation Mr. Honeyman desires would contaminate the general atmosphere of our towns all the more (and it is bad enough already), without doing a particle of good to the safety of our houses. These are best protected by keeping the drain air out of them, and the experiments made by Dr. Carmichael, of Glasgow, clearly proved that one good water-trap is worth all the ventilation in the world that can practically be given. Even when fully exposed in the open air we often find that fish stinks abominably: so when this is the case, how, in the name of common-sense, could the confined air in a 12-in. pipe prevent it?

Further, in the case of soil-pipes I should like Mr. Honeyman to explain how he imagines that these would be or could be any better aerated by the air from the lower 2-in. drain-pipe, already partly contaminated, than by fresh air direct from the atmosphere, as is being done at present by himself, and by me and others.

He might as well tell us that it would be an improvement to add a teaspoonful of ink to the clean water we wash our faces in.

I consider that to go to the great expense of laying a new drain 16 in. by 12 in., as illustrated by Mr. Honeyman on page 509, in place of ordinary 6-in. drain-pipes merely for the purpose of greater aeration to the drain would be a great mistake and a pure waste of money,—the game is not worth the candle.

The sectional system of house-drainage, when properly done, with ordinary-sized pipes and no more inlet ventilation than is strictly necessary, is much safer and better than the plan proposed now by Mr. Honeyman. To make the fresh-air inlet of the drain "twice the size of the outlet" as proposed by Mr. Middleton, on page 510, is absurd, especially when the inlet is on the ground level, as the wind there sometimes sucks the air out. Instead of being larger I assert that the fresh-air inlet might, with advantage, be only a quarter, or less, the area of the outlet, provided the outlet is not less than 4 in. in diameter.

Experimenting with a 6-in. drain lately which had a 4-in. iron blow-off pipe carried up to above the chimney, and with one of my fixed exhaust ventilators on top, I found the air entering the 6-in. eye inlet from the house side of the trap at the rate of 80 ft. a minute. I then contracted the inlet area to only 2½ in. diameter, when the air rushed in at the rate of 400 ft. per minute through the 2½ in. inlet.

Mr. Honeyman is not very logical when he upholds the virtue of the water-trap for locking off the sewer air, but condemns it as useless for locking off drain air from either soil-pipes, rain-water pipes, or gullies, and wants all these used so as to bait "purify" or ventilate the drain. He forgets that by his plan he is sacrificing the people for the sake of an imaginary benefit to the drain.

I deny Mr. Honeyman's assertion that "by a multiplicity of traps we create a multiplicity of obstructions and deposits"; that is, if the traps are properly used. In practice, and in or at many houses I find the opposite the case, and the plumber has more opportunities of doing us to this, after the work is done, than the architect.

I do not agree with Mr. Honeyman that the grease-trap of the sink should be inside. I consider it should be outside, and especially if the sink be next an outer wall. A grease-trap inside generally



uses offence when being cleansed, and especially done carefully.

I also oppose very strongly Mr. Honeyman's idea of a valve closet, third column, that a valve closet should any water be used, it is a "superior" apparatus." I consider it a grand appliance for "manufacturing diphtheria." Even supposing Mr. Honeyman's new drain-pipe could have its atmosphere like "the pure air of heaven," the sides of a vertical soil-pipe might *per se* be contaminated, after the water-flush dried in the pipe, disease-producing particles might get dislodged, and be carried up through the closet, if the valve were not tight, and so kill a child looking into the closet, as children often do. Mr. S. S. Hellyer, of London, as I write strongly of the advantage of having a water-trap below a valve closet.

I am very sorry to find that I differ so far from Mr. Honeyman in what he has said. I would have heard him advocating the necessity of having purer air in our sitting-rooms and bedrooms. In most cases, the air of these is far from being as pure as it should be. W. P. BUCHAN.

Glasgow, October 8th, 1887.

# LIBERALITY OF THE GUILDFORD RURAL SANITARY AUTHORITY.

SIR,—I was startled by an advertisement in the *Free Advertiser* for a competent inspector of houses at the enormous salary of 150*l.* per annum, to include travelling expenses, and out of which he is to keep a horse and conveyance and devote his whole time to the duties of the office. I doubt in these times of keen competition there will be a large number of candidates for this very attractive appointment,—possibly even some good ones amongst them. But what I wish to know is whether the Guildford Rural Sanitary Authority really think it possible for any one to keep up a respectable position on 150*l.* per annum, keeping a horse and trap, and paying all travelling expenses, besides resisting the temptations of the numerous bribes to which a man in this office is so frequently offered to overlook his affairs? The subject does not require much going into to see which is the better offer, the journeying in constant work (and there are plenty of them) in these slack times) with 30*s.* per week, or a sanitary inspector with 150*l.* per annum, and, probably, has worked many extra hours and his daily work to obtain the necessary knowledge to fill this office.

NOT ONE OF THE CANDIDATES.

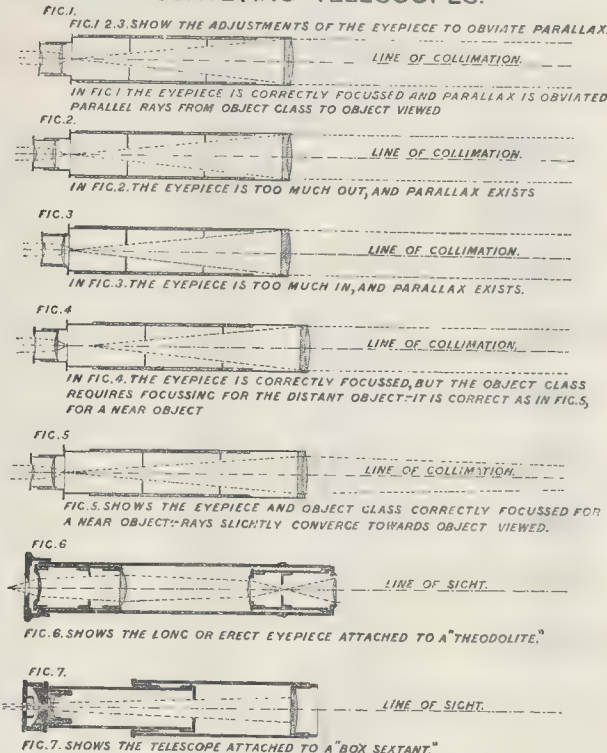
## THE FIRE AT WHITELEY'S.

SIR,—Referring to your note at p. 591 on Mr. Ker's evidence [p. 615] before the coroner as to "pushing-out" action on the walls "arising from the great expansion of the ironwork," it may be interesting to place on record our observations at the large fire which took place some two years ago at the Bromley Rice Mills at Bow. There the work of the thick and high walls had been so aged against from the interior as to slide on its own weight, the girder line it was moved, and the roof overhanging the ground below to the extent of over half an inch, and this at levels where the walls which were weighted with several incumbent stories. There was no other indication of the movement than that it was caused by the direct expansion of the iron floor girders at short distances apart, the ends of which were in contact with the walls. It should, however, be noted that these girders were of cast iron.

A. & C. HARSTON.

**Building in St. Bride-street.**—The whole of the vacant land on the east side of St. Bride-street, a large portion of which remained unused for some years after the completion of the street, is now covered with buildings of a desirable character. Two large blocks are on the point of completion. The St. Bride-street frontage of the two blocks at the junction of Stonecutter-street is 270 ft. long, being two-thirds of the entire length of the block. The principal block has a frontage of 110 ft., with a return frontage of 200 ft. long on Stonecutter-street. It is a lofty building of four, nearly 80 ft. in height, and is intended for warehouses, shops, and offices, there being upwards of one hundred of the last-named of apartments. The elevations are faced with white Suffolk brick and stone, each floor having a range of fourteen three-light windows. Mr. Groom, of Broad-street-buildings, is the architect. The adjoining block, which contains four floors, is faced with red brick, with fluted piers in the gables. Carved stone bands and friezes are carried across the frontage at the foot of each floor.

## SURVEYING TELESCOPES.



## The Student's Column.

### LAND SURVEYING AND LEVELLING.

#### XIX.—SURVEYING TELESCOPES.

FIGS. 1 to 7 illustrate the ordinary forms of telescopes used in field work, figs. 1 to 5 applying to a level, and figs. 6 and 7 to a level staff. The cone of rays formed in each case between the eye-piece and the object-glass is shown by dotted lines upon this diagram. Having carefully set up the instrument as explained by figs. 1 and 2 in *Builder*, May 7, p. 686, the eye-piece must be first adjusted for parallax. When the image of the object viewed, formed by the object-glass, either falls short of, or beyond the place of the cross hairs, the error arising from this cause is termed parallax, and the purpose of the adjustment is to make the focus of the eye-piece coincide with the focus of the object-glass. If this adjustment is perfect, the image of the object viewed will appear to coincide with the cross hairs when the eye is moved backwards and forwards, as explained in the *Builder*, March 5, p. 369. If imperfect, the image will appear to waver when the eye of the observer is moved. When the image appears to shift in the opposite direction to the head, the eye-piece must be drawn out a little further; when in the same direction, the eye-piece must be drawn a little inwards. So long as the eye-piece remains undisturbed, the process need not be repeated for the same eye, but would in all probability need alteration to suit the eye of another person. The position of the object-glass with reference to the eye-piece will need alteration at every change of distance of the object viewed, as shown in figs. 4 and 5. The focus of a large lens is always a small circle,—not a point, as indicated in the diagram,—but no real image can be formed, as there is no screen to receive it. The rays simply meet at a point called the focus, and proceed on their course through the several lenses composing the eye-piece. The rays are always turned out of the eye-piece parallel to one another, and then the eye of the observer focusses them upon the retina. The

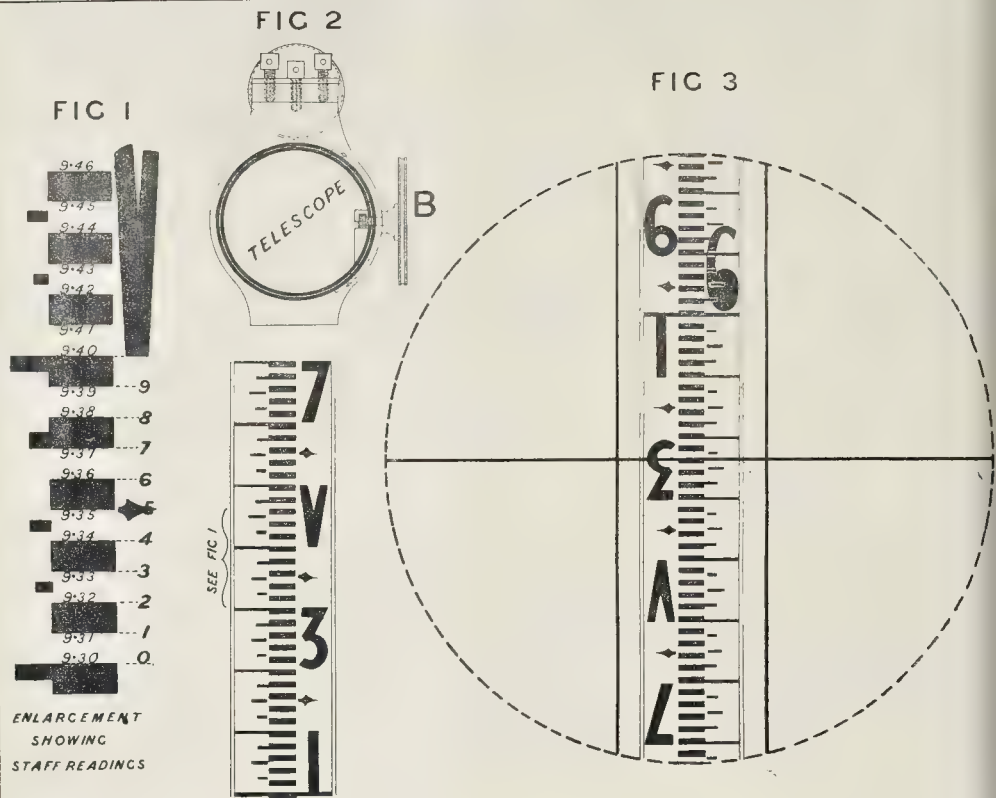
rays between the object-glass and the object viewed slightly converge towards a near object (fig. 5), but the more distant the object the more parallel do these rays become.

An object-glass may be formed of two or more lenses. Two lenses are the most common, the number employed depending upon the circumstances of focal length and aperture. Both the dispersive and refractive properties of the lenses have to be considered by the maker. Three lenses are considered to provide the most perfect achromatism (see *Builder*, March 5, p. 369). One advantage of the use of three lenses in an object-glass is that the outside lenses protect the central flint glass portion and prevent it becoming stained and tarnished. A flatter surface can also be given to the lenses when three are employed, and a sharper definition of the object viewed provided. The lenses must have a common axis. The axis of the telescope should be parallel with the axis of the cylindrical pieces in which it is held in the Y's, but the exact coincidence of the cross hairs with the axis of the telescope is not absolutely essential to correct levelling.

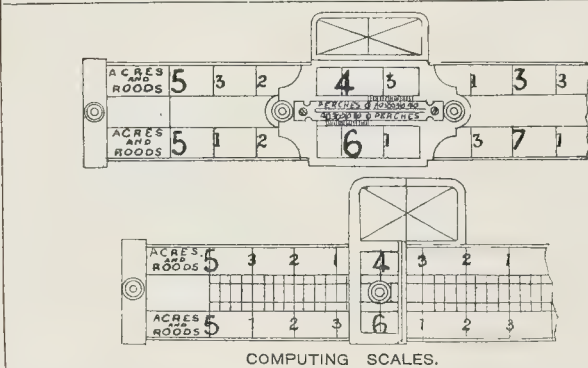
The cross hairs consist of single threads of a spider's web placed in a sliding frame forming a diaphragm, as shown in fig. 3 (*Builder*, April 23, p. 624). These spider's lines are extremely fine, and, at the same time, perfectly opaque. Other fine material is apt to be slightly fringed along its edge, and to cause confused vision when magnified. In adjusting the horizontal cross-hair so as to make the line of sight (technically called the line of collimation) parallel to the ran of the outside bubble, when set level (*Builder*, April 30, p. 657), if we slack one of the vertical collimation screws slightly, and tighten the opposite one, we can adjust the horizontal cross-hair so as to obtain accurate results in levelling, although the cross wire may not traverse the axis of the telescope. Strictly speaking, each time the object-glass is removed this adjustment needs testing.

Fig. 1 shows a detailed explanation of the decimal divisions upon a level staff (see fig. 2). Fig. 3 shows the amount of field included in the vision under ordinary circumstances. With the





DIACRAM ILLUSTRATING THE READINGS UPON A LEVEL STAFF



use of a positive eye-piece an inverted image at the common focus of the object-glass and eye-piece is formed within the diaphragm plate, and the staff is read upon the horizontal line in which this focus appears.

## COMPUTING SCALES.

\* \* \* One of the two annexed illustrations shows a form of computing scale with one set of divisions thereon indicating acres and roods, the perches being read upon the attached ivory scale as explained in the *Builder*, October 29th, p. 618. The second illustration shows Merrett's computing scale, in which one metal frame can be applied to various scales. In the instrument used by the Tithe Commission office these scales were seen in our illustration (*Builder*, October 29th, p. 618) to be engraved one under the other upon the same scale and upon the same side of it. In our description of the Planimeter

last week the word "the" should be "ten" upon line 4 from the end of column 3, so that the whole line reads "horizontal wheel M records ten square units in," &c.

**Terry's Theatre.**—We are asked to say that the electric light fittings in this theatre were carried out by Messrs. Vaughan & Brown, not by Messrs. Verity. We took the name from the account originally furnished by the architect.

**Restoration of Capesthorpe Hall Chapel, Cheshire.**—The chapel attached to Capesthorpe Hall, the seat of Mr. W. Bromley-Davenport, M.P., has just been re-opened by the Bishop of Chester, after a thorough restoration. The cost has been about 5,000l. Messrs. H. & F. Lea, of London, were the contractors, and the stonework has been entrusted to Mr. Leadbeater, of Alderley Edge.

## CHURCH-BUILDING NEWS.

**Cleckheaton (Yorkshire).**—The foundation stone of the Church of St. Luke, Cleckheaton, Yorkshire, has just been laid by the Bishop of Ripon (Dr. Boyd Carpenter). The church, which is being erected from the designs and under the superintendence of Mr. Medland Taylor, architect, of Manchester, is in the Geometrical Decorative Gothic style, and consists of a nave, north and south aisle, and chancel. The aisles are carried round the western end of the nave, which terminates in a semi-hexagonal apse, at the extremity of which is the baptistery, an unusual and picturesque arrangement. The chancel well raised, seven steps leading up to the altar. The windows are mostly tracied, those in the clearstory being square-headed and simpler in character than in other parts of the building. The floor is of wood blocks, with tiles in the chancel and passages. The principal entrance to the church is by a south-western porch and the tower. There are other doors at north-west and south-east, making in all three exits. Advantage has been taken of the natural slope of the ground to form a parish room as choir vestry, which extend under the whole of the chancel, and from which a spacious staircase leads up into the church. Accommodation is provided for 650 persons, the seating being all free and unappropriated. The church will be built entirely of stone, both inside and out. There will be no plaster. The contract for the church, with tower, spire, parish room and all fittings complete, has been taken by Messrs. J. & W. Beanland, builders, Bradford, for the sum of 5,000l.

**Exeter.**—There has just been added to St. Sidwell's Church, Exeter, some new stalls of English oak. The new stalls stand upon platforms, and each seat measures 12 ft. 6 in. long. The fronts are of open tracery work divided by uprights, upon which occur crockets and pinnacles. The seats have their backs carved

d traceried. The stalls have been designed by Mr. R. Medley Fulford, F.R.I.B.A., of Exeter, and have been made by Mr. Harry

Macclesfield.—The Bishop of Chester consecrated, a few days ago, the Church of St. John, Macclesfield. The foundation-stone of the edifice was laid in September, 1884, but the lands only permitted of the erection of half of the nave, and for three years service has been conducted there, it having been licensed for at purpose by the Bishop. Congregations came so overcrowded, however, as to render the completion of the plan imperative, and Mr. Comley-Davenport, M.P., laid the foundation stone of the extension. The style of building is of the thirteenth-century. The nave has arched bays, with two side aisles, and is 50 ft. in height; there is an apsidal chancel, 31 ft. by ft., with an organ-chamber on the north side, and two vestries for clergy and choir on the south side. The church is seated for 300. A stained-glass two-light window, of which the subjects are the "Crucifixion" and "Moses leading the Brazen Serpent," has been placed in the east-end window. The cost of the building will be about 6,000. Messrs. Valmister & Sons, of Macclesfield, were the architects, and Mr. Haywood, of Alderley Edge, the contractor.

Plymouth.—The consecration of St. Matthias's church, Plymouth, took place on the 25th ult. The building is in the Perpendicular style, and consists of nave, north and south aisles and arches, chancel, with vestry on the north side of organ-chamber on the south, and tower at the west end of the nave. The tower is about 10 ft. high, and is of the Somersetshire type, the belfry windows filled with open traceried work. It is terminated by an embattled parapet with corner pinnacles. The nave from the tower-arch to the chancel is divided from the aisles by five bays of four-centred arches.

Bath stone springing from moulded piers, and columns with red Mansfield stone shafts. Bath stone moulded caps and bases, and is started by three-light traceried square-headed arched windows, with stone relieving arches. The side aisles are lighted by three-light arched windows. The chancel, divided from the nave by a moulded two-centred arch, having relieving arch over of green polyphant and Mansfield stone, is separated from the organ-chamber by a four-centred arch, and has the east end a traceried window of seven lights. On the north side are three two-light windows above the vestry roof. The roofs of the nave and of the chancel are of oak and pitch beam, and are of hammer-beam construction, the main portions having moulded with traceried arches and moulded and carved cornices, the chancel the trusses are borne by angels, captured in stone. The organ-chamber roof of similar form to that of the chancel. The piers and chancel-stalls are of oak. The font of Beer stone and Devon marble, and the capital is of oak, on a base of marble and freestone. The glazing has been executed by Messrs. Fournace & Watson, of Stonehouse. The chancel pavement is from the Worcester series, and the other pavements of tiles have been obtained of Messrs. Woolcroft.

The church is warmed by Porritt's underground air-warming apparatus. The building is erected of Plymouth limestone, lined with Horrabridge brick, the dressings and moulded and traceried parts being chiefly of Box Ground and Sumson's pinks Park stone, Portland stone being employed for the more exposed parts. The vestry and side aisles are covered with lead, the other roofs with Delabole slate. The wood and stone carving has been executed by Mr. Hems, Exeter. The church will accommodate about 200 people. The architects were Messrs. Hine & Odgers, the contractors were Messrs. Finch & Son, Plymouth. Mr. Waymouth has been clerk of works.

Shushtoke.—The parish church of Shushtoke, which was partly destroyed by fire through lightning in June of last year, was re-opened by the Bishop of Worcester on the 25th ult. The church penetrated the walls of the nave to the extent of five or six inches, and these have been up with red and grey sandstone from the Green, and surmounted by a cornice of Millington stone, with carved corbels under the principals. Above is a carved wooden cornice connecting them with the roof. A latter, which is of pitch pine, is of wide oak. It is divided into five large bays with principals arched up to the tie-beams, and

ornamented with a carved floral design. The new seats are of English oak, and the floor beneath is laid with oak blocks. The aisles are floored with Portland and York stone and slate squares. A new font has been added in place of the old Norman one. A new pulpit of traceried design, in oak, with a stone base, has also been added. The upper part of the chancel arch has been entirely rebuilt, with carved corbels on each side. On the outside of the east belfry window the mitred head of St. Cuthbert has been reproduced. A new east window of three lights, with traceried head, deeply-cut mouldings with shafts and caps to jambs, and mullions and carved flowers round the head outside, has been inserted, and is being filled with stained glass by Messrs. Burlison & Grylls. The choir seats are of oak, and an oak lectern has been added. The roof has been covered with Broseley tiles, the battlements of the tower have been rebuilt with Hollington stone of red and light grey, with new gurgyles, together with new pinnacles at each of the angles. The top of the spire has been repaired with a new finial. Messrs. Bodley & Garner, of London, are the architects, and the contract was taken by Messrs. Stephens & Bastow, while Mr. David Knight has officiated as clerk of works. The church has been fitted with hot-water heating apparatus by Messrs. Fox, of London.

Stone (Staffordshire).—The Church of St. Michael, Stone, having been recently added to it a chancel, organ-chamber, and vestries, the same were consecrated by the Bishop of the Diocese a short time ago. The style of architecture adopted for the new portions is Late Perpendicular, the material used being Weston stone. The chancel is connected with the nave by a bold arch, and in the south wall is an arch opening into the organ-chamber. At the east-end is a large stained-glass window of six lights. The subjects represented in the window are "The Last Supper," "The Crucifixion," and "The Adoration of the Lamb." The floor is laid with encaustic tiles. The roof is open framed, of pitch pine, and the choir-stalls and altar are of oak. The plaster ceiling of the nave has been replaced by a wood-panelled ceiling, and the west gallery has been removed, thus disconnecting the north and south galleries. The work has been carried out by Mr. N. Barlow, of Stoke-on-Trent, from plans prepared by Messrs. Scrivener & Sons, of Hanley, the total cost of the improvements being 3,500.

#### RECENT PATENTS.

##### ABSTRACTS OF SPECIFICATIONS.

14,580, Sizing and Varnishing Paper-hangings H. A. Perry.

This invention relates to a machine with two rollers placed one above the other, so that when the lower one is turned by a handle the upper one revolves in the opposite direction. Above and parallel with the rollers is a metal rod which holds the paper, and below the lower roller a tray is placed to hold the size or varnish. A scraper is kept close to the lower roller by springs. The upper roller is covered with waterproof material, and the lower one with flannel.

15,374, Ventilators. W. P. Buchan.

This invention is claimed as an improvement on a previous specification, and has for its object the better adaptation of valve-boxes for the purposes of exhaust ventilation without the use or aid of external exhaust induced current ventilators. The self-acting valve-box is fitted in any suitable position, and it will thoroughly ventilate the apartment by its own action.

15,493, Lavatories or Washhand Basins. J. Shanks.

According to this invention, the basin is made with its deepest part near the front, so that a person washing his hands does not require to lean over so far as when the deepest part is at the middle or near the back. The form of the basin is like a pie-dish, and the waste-pipe is fitted to an outlet at an incline at the bottom of the basin. The taps and fittings are preferably protected by the porcelain.

15,584, Ventilators. P. M. Walker.

According to this invention, a double plate is employed, each side perforated; but the perforations are in no case opposite each other; this prevents draught. Sometimes the perforations are oblique or radial to the surface of the plate.

633, Improved Clamp for Picture-frames. G. Jackson.

By this invention, instead of causing the jaw or gripping portion to move in a horizontal direction,

the moulding is held vertically and gripped while in that position. Frames may be made much more quickly by one operator instead of two. A wing nut with long lugs or ears is used, and a smaller nut clamps the moulding to the table, the vertical position being the chief improvement claimed.

1,463, Spring Door-closer. B. Bancroft.

The torsional strain of a spiral spring is, by this invention, made the motive power. When the door is opened, the spring (which is enclosed in a shoe or casing in the door) is slightly twisted, but when the door is released, it will in resuming its straight position close the door.

1,493, Chimney Cowl. J. S. and J. T. Wilson.

The top of the cowl which is the subject of this patent is open, with a vane just above it governing a shield or protection three-quarters round the cowl. The action prevents draught, gives free sensitive motion round, and is a guard against different eddies of wind.

#### NEW APPLICATIONS FOR PATENTS.

Oct. 21.—14,313, F. Curtis, Wrought-Iron Door Latches.

Oct. 22.—14,331, B. Banks, Flushing Cisterns or Water-waste Preventers.—14,334, R. Hocking, Water-closets.—14,337, S. Hellyer, Water-closets and Urinals, and Flushing same.—14,339, S. Rhodes, Brick Machinery.—14,392, 14,393, and 14,394, G. Snelus and Others, Manufacture of Cements.—14,405, J. Cathie, Domestic or Open Fire Grates.

Oct. 24.—14,421, E. & J. Verity and B. Banks, Automatic Casedown Stays.—14,422, G. Newman, Door Springs and Checks.—14,442, G. Farist, Fireproof Curtains for Theatres, &c.—14,456, G. Maltster, Ventilators.—14,460, P. Davies, Sink Cones and Stick Traps and Casting them with Lead.

Oct. 25.—14,507, C. Watts, Balancing Elbow Levers for opening Ventilators, Windows, &c.—14,545, M. Frankenberg, Parquetty Wood Flooring.

Oct. 26.—14,554, R. Lee, Concrete and Cement Fireproof Building Materials, Bridges, &c.—14,556, J. Stones, Fireproof Curtains or Screens for Theatres and Large Openings.

Oct. 27.—14,630, W. Ihne, Ladders.—14,639, H. Alexander, Ventilator for Roofs, Shafts, Pipes, &c.

#### PROVISIONAL SPECIFICATIONS ACCEPTED.

10,142, J. Mason, Hinged or Pivoted Skylights, Ventilators, Doors, &c.—12,207, J. Cartland, Door Bolts, &c.—12,640, P. Barnett, Self-lowering and Adjusting Metallic or other Fireproof Material Shutters for Theatres, &c.—12,919, A. Wells, Revolving Wood Shutters.—12,975, W. Horn, Door Latch.—12,991, W. Murray, Gates.—13,065, E. Weldon, Attaching Blades of Saws to Handles.—13,180, J. Hargreaves, Manufacture of Cements.—13,184, H. Snell, Glazing Windows, &c.—13,110, A. Harris and J. Hannay, Fireproof Theatre Curtains.—13,161, S. Huntley, Devices for Cleansing Drains.—13,193, J. & S. Stanley, Structural Means for Extinguishing and Preventing the Spread of Fire in Theatres, &c.—13,434, R. Bradshaw, Fireproof Curtains or Partitions for Theatres, &c.—13,444, W. Webb, Sewer Ventilation.—13,487, H. Smith, Swing Doors.—13,537, T. Fawcett, Brick-making and Drying Machinery.—13,973, Sir G. Chubb and Others, Strong Rooms and Safes.

#### COMPLETE SPECIFICATIONS ACCEPTED.

##### Open to Opposition for Two Months.

13,532, J. Fondu, Apparatus for Affording Escape from Buildings.—15,678, H. Sully, Glazed Pavement Lights.—15,675, J. Coppard, Preventing the Rattling or Jarring of Windows or Doors.—17,019, G. Henley, Building Hollow Walls.—9,699, T. Weston, Wood Screw.—16,945, C. Swindell, Stove Grates and Fireplaces.—78, J. Gray, Automatic Door-holder.—11,912, A. Boulton, Door Fasteners.—12,534, W. Ducker, Portable Buildings.—12,710, D. Grove, Portable Buildings.

**A Jubilee Calamity.**—We are asked to draw attention to the sad case of Mr. James Lees, late manager for the Goole Gas and Water Company, and formerly in business in Carlisle as an iron-founder and contractor for ironwork used in buildings, in piers, and in roofing. At a public display of fireworks on Jubilee Day, a portion of the fireworks, which ought to have been harmless, exploded. Mr. Lees was much injured, and has lost his sight, so that, at forty-eight, he is blind for life, with a wife, and two daughters too young to earn anything. The town of Goole is raising a fund, vested in trustees, to whom Mr. G. W. Cutts, solicitor, is secretary; but the sum required is larger than can be raised in Goole, and an appeal is therefore made to the public, and especially to those connected with gas and water undertakings, and with building and engineering.



## RECENT SALES OF PROPERTY.

## ESTATE EXCHANGE REPORT.

OCTOBER 20.

By WOODFOLD &amp; HAYWARD.

Dover—6 and 10, Albert-terrace, freehold .....	£305
25, Clarendon-street, freehold .....	235
85 and 90, Biggles-street, freehold .....	900
24 and 25, Priory-road, freehold .....	680
7, St. Martin's-place, 37 years, ground-rent 11. 17s. ....	340
1 and 2, Clarence-place, freehold .....	485

OCTOBER 24.

By GRAY &amp; SON.

Notting Hill—60, Braley-road, 57 years, ground-rent 9l. 10s. ....	260
Baywater 12, Archer Mews, 50 years, ground-rent 3l. ....	80

OCTOBER 25.

By WALTON &amp; LEE.

Essex, Layer Breton—The Lodge, and 20s. 1r. 12p., freehold .....	1,980
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By DAREHAM, TAYSON, &amp; CO.

Telington—187, Liverpool-road, 12 years, ground-rent 7l. ....	155
Kent, East Farleigh—The Ewell Manor Estate, 25s. 2r. 7p., freehold .....	24,000
Hackney-road and Treadway-street—Ground-rents of 28l. 6s., reversion in 184 years .....	1,100
Ground-rents of 10l., reversion in 184 years .....	1,090
Treadway-street and Temple-street—Ground-rents of 180l., reversion in 184 years .....	21,700
Minerva-street—Ground-rents of 8l., reversion in 184 years .....	1,530
Old Bethnal Green-road, 35—Ground-rents of 46l., reversion in 184 years .....	6,820

OCTOBER 26.

By D. SMITH, SON, &amp; OAKLEY.

Cockspur-street—No. 30, freehold .....	5,700
High Holborn—No. 225, freehold .....	3,500
Oxford-street—163, Wardour-street, freehold .....	2,200

By R. J. COLLINS.

Clapton—4, Kenningshall-road, freehold .....	450
Hackney—8, Tower-street, 87 years, ground-rent 6l. 10s. ....	145

By W. G. &amp; W. M. M. &amp; W. M. M.

Tottenham—6, Tweed-terrace, freehold .....	245
Canonbury—23, Canonbury-square, 31 years, ground-rent 23l. ....	200

By BARRY &amp; SON.

Bermondsey—2 to 6, Macks-road, 38 years, ground-rent 12s. ....	130
Peckham—12 and 15, Manaton-road, 79 years, ground-rent 6l. 2s. ....	430
65, 67, and 69, Philp-road, 79 years, ground-rent 9l. 3s. ....	630

By J. A. &amp; W. THAYER.

Bethnal Green—17, Madestreet, freehold .....	150
St. John's Wood—14, North Bank, 21 years, ground-rent 10l. 10s. ....	280
Westbourne Park 14, Westbourne Park Villas, 450 years, ground-rent 9l. ....	700

By TEMPLE &amp; MOORE.

Homerton—19, Water-lane, 29 years, ground-rent 2l. 5s. ....	115
10 to 13, College-street, 53 years, ground-rent 12s. ....	70
15 to 27, Warwick Villas, freehold .....	90

By A. SNAPE &amp; SON.

Mill End—29, Burdett-road, 91 years, ground-rent 33. ....	620
33, Burdett-road, 60 years, ground-rent 4l. ....	600

OCTOBER 27.

By G. HEAP &amp; CO.

Leicester-square—17, Rupert-street, freehold .....	890
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By NEWBOLD &amp; HARDING.

Hoxton—9, Bookham-street, 47 years, ground-rent 6l. 6s. ....	415
Holloway—107 and 108, Mercer's-road, 80 years, ground-rent 10l. ....	800

By A. SNAPE &amp; SON.

Dalston—11, Livermore-road, 65 years, ground-rent 4l. ....	285
Tollington Park—87, Regia-road, 77 years, ground-rent 6l. 6s. ....	360

By A. SNAPE &amp; SON.

Baywater—8, Kildare-gardens, 64 years, ground-rent 8l. ....	1,080
Walthamstow, Marlborough-road—Rose Cottage, freehold .....	405

By W. W. JENKINSON.

Woodside, near Croydon—Woodside Cottage, with grounds, freehold .....	600
A plot of freehold land .....	250

By A. SNAPE &amp; SON.

Old Charlton—Ground-rent of 17l. 12s. 6d., reversion in 20 years .....	620
Victoria-road—Ground-rents of 52l., reversion in 53 years .....	1,360

By A. SNAPE &amp; SON.

Victoria-road—Ground-rents of 60l., reversion in 54 years .....	1,550
Victoria-road—Ground-rent of 3l. 3s., reversion in 77 years .....	210

By A. SNAPE &amp; SON.

Victoria-road—Ground-rent of 28l. 2s., reversion in 93 years .....	725
Woolwich—Ground-rent of 29l., reversion in 25 years .....	630

By A. SNAPE &amp; SON.

Nelson-street—Ground-rent of 14l. 1s., reversion in 48 years .....	345
Margaret-place—Ground-rent of 12l., reversion in 55 years .....	385

By A. SNAPE &amp; SON.

Rodney-street—Ground-rent of 18l., reversion in 60 years .....	315
Nelson-street—Ground-rent of 15l., reversion in 41 years .....	600

By C. R. CAHOSS.

Upton Manor—Ground-rents of 28l. 5s., reversion in 89 years .....	1,625
Netting Hill—Ground-rents of 67l. 10s., reversion in 79 years .....	250

By E. SIMMONS.

Uxbridge-road—72, Friarville-gardens, 90 years, ground-rent 8l. 8s. ....	380
Old Kent-road—2 and 3, Blockhouse-street, 73 years, ground-rent 9l. 10s. ....	195

By E. SIMMONS.

25, Blockhouse-street, 73 years, ground-rent 4l. 15s. ....	195
Lambeth—2 to 6, Fraser-street, copyhold .....	1,000

Kennington—4 and 6, Henry-street, copyhold .....	£820
Mildmay Park—72, Mildmay-grove, 60 years, ground-rent 7l. ....	485
City—43 and 44, Lombard-street, held for 49 and 79 years, at ground-rents of 870l. ....	2,820
Upper Mitcham—3 and 4, York-place, 27 years, ground-rent 13l. 14s. ....	300
Lower Tooting, Merton-road—Freehold house and shop .....	250
Mill End—63, W-street, freehold .....	215
91, Globe-road, freehold .....	615
34, St. Peter-street, 43 years, ground-rent 3l. 5s. ....	350
Stepney Green—8, Latimer-street, 69 years, ground-rent 3l. 10s. ....	240
Commercial-road—4 and 5, Queen's Court; and 1, 2, and 3, Batty-place, 13 years, ground-rent 8l. 15s. ....	80
Mill End—Improved ground-rents of 11l., term 31 years .....	70
Stoke Newington—47, Milton-road, 65 years, ground-rent 4l. ....	190
Great Marylebone-street—No. 48, term 7 years, ground-rent 30l. ....	330
Holloway—144, Tufnell Park-road, 15 years, ground-rent 8l. ....	420
By C. C. & T. MOORE.	
Bow—14 and 16, Burgess-street, 74 years, ground-rent 8l. 8s. ....	325
South Bromley—31, Bridge-street, freehold .....	320
Stratford—42 and 44, Mager-road, 68 years, ground-rent 4l. ....	170
4 to 16 even, Norfolk Park-road, 15 years, ground-rent 14s. ....	510
23 and 25, Queen-street, 66 years, ground-rent 4l. ....	225
Mill End—22 and 23, King-street, freehold .....	620
Pepper—41, Root-street, freehold .....	100
Limehouse—7, White's Keys, freehold .....	100
Stepney—20, 21, and 22, Walter-street, 23 years, ground-rent 3l. ....	555
Mill End—12 to 22, Baker-street, 15 years, ground-rent 77l. ....	450
4 to 16 even, and 18 to 22 even, Clark-street; and 1, 1, John-place, 11 years, ground-rent 10l. ....	650
1 and 2, Woodbine Cottages, 63 years, ground-rent 8l. ....	485
Southend—Four plots of freehold .....	193
By R. HOLSWORTH.	
Stamford Hill—64, Olinda-road, 92 years, ground-rent 5l. ....	160
By G. B. SMALLER.	
Hampstead—The residence, Belton Grange, freehold .....	3,450
By BAKER & SONS.	
Wandsworth—Ground-rents of 70l., reversion in 91 years .....	1,445
Ground-rents of 27l., reversion in 43 years .....	615
Harrow, near 1, Albion-villas, freehold .....	1,060

## MEETINGS.

SATURDAY, NOVEMBER 5.

Association of Public Sanitary Inspectors.—Address by the Chairman of Council, Mr. Hugh Alexander. 6 p.m.

MONDAY, NOVEMBER 7.

Royal Institute of British Architects.—The President (Mr. Edward L'Amor, F.R.S.), will deliver the Opening Address of the Session. 8 p.m.

Society of Engineers.—Mr. Perry F. Nursey on "Primary Batteries for Illuminating Purposes." 7-3 (10).

Royal Institution.—General Monthly meeting. 5 p.m.

Clerks of Works Association (Carpenters' Hall). Monthly Meeting. 8 p.m.

TUESDAY, NOVEMBER 8.

Institution of Civil Engineers.—(1) Address by the President, Mr. George B. Bruce. (2) Presentation of Medals, Premiums, and Prizes awarded during last Session. 8 p.m.

WEDNESDAY, NOVEMBER 9.

Hospitals Association.—Paper by Mr. Keith D. Young on "Hospital Construction," Sir Douglas Galton in the chair. (Board Room, Middle Hospital.) 8 p.m.

THURSDAY, NOVEMBER 10.

Society of Telegraph-Engineers and Electricians.—Mr. E. Stallibrass, F.R.G.S., on "Deep-Sea Sounding in connexion with Submarine Telegraphy." 8 p.m.

MISCELLANEA.

The Institution of Civil Engineers.—The ordinary meetings will be resumed on Tuesday, the 8th of November, and be continued weekly till the end of May. At the opening of the Session, Mr. Geo. B. Bruce (President) will deliver his Address. On subsequent occasions, the following papers are to be read with a view to discussion:—"Accidents in Mines," Part II., by Sir Frederick Abel, C.B., F.R.S.; "Electrical Tramways: the Bessbrook and Newry Tramway," by Dr. Edw. Hopkinson, M.A.; "The 'Jubilee' Bridge over the river Hooghly on the line of the East Indian Railway," by Sir Bradford Leslie, K.C.I.E.; and "The Alexandra Dock, Hull," by C. A. Hurlitz. The Supplemental Meetings of Students have been appointed to commence on Friday, November 18th, and to take place at nearly fortnightly intervals. Among the subjects which will engage attention during the early part of the Session are:—"The Classification of Continuous Railway-Brakes," by A. Wharton Metcalfe; and "Railway-Engineering in British North America," by Robert J. Money.

Leland Club.—In our notice of the proceedings of this society (p. 620, ante) for "Durobrisse" (ancient name of Rochester) read "Durobriva."

The New Cathedral at Truro was consecrated on Thursday last, Nov. 3. It has been in course of erection since 1879, from the designs of Mr. John L. Pearson, R.A. The nave has yet to be completed. When complete the total length of the cathedral will be 300 ft., and the height of the central spire 250 ft. The width of the nave and choir is 29 ft., and the height to the vaulting 70 ft. The plan of the church as a whole comprises a nave and aisles of nine bays, with two western towers and spires, a large western porch, and a south porch the great transept with its aisles and a baptistery in the angle between the south transept aisle and the nave aisle; a large tower and spire over the crossing; the choir, with an eastern transept opposite the altar and one bay behind the altar forming a retrochoir; one choir aisle on the north side, and three on the south side, of which the outermost is part of the old parish church; a small tower and spire at the west end of this aisle abutting upon the main south transept; and the vestries, which are obtained in a crypt below the choir. The design comprises, besides, a cloister court to the north of the nave, and an octagonal chapter house on the east side of the court. Of this ambitious scheme the eastern part of the church is alone at present completed. The choir with all its aisles, the eastern transept, the great transept with its aisles, the baptistery, and the lower part of two nave bays,—these are all finished, and the central tower just shows above the roof. One aisle of the old church has been retained and incorporated in the new building. In round figures the cost of the fabric so far has been £71,000, the ultimate cost being estimated at £55,000. The builders employed are Messrs. J. Shillitoe & Son, of Bury St. Edmunds. The clerk of works originally engaged was Mr. Babb, and since his death Mr. R. Swain has taken his place. The altar has been painted by Mr. J. R. Clayton, and the stained-glass windows are by Messrs. Clayton & Bell. A great deal of the sculpture and carving has been done by Mr. Hitch & Messrs. Linscombe & Son, of Exeter, and by Mr. T. Nicholls. The stones selected for external use were granite from Penryn for the ashlar face, and Bath stone for the dressings. The whole of the dressings, indeed, inside and out, including the massive columns, are of Bath stone, and we are informed that nearly the whole of it has been supplied from the quarries of Messrs. Randall, Saunders, & Co. (Limited), of Corsham. Internally the ashlar is of St. Stephen's granite. For thin shafts among the clustered columns a slaty blue stone from Polyphant has been largely used. Another stone of a brownish-gray hue from Duporth has been less freely introduced, and in other cases the shafts have been formed of the brown Ham Hill stone, or the strong yellow stone of Northampton, and in one place of porphyry.

The Russian Naphtha Industry.—According to the *Novoye Vremya*, a Russian entrepreneur and engineer has submitted a plan to the Russian Government for the development of the naphtha industry of Russia, which will most likely be accepted. M. J. P. Kinnor, the gentleman referred to, proposes the laying down on the peninsula of Apsheron, famous for its naphtha wells, a network of pipes with a main pipe to the port of Batoum or Poti, where the oil is to be refined. The network will be of such dimensions as to be capable of conveying, by means of hydraulic pumping machinery, 200,000 pood of naphtha in every twenty-four hours to either port. The company formed to carry out the scheme will have a capital of fourteen million roubles, and has deposited 100,000 roubles with the Government, to revert to the latter in case of non-performance of the undertaking.

The International Exhibition in Barcelona.—Great activity prevails at Barcelona with the erection of the buildings for the International Exhibition to be opened in that city early next year. They are already far advanced, and will, in connexion with extensive gardens now being laid out, be very imposing. From England many applications for space have been received, particularly as regards machinery and engineering, whilst several foreign Governments give official adhesion to the Exhibition.

New Museum at Antwerp.—A new museum has just been opened at Antwerp, called the Museum of Industry and Commerce. It contains samples of Belgian industry and foreign produce.



**Enlargement of the Memorial Hall, Farringdon-street.**—The Memorial Hall in Farringdon-street is at present being considerably enlarged by the extension of the building northward. The Farringdon-street frontage is being lengthened in the direction of Fleet-lane to the extent of about 30 ft., and when the works are completed the Farringdon-street elevation of the building will be nearly 120 ft. long. The return frontage of the enlarged structure is carried in an eastward direction along Fleet-lane to the extent of about 90 ft. Including the basement, it will contain five floors, and will in every respect be uniform in architectural character with the present building. The height of the building to the main cornice will be 60 ft., and to an ornamental iron cresting surmounting the roof about 80 ft. The basement will be occupied by stores, the ground and all the upper floors containing offices, of which there will be five on each floor, together with large warehouses in the rear of each floor which are intended to be let off. The building, which was commenced in March last, has already been carried up to the third floor, but during the last ten or twelve weeks the works have been suspended in consequence of a dispute between the trustees of the hall and the owner of some property on the north side of Fleet-lane, respecting a claim made by the latter on account of ancient lights. The property in question is at the corner of Farringdon-street and Fleet-lane, and it is stated that the owner asks £2,000, as compensation, which claim the trustees consider excessive. Mr. W. D. Church, of South-place, Finsbury, is the architect, and the contractor is Mr. Holloway, of Tavender Hill, Battersea.

**Progress of the Dock and River Works at Preston.**—Mr. Walker, the contractor for the large new dock of forty acres on the site of the Marsh, at Preston, adjoining the Ribbles, is making rapid progress with the undertaking, and it is expected that it will be ready for the admission of water early in the coming year. During the necessary excavations an interesting discovery has been made, amongst the historical relics which have from time to time been met with during the progress of the works. It consists of an ancient canoe, about 9 ft. in length, and something like 20 ft. in width, "midships," its depth being little more than a foot. It is composed of oak and appears to have been formed out of the trunk of a tree, in one solid block. The belief is that it has been embedded in the earth several centuries, as it is in a state of decay, and falls to pieces when touched. It may be added that the dredging and deepening of the channel of the river is being actively pushed forward simultaneously with the construction of the dock, several steam dredgers being at work.

**Luton Sewage Works.**—A Home Counties district Meeting of the Association of Municipal and Sanitary Engineers and Surveyors was held at Luton on Saturday last, when Mr. W. Leete, the Borough Surveyor, read a paper on the new sewage works recently carried out by him. The works possess some points of special novelty and interest. A résumé of the paper is in type, but it is necessarily held over next week for want of space. We hope to give next week.

**Statue of the Late Mr. Samuel Morley.**—On Saturday, the 22nd ult., a statue of the late Mr. Samuel Morley was unveiled at Bristol by Sir Joseph Weston, in the presence of 1,000 spectators. The statue is of Sicilian marble, and is 8 ft. in height. It is the work of Mr. Havard Thomas, of Chelsea. It stands on a polished granite pedestal, 11 ft. in height. The pedestal was provided and erected by Messrs. Arthur Lee Bros., of Bristol.

**Commercial Failures.**—According to *Emp's Mercantile Gazette*, the number of failures in England and Wales gazetted during the week ending Saturday, October 20th, was 10. The number in the corresponding week of last year was 96, showing a decrease of 10, and a net decrease in 1887, to date, of 18. The failures in the building trades during the week ending October 29th were 6, as against 10 and 10 in the corresponding weeks of 1886 and 1885 respectively.

**Removal.**—Messrs. George Waller & Co., owing to the expiration of the lease of their premises at Holland-street (where they have an established over fifty years), have removed to 57, Park-street and Bear Gardens, Southwark, S.E. (near the dry arch of Southwark bridge, Surrey side).

**The County Surveyorship of Hertfordshire.**—We note that the Hertfordshire Michaelmas Court of Quarter Sessions, held on the 20th of October, decided to increase the salary of the County Surveyor, Mr. Urban Smith, C.E., of Westminster, from 400l. to 500l. per annum.

**Sewage Treatment.**—A lecture on the "Treatment of Sewage by the Iron Process, as used at Chichester Barracks and Windsor Castle," will be delivered by Mr. Conder, M. Inst. C.E., at the Royal Engineers' Institute, School of Military Engineering, Chatham, on Thursday, the 17th inst., at 5.30 p.m.

**The New City of London Court.**—At the invitation of Mr. Bridgman (Chairman of the Law and City Courts Committee), the Lord Chancellor has consented to lay the foundation stone of the new City of London Court on Wednesday, November 23rd.—*City Press*.

PRICES CURRENT OF MATERIALS.			
TIMBER.			
	£.	s.	d.
Greenheart, B.G. .... ton	6	5	0
Teak, E.I. .... load	8	0	12
Sesquios, U.S. .... foot cube	0	2	0
Ash, Canada .... load	3	0	0
Birch ....	2	0	0
Elm ....	3	10	0
Fir, Dantisc, &c. ....	1	10	0
Oak ....	2	10	0
Canada red ....	3	0	0
Pine, Canada red ....	2	0	0
" yellow ....	2	0	0
Lath, Dantisc .... fathom	3	0	0
St. Petersburg ....	4	0	0
Waincoat, Riga .... log	0	0	0
" Odessa, crown ....	2	10	0
Deals, Finland, 2nd and lat. .... std. 100	7	0	0
" 4th and 3rd ....	6	10	0
Riga ....	6	10	0
St. Petersburg, lat yellow ....	8	10	0
" 2nd ....	7	0	0
" white ....	6	10	0
Swedish ....	6	0	0
White Sea ....	0	0	0
Canada, Pine, 1st ....	16	0	0
" 2nd ....	10	0	0
" 3rd, &c. ....	6	0	0
" Spruce, 1st ....	8	0	0
" 3rd and 2nd ....	5	0	0
New Brunswick, &c. ....	5	0	0

TIMBER (continued).			
	£.	s.	d.
Battens, all kinds ....	4	0	0
Flooring Boards, sq., 1 in. pre-	0	8	0
pared, First ....	0	6	0
Second ....	0	4	0
Other qualities ....	0	4	0
Cedar, Cuba .... foot	0	0	3
Honduras, &c. ....	0	2	0
Australian ....	0	0	0
Mahogany, Cuba ....	0	0	4
St. Domingo, cargo average ....	0	4	0
" ....	0	0	0
Tobacco ....	0	0	3
Honduras ....	0	0	5
Maple, Bird's-eye ....	0	5	0
Rose, Rio ....	5	0	0
Bahia ....	7	0	0
Box, Turkey ....	5	0	0
Satin, St. Domingo .... foot	0	5	0
Porto Rico ....	0	6	0
Walnut, Italian ....	0	3	0

METALS.			
	£.	s.	d.
Iron—Bar, Welsh, in London .... ton	4	15	0
" in Wales ....	4	5	0
" Staffordshire, London ....	5	10	0
COPPER.			
British, cake and ingot .... ton	47	10	0
Best selected ....	48	10	0
Sheet, strong ....	52	10	0
Chili, bars ....	44	0	0
YELLOW METAL.			
Lead .... lb.	0	0	0
LEAD.			
Pig, Spanish .... ton	12	7	0
English, common brands ....	12	8	0
Sheet, English ....	12	8	0
SPELT.			
Silesian, special .... ton	16	5	0
Ordinary brands ....	16	0	0
TIN.			
Straits .... ton	121	0	0
Australian ....	121	0	0
English ingots ....	123	0	0

OILS.			
	£.	s.	d.
Linseed .... ton	19	5	0
Cocanut, Ceylon ....	30	0	0
Ceylon ....	22	0	0
Palm, Lagos ....	25	0	0
Rapeseed, English pale ....	25	0	0
" brown ....	23	10	0
Cottonseed, refined ....	19	15	0
Tallow and Oleine ....	25	0	0
Lubricating, U.S. ....	5	0	0
" refined ....	5	0	0
TERRAZZO.			
American, in casks .... cwt.	1	4	0
TAR.			
Stockholm .... barrel	0	15	0
Archangel ....	0	10	0

## CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

### CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Transshipping Shed, &c., Newhaven	L. B. & S. O. Ry. Co.	F. D. Bismister	Nov. 7th	ii.
Sewering, &c., Works	Hendon Local Board	S. S. Grimley	do.	ii.
Works to Mortuary Buildings	St. Luke's (Middlesex)	do.	do.	ii.
Making-up and Paving Roads	Vestry	W. C. Meaby	Nov. 8th	ii.
Road-making and Paving Works	Wandsworth Bd. of Wks	Official	do.	ii.
Quernsey Granite Spalls	Hammersmith Vestry	do.	Nov. 9th	ii.
Repair of Private Roads	Dartford Union	do.	Nov. 11th	ii.
Kerbing, Tar-Paving, &c., Work	Croydon Cor.	do.	Nov. 15th	ii.
Galvanised Iron Rails	Lewisham Bd. of Wks.	do.	do.	x.
Road-Making and Paving Works	Vestry of St. Matthew	do.	do.	x.
Boys' School	Bethnal Green	do.	Nov. 16th	x.
Electric Light	Fulham Vestry	J. F. Norrington	do.	ii.
Stores and Materials	Longdon School Board	Jas. Cubitt	Nov. 30th	ii.
Exhibition Buildings, Finsbury	London County Corporation	Official	Dec. 1st	ii.
Hacknicks, Buildings, Southend-on-Sea	Cheshire Lines Com.	do.	Dec. 3rd	ii.
Wood-Block Flooring	Salvation Army	Marx & Tuke	Not stated	ii.
	Schl. Board for London	Official	do.	x.

### PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Inspector of Nuisances, &c.	Bridgnorth Union	100l.	Nov. 10th	xiv.
Surveyor of Buildings, Public Works, Ireland	Civil Service Com.	Not stated	Nov. 16th	xiv.

### TENDERS.

BANBURY.—For erection of two cottages of Mr. Wise.	
Grant	2312 0 0
Claridge	210 0 0
Jarvis	207 0 0
BICESTER.—For the erection of New "Salvation Army" Barracks for "General" Booth. Mr. E. J. Sherwood, architect, 101, Queen Victoria-street, E.C. 1.	
Grimley & Son, Bicester	4500 0 0
Coxhead, Leytonstone	444 0 0
BLACKHEATH.—For new premises at Blackheath, for the London and Provincial Bank (Limited).—Mr. E. H. Bourchier, architect, 32, Great George-street, Westminster.	
Smith	23,138 0 0
Allen & Fairhead	3,110 0 0
Lark	2,930 0 0
Oldridge & Son	2,847 0 0
Gregory & Co.	2,847 0 0
Havell	2,795 0 0
Bush	2,779 0 0
Jerrard	2,735 0 0

CEFF (North Wales).—For the erection of new "Salvation Army" Barracks for "General" Booth. Mr. E. J. Sherwood, architect, 101, Queen Victoria-street, E.C. 1.	
Weale & Co., Ludlow	2,453 0 0

CLAPTON.—For the erection of a temporary exhibition Building for "General" Booth. Mr. E. J. Sherwood, architect, 101, Queen Victoria-street, E.C. 1.	
Willsons Paper Co. (accepted)	£151 0 0

CLEVEDON (Somerset).—For alterations and additions to premises known as Glendale, for the Rev. G. S. Newman. Messrs. Barker & Cross, architects.—	
Elston, Clevedon	2338 18 0
Hardwicke & Tanner, Clevedon	483 10 0
Doddard, Elston	485 0 0
Hill, Clevedon (accepted)	444 11 11

FOLKESTONE.—For alterations to the Braistone Hall, for "General" Booth. Mr. E. J. Sherwood, architect, 101, Queen Victoria-street, E.C. 1.	
Alderton & Wansler, Cambridge	£215 0 0
Coxhead, Leytonstone (accepted)	200 0 0

GRIMSBURY.—For the erection of six cottages, for Mr. R. Gibbs. Mr. H. Hopkins, surveyor.—	
Claridge	£780 0 0
Grant	740 0 0
Jarvis	703 0 0

HITCHIN.—For the erection of New "Salvation Army" Barracks for "General" Booth. Mr. E. J. Sherwood, architect, 101, Queen Victoria-street, E.C. 1.	
Foster, Hitchin	£702 0 0



**ELTHAM.**—For construction of Footcray Road South Sewer, for the Board of Works for the Plumstead District.  
Mr. J. Lee Bennett, surveyor:—  
W. Harris, Camberwell ..... £1,129 0 0  
J. Randall, Walthamstow ..... 1,017 14 11  
G. Oeston, Erith ..... 954 0 0  
W. & J. Woodhams, Sydenham ..... 918 16 4  
C. Killingback, Camden Town ..... 890 0 0  
T. Adams, Kingsland ..... 875 0 0  
W. Porter, Hackney ..... 825 0 0  
H. Potter, Clapton (accepted) ..... 798 0 0  
Woodhams & Fry, Greenwich ..... 785 0 0

**LEICESTER.**—For the supply and erection of four independent rotative Woolf Compound Beam Pumping Engines, together with eight Lancashire steel boilers and other machinery and plant in connexion therewith, for the new Sewage Pumping Station, according to designs, plans, and specifications, by Mr. J. Gordon, M. Inst. C.E., borough surveyor:—

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Direct Acting Vertical Compound Intermediate Receiver and Surface Condensing Engines	33,000	0 0	—	—
Thornhill and Warham, Burton-on-Trent	—	—	32,600	0 0
Hastorn & Davy, Leeds	—	—	29,935	0 0
Improved Differential Compound Surface Condensing Engines	21,885	0 0	—	—
Bever & Doring, Dewbury	—	—	28,417	10 0
Lillishall Iron Co., Oakengates	—	—	27,900	0 0
D. Stewart & Co., Glasgow	—	—	26,412	2 0
J. Watt & Co., London	—	—	24,260	0 0
Easton & Anderson, London	—	—	23,794	0 0
Wood Brothers, Sowerby	—	—	22,851	0 0
Gimson & Co., Leicester	—	—	22,629	6 0
G. Kirk & Co., Stoke-on-Trent	—	—	21,168	0 0
F. Silvester & Co., Newcastle, Staffs	—	—	18,947	0 0
A. Engine Builder's Design, B. Borough Surveyor's design and specification.	—	—	—	—
Accepted.	—	—	—	—

**LONDON.**—For alterations, &c., at 14, Cranbourne-street, Leicester-square, for Mr. Hawes, Mr. L. Solomon, architect, New Broad-street:—  
Sage & Co. .... £475 0 0  
Drew & Cadman ..... 385 0 0  
Yardley & Sons (accepted) ..... 331 10 0

**LONDON.**—For new shop fronts, &c., at 16, Cranbourne-street, Leicester-square, for Mr. Throver, Mr. A. J. Boniton, architect, Lincoln's Inn Fields:—  
Hay & Son ..... £118 7 0  
Drew & Cadman ..... 113 0 0  
Yardley & Sons ..... 69 0 0  
Munday ..... 97 0 0

**LONDON.**—For re-building in Mayfair, Mr. R. Fabian Russell, F.R.I.B.A., architect, 6, Moorgate-street, E.C.:—  
J. Woodward (accepted) ..... £23,730 0 0

**LONDON.**—For addition to No. 89, Blackfriars-road. Mr. W. H. Bovey, architect:—  
Child ..... £285 0 0  
Hoare & Son (accepted) ..... 270 0 0

**LONDON.**—For re-building Nos. 43 and 45, Great Titchfield-street, and Nos. 1 and 1a, Little Titchfield-street, W., for Mr. W. M. Nery, Mr. W. R. J. Miller, architect. Quantities by Messrs. J. A. & E. Bull:—  
Perkins ..... £3,967 0 0  
Oldrey & Co. .... 3,968 0 0  
Simpson & Son ..... 3,928 0 0  
Colls & Son ..... 3,795 0 0  
Bywaters ..... 3,676 0 0  
Fyatt & Fotheringham ..... 3,473 0 0

**LONDON.**—For alterations and additions to the Rising Sun, Bridge-road, Battersea, S.W., for Mr. G. Senaam, Mr. H. L. Newton, architect, 17, Queen Anne's Gate, Westminster:—

Gill	£927 0 0
S. Godden	875 0 0
S. R. Lamb	860 0 0
Burman & Son	817 0 0
Fincher	815 0 0
J. Walker, Poplar (accepted)	790 0 0

For Puter's Work.

R. Kemble ..... £120 0 0  
J. Davidson ..... 112 5 0  
Bardes & Son ..... 107 14 0  
Heath, Goswell-road (accepted) ..... 103 0 0

**LONDON.**—For rebuilding and enlarging Messrs. McEwan & Co.'s Moulding Mills, York-road, Lambeth, S.W. Mr. Robert F. Whitlock, architect, 45, Finsbury-pavement, E.C. Quantities by Mr. H. Pollard, 14, Duke-street, Adelphi, W.C.:—

A. Mackie	£7,184 0 0
W. Howard & Co.	6,715 18 1
Longmire & Burge	6,664 0 0
W. Brass & Son	6,234 0 0
B. Rosegood	6,189 0 0
Colls & Son	6,157 0 0
T. Rider & Son	6,107 0 0
C. Ansell	6,106 0 0
E. C. Howell & Son	5,899 0 0
James Holloway	5,830 0 0

\* Accepted subject to modifications.

**MAIDSTONE.**—For taking down and rebuilding warehouse, at Bridge Wharf, Undercliffe, Maidstone, for Mr. William Taylor, Messrs. Ruck, Son, & Smith, architects. Quantities supplied:—  
Cor Brotham, Maidstone ..... £1,249 0 0  
E. Vaughan, Maidstone ..... 1,220 0 0  
A. N. Fryer & Co., Maidstone ..... 1,192 10 0  
T. Elmore, Maidstone ..... 1,177 17 6  
E. Wilkins, Loose ..... 1,164 10 0  
Wallis & Clements, Maidstone ..... 1,099 0 0  
\* Accepted.

**PADDINGTON.**—For the erection of addition to premises, Irongate Wharf, Paddington, for the London General Omnibus Company, under the superintendence of Mr. G. T. Lanham. Quantities by Mr. H. J. Bolton:—

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Hack	1,247 0 0
Garrud	1,181 0 0
Masley	1,173 0 0
Turtle & Appleton	1,119 0 0
Stephenson	1,089 0 0
Tombs	1,087 0 0
Hunt	1,019 0 0
Evans	998 0 0
Parker	997 0 0
Haynes	980 0 0

**PUTNEY.**—For altering Nos. 6 and 7, Salisbury Pavement, High-street, Putney, for the London and County Banking Company's New Branch Bank. Messrs. Thomas & William Stone, architects, 2, Great Winchester-street, E.C.:—

	Corncockle	Portland
W. Gregor	£1,520	£1,695
Adamson	1,445	1,390
Debbins	1,450	1,390
Higgs	1,280	1,161
Turtle & Appleton	1,238	1,128
Parsons	1,225	1,099
Avia & Co. (accepted)	1,091	988

**ROMFORD.**—For alterations to the Old Wesleyan Chapel (purchased by the "Salvation Army") for "General" Booth. Mr. E. J. Sherwood, architect, 101, Queen Victoria-street, E.C.:—  
Coxhead, Leytonstone ..... £230 0 0  
Dowling & Edwards, Romford ..... 220 0 0  
Hammond & Son, Romford ..... 219 0 0  
\* Accepted.

**SCARBOROUGH.**—For erecting the Scarborough Constitutional Club. Mr. Henry A. Cheers, architect, Twickenham:—

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Jackson, Hull	4,399 0 0
Barry, Scarborough	4,223 0 0
Binn, Bradford	4,213 0 0
Livingston, Scarborough	4,110 0 0
Bastinman, Scarborough	3,997 0 0
Martin, Maldenhead	3,980 0 0
Fedbury, Scarborough	3,838 0 0
Peacock, Scarborough	3,775 0 0
Wallburn, Scarborough (accepted)	3,774 0 0

**STOCKTON-ON-TEES.**—For alterations to skating rink (purchased by the "Salvation Army") for "General" Booth. Mr. E. J. Sherwood, architect, 101, Queen Victoria-street, E.C.:—

Cool, Stockton	£243 0 0
Jaynes, Stockton	629 0 0
Atkinson, Stockton	648 0 0
Coxhead, Leytonstone	630 0 0
Davidson, Stockton	614 0 0
Earnshaw	450 0 0
Welch, Stockton (accepted)	437 0 0

**THAMES DITTON.**—For new road at Thames Ditton, Surrey. Messrs. C. & F. Rutley, surveyors, Dowgate Hill, E.C.:—

Kavanagh	£1,775 11 7
Quintenn	1,767 4 10
Woollett	1,635 4 0
Wharbridge, Croydon (accepted)	1,681 5 3

**WANDSWORTH.**—For erecting labour sheds, &c., at Garratt-lane, for the Guardians of the Poor of the Wandsworth and Clapham Union. Mr. W. T. Winkie, architect, 2, East India Avenue, Leadenhall-street:—  
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W. Hammond ..... 1,981 0 0  
W. J. Beale ..... 1,965 0 0  
F. R. Turtle ..... 1,961 0 0  
W. Johnson ..... 1,960 0 0  
Kirk & Randall ..... 1,947 0 0  
R. Mayo (accepted) ..... 1,899 0 0

**WILLESDEN.**—For the erection of new public offices, for the Willesden Local Board. Mr. Edward Harner, architect. Quantities by Messrs. Northcott, Son, & Neighbour:—

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B. E. Nightingale	6,990 0 0
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Kilby & Gayford	6,720 0 0
H. Wilcock	6,670 0 0
F. & E. Higgs	6,640 0 0
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W. M. Oldrey	6,495 0 0
J. M. Goodwin	6,180 0 0
Charles Wall	6,085 0 0

**WREXHAM.**—For alterations to Old National Schools (purchased by the "Salvation Army") for "General" Booth. Mr. E. J. Sherwood, architect, 101, Queen Victoria-street, E.C.:—  
Weale & Co., Ludlow ..... £380 0 0

**WROTHAM.**—For the erection of New "Salvation Army" Barracks (wooden) for "General" Booth. Mr. E. J. Sherwood, architect, 101, Queen Victoria-street, E.C.:—  
Semark, Boro' Green (accepted) ..... £196 0 0

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### Truro Cathedral.



THE opening of this cathedral, the first entirely new cathedral consecrated in England since St. Paul's, is an incident of considerable interest, architecturally as well as from other points of view. The circumstances

are different, certainly. St. Paul's was built at a time when Church feeling, as now understood, was at a very low ebb, and when architecture spurned all reminiscence of Mediaeval barbarism as a thing almost beneath its notice. Truro Cathedral is the offspring of a revival, or so we are assured, of the Mediaeval church in her earnestness and her aspirations, and is built by an architect who has studied Mediaeval architecture in preference to any other style, and whose evident object it is to restore the Mediaeval cathedral as fully as possible.

We fear it cannot be hoped that Truro will ever reach the reputation enjoyed by St. Paul's as a powerful and original architectural design; the detail is even more conservative and more of a reproduction than the Renaissance detail of Wren; and the general design, if one may compare buildings so different in their style, is certainly far inferior to Wren's in dignity, power, and unity of conception. It has its points of special interest, however, beyond those of mere Gothic correctness.

The cathedral, as most of our readers are aware, is nothing like complete, and we fear it is somewhat doubtful whether the funds will ever be raised to complete it. The fact is, the position is unfortunate for those who take an ecclesiastical view of things. The whole of that part of England is very much permeated by "the demon of Dissent," and we heard it roundly asserted by influential people in the neighbourhood that Truro did not want a cathedral, and that it was a foolish expenditure of money. Many of those who hold this view have, nevertheless, from what may be called an *esprit de county*, and from a hatred of being thought illiberal, subscribed pretty largely to the new cathedral; but it is more than hinted that this flow of liberality is now run out. With the wisdom or unwisdom, the necessity or otherwise, of dividing the Exeter diocese and founding a separate bishopric at Truro we have nothing to do; but since it is founded, we certainly desire that the new bishop should have a cathedral, and as fine a cathedral as circumstances will admit of, just because a cathedral is a beautiful thing, and forms a centre for the artistic and musical life of the district; a place where people may see something grander and nobler than they can see in their ordinary parish church (or chapel); and we should imagine that even Dissenters of the more cultured order would like a cathedral as a place to see and go into, even if they declined on conscientious grounds to join in the service. For these reasons, and apart from any questions of religious sect, we very much desire to see Truro Cathedral completed, and we think it will be for the general good and happiness of the greatest number that it should be completed.

The complete plan of Truro, as proposed, includes a nave and choir; principal transepts at the crossing and subsidiary eastern transepts; a cloister and an octagonal chapter-house on the northern side of the cathedral; a centre tower with spire; two smaller western towers; and a campanile or small tower at the eastern side of the south transept. Of this there is now built the choir and both transepts, and two bays of the nave, on plan; the central tower is carried up to such a height that it just clears the nave roof, and the small tower or campanile adjoining the transept is completed.

The first glimpse of the cathedral on going up the narrow street facing the south transept is decidedly disappointing. The design and detail of the aforesaid campanile is prominent, and it is not happy. It produces the impression of a rather hard, thin, straight-lined structure, with a square-sided pyramidal copper-covered roof (a very ugly form) rising from a very slight corbel table or eaves moulding; the clock, projecting at right angles to the wall, is a miserable little affair; the whole thing looks poor and hard, and (which is a very serious defect) it looks out of scale; it looks like a tower of small size built on the scale and lines of a larger one, and we are at once convinced that if we saw it in a drawing with no figures to give scale to it, we should take it for larger than it is. The sense of thinness is increased by the fact that the upper portion, in which is hung the old peal of bells formerly belonging to the Church of St. Mary which stood on this site, is cut up into long narrow openings with neither glass nor lucarnes in them,—simply bare slits; and we are told it is not intended to put lucarnes: if so, this is a great mistake, the tower would look twice as well with something to fill up these blank openings. It is a very unfortunate feature to have standing as the prominent one on the approach to what is at present the main entrance; but it must be added that this tower is decidedly the weakest portion of the exterior design. The adjoining transept has a front much more effective than the campanile seems to promise. There is a cleverly-contrived and richly-decorated porch (the carved decoration being, however, not all completed yet), of three arches, and with the side arches and their superstructure canted back at an obtuse angle with the centre portion; above the balustrade of the porch rises a large recessed arch, with a drop moulding in the archivolt, giving a deep shadow, and including under that a large circular window: the gable of the transept is covered with a hatched wall diaper. To the left is the baptistery, which is fitted in at the angle of nave and transept, and shows a segment of a circle externally. The style of the building is Early English, of somewhat the type of the portions of the same date at Lincoln, mingled with a certain character which belongs to Mr. Pearson's church buildings, and is more easily recognised than described. There is the solidity (on a smaller scale) of Lincoln, but not the grace and refinement; but there is, at all events, no gimcrack, no "pretty Gothic" about it.

Eastward of the transept occurs one of the most interesting features, both externally and internally,—the old aisle of St. Mary's church, the only portion of the older edifice which was thought worth preserving, but which certainly was, and it has repaid the modern architect's care and reverence for it by leading him to what is, in fact, the most interesting portion of his design, to be described further when we speak of the interior. The aisle is an example of very good late work of very marked characteristics. It stands, or is left, just outside of the south aisle of the choir, and nearly flush with the south wall of the transept, thus filling up an angle of the site at this part. The wide windows are segmental-headed, divided into two main lights by very thick mullions branching each way at the top, and subdivided further by mullions of a subordinate order. Above the windows runs a string-course, and over it a line of flatly-cut quatrefoil panels, and then a battlemented finish. Above this rather rich-looking piece of late work we see the more solid-looking and rather Lincoln-like clear-story of the new building, with its flying buttresses coming down and losing themselves to the eye behind the interesting battlements of the old aisle; and what the flying buttresses about upon we will see when we come inside; for that is the pith of the matter. The eastern transept is not defined on the ground plan externally, but rises above the aisle roofs; the main feature in it is a group of four large separate lancet windows, regularly spaced. In the opposite or north-east transept there are also four windows, but they are in two couplets separated by a central pier, and are further divided vertically into two stories by a cross row of large quatre-



foil lights. This slight variation of corresponding portions of the building is a characteristic feature of it, and is illustrated in various other ways. The east end is a fine and bold piece of design, though here we think that the representation of it in drawing would convey the impression of larger scale than it actually is; in other words, that the design is of that plain and monumental kind which would be more suitable, and would tell better, on a building of the largest scale than in this comparatively small one. The windows are plain lancets, in two stories, the lower ones with small buttresses between them, and with very deep jambs and archivolts mouldings, producing a deep and effective shadow; the upper tier of windows are loftier in proportion, and treated in a rather lighter manner. The main buttresses here and elsewhere are of the type of design which we are accustomed to in Mr. Pearson's churches, running up with very straight unbroken lines for a great part of their height, before any set-off is made. It is a form of buttress which conduces very much to a generally solid and monumental appearance, which the eastern portion of the Cathedral certainly possesses. The walling, which is externally of Penryn granite with Bath stone dressings, has been admirably executed; no better work could be seen.

On entering by the south transept door we find ourselves in a modern Gothic interior, which is a more complete combination of new workmanship and Medieval forms than anything since Street's nave of Bristol Cathedral; only that was a modern completion of a Medieval design, this is a modern Medieval design entirely. The impression of a certain want of solidity, and deficiency in scale, which we noticed in the exterior, is not characteristic of the interior. The whole is in keeping, as an example of a well-built and carefully-designed cathedral, of the second order of size, a cathedral to be classed, when completed, with such buildings as Norwich and Wells in regard to scale and dimension. The interior is consistently carried out in Early English style, of rather early than late type; there are hardly any carved capitals, almost the entire decorative expression depending on severely-designed mouldings of the orthodox Early English type, and at this part of the church almost the only ornament visible is a couple of "dog-tooth" enrichments in the crossing arches. The crossing piers consist of a cluster of larger and smaller shafts, unbroken by bands, except on the shafts next the abutting wall planes, where the string-courses at the base of the triforium, and the upper members of the caps of the transept arcade, just clip the adjacent shaft, so as to give a connexion between the piers and the adjoining work. The crossing arches are scored with a deep shadow on either side of the central moulding, outside of which again come the dog-tooth members aforesaid; it makes a fine and effective arch, but to all appearance a little too flat in section to be entirely in keeping with the style selected; at least, it has that effect from below, so far as the central portion of the arch mould is concerned. The outer members of the arch do not descend to the impost, but meet on a small angle-shaft standing on the main caps; pretty, but a little at variance with the effect of solidity which one demands in such a situation. Above the crossing arches there is a massive and heavy corbelled cornice supporting a gallery with a balustrade pierced with quatrefoil openings, and above this is a lantern-stage with an arcaded gallery round. The corbelling under the gallery is curiously irregular in the spacing and size of the corbels, a fancy of which we fail to see the advantage, unless they are old details worked up.

The main composition of the lower portion shows the orthodox arrangement of arcade, triforium, and clearstory. The transepts have two narrow bays on either side of the crossing, except on the south-west side, where the baptistery is fitted into the angle between transept and nave, and opens by a large arch to the transept with two sub-arches carried on a slender pier with four shafts of the grey Polyphant stone which has been used for thus giving play of colour and accentuation

to the lines of piers and vaulting shafts. This stone is introduced in thin shafts, in the crossing piers, the vaulting shafts, and elsewhere; its tone is a very agreeable light grey, with a slight mottle on it, just sufficient to give a little surface and texture. The triforium is very boldly treated in the transepts, with two orders of shafts carrying arch-moulds over the whole bay, the outer one (carried by a grey shaft) moulded, the inner one simply chamfered; a third order of shafts fills up the space with a sub-arcade, carrying a spandrel wall pierced with one or more quatrefoil openings, with a small dog-tooth on the edge, the effect of which is not happy; it gives the openings a ragged look. The clearstory is a large one, of two-light windows, with a long detached shaft on the inner wall plane, leaving a gallery passage between it and the window. The vault is a simple quadripartite with cross-ribs dividing the bays, lined out with an effective section giving a couple of thin dark lines on either side of the central roll.

The north transept design, which faces one on entering the door, shows a gallery carried on two arches on the ground story, the imposts ranging with those of the transept arcade, but the arches kept lower. As we have before observed, there is a constant variation of treatment about the interior, another of the points in which it so strongly resembles a Medieval cathedral. Above the gallery, which has a balustrade pierced in quatrefoils, is a range of three two-light windows, with cinquefoil lights in the heads (plate-tracery); and above these the whole of the transept wall is filled up by a very large circular window, treated not exactly "wheelwise," but with four large circles filled up by smaller ones, and subsidiary tracery forms, and filled with stained glass.\* This glass is most happily designed for the situation. It is true that the subjects cannot be made out from below, at least without a lorgnette; but, for ourselves, we opine that the spectator need not afflict himself about that. One sees the very best stained-glass windows rather by faith than by sight. It is satisfactory to the intellect to know that it is not designed by accident, and does mean something; but the main point is that it should produce a fine and rich effect in the ensemble of the interior; and Messrs. Clayton & Bell have succeeded in that. There is a rich, uncertain, jewelled effect in the north transept window which is very satisfactory to one's sense of the picturesque; we care not for more, having no kind of doubt that the legends embodied in it are perfectly orthodox and appropriate, and perhaps their very uncertainty to the eye allows one to give a wide range to their meaning. Viollet-le-Duc has related how, when he was first taken into Notre Dame as a child, he thought the sounds of the organ proceeded from the colours of the great rose-window; and that is not a bad way to think of a stained window,—as a kind of coloured music.

The design of the south transept wall (it will be understood that we have been standing with our back to it all this time) shows a circular window also, and beneath it a range of three windows treated differently from those of the north transept; single lights, deep-set in the wall, with a massive pier between them, pierced through for the triforium passage. These have been filled with stained glass, which the corresponding range of lights in the north transept very much require, for at present their mass of light beneath the coloured circular window has a very harsh effect. The circular window in the south transept is designed more on the radiating or wheel fashion. We approve of the variation, but prefer the design of the north window; the south is somewhat mechanical, and does not lend itself to stained glass effect so well.

The baptistery, to which we have already referred, is a very pretty architectural incident of the church. A square-vaulted bay, making a kind of ante-chapel to it, intervenes between it and the west wall of the transept; then comes

the actual baptistery, a circular-vaulted compartment with one-quarter of the circle defined by the outer wall, the remainder by piers and arches which are ingeniously and picturesquely connected with the main work around them. The floor is raised on two circular steps of marble, which are again raised on a single marble step following the square outline, and also faced with dark polished marble. The floor is laid with a geometrical design in coloured marbles, looking well enough, but not Medieval in character, nor in fact with very much character about it at all. It would have cost no more in the working to have made it of a more thoughtful and characteristic design. The font, again, is raised on three circular polished marble steps, two of dark grey and one of an amber-toned veined marble. The base and bowl of the font are of a dark red marble, with shafts of very dark green veined with a lighter colour. The carved caps of the shafts come out badly in this dark material; the modelling does not define clearly, and they look like irregular spongy masses; a point to be remembered in treating material of this kind: it will not repay elaborate carving. The font-cover is of wood of the miniature tracery and buttress work of which there are so many examples, ancient and modern: it is well enough done, but it is like a great many other things of the same kind, and is almost ostentatiously devoid of originality or novelty. The outer wall of the baptistery is decorated with a wall-arcade of trefoiled arches with dark marble shafts. The baptistery is lighted by narrow lancet windows, filled with stained glass, with small pictorial subjects divided by stages of diaper work; the general effect is good.

The choir is raised, between the main arcades, on a flight of three steps in the first instance, bottom and upper ones of grey mottled marble, the middle one of nearly black marble; \* these project out into the crossing, leaving a small platform on the upper step; and a fourth marble-faced step rises flush with the inner order of the crossing arch. In the choir the same general architectural ordinance is repeated as in the transepts, but with some variation and enrichment of detail. The arches are enriched with dog-tooth ornaments; those of the triforium also with these and other enrichments; and one or two of the triforium caps on the south side are carved with the usual form of Early English foliage, rather capriciously used, as if by accident or by an inspiration of the workman. Whether the intention was to give this kind of idea we know not. The vault is of the same simple character as in the transepts. The vaulting surfaces in both are left perfectly plain, of unadorned courses of stone, but in the choir the transverse vaulting ribs are enriched. The plan of the choir piers is very effective, consisting of two large cylindrical members, columns one quarter engaged to each other in fact, coupled in the transverse direction of the building, and with a much smaller shaft in the nook formed by their junction on the east and west side of each pier. This is a most effective pier, and its breadth and massiveness of appearance give additional effect by contrast to the rather delicate lines and shadows of the arch mouldings. The choir arcade is very lofty in its proportions; perhaps it would be more correct to say that the arches are very narrow, for the scale of the architecture is

\* We give, from the authorised handbook to the Cathedral (which, by the way, is disfigured by most wretched illustrations) the following particulars as to marbles used in the choir floor. The steps are of Frosterly marble and serpentine alternately. The mosaic panel between the two highest of these first steps is formed of varied Devonshire marbles with the exception of the small green squares, which are of Vert Antique. The pavement in the centre of the choir is formed of various designs in dark red (Griseulien) dark green (Vert des Alpes), with large red squares (Rouge Royal), the cream-coloured bordering being of Jura marble. Between the next steps are two large panels on the north side, with light red alaba (Rouge de Veronne), dark red (Rouge Royal), dark green (Vert des Alpes); on the south side, light green alaba (Cippolino), and dark red (Rouge Royal). The next level is laid with red marble (Griseulien), green (Cippolino), and cream coloured (Biancetto). The veined steps of the Sanctuary are of Pavena marble, and the mosaic of dark red (Rosso Antico), light red (Rouge Jasper), dark green (Vert Antique), and light green (Cippolino). In the panel, between steps 1 and 2, is the bright blue circle in the centre, of Lapis Lazuli. These marbles are gifts from various individuals.

\* We gave a brief summary of the subjects of the stained glass windows in the cathedral in our last issue, pp. 626-7, note.



small, and the whole effect is that of elegance rather than power. The choir floor is raised a step at the middle of the third bay from the crossing, and another step at the eastern pier of the fourth bay: at the eastern pier of the fifth bay is another step with the altar-rail. The vaulting shafts are stopped on corbels on three of the piers; the two easternmost ones descend to (or rather rise from) the floor; we wish they all did; the springing of them from a corbel half-way up the pier has the sanction of precedent, of course, but it has an unsatisfactory effect, and injures the constructive unity of plan and superstructure. At the eastern end of the choir is the second transept already alluded to, flanking the sanctuary with two lofty arches, from which a flood of light descends at this point, with very fine effect. The altar-space is flanked by a richly-designed screen with sedilia at each side, and at the back the lofty and very richly-carved reredos, forming a very effective termination to the vista of the lower portion of the building. An ambulatory is carried round behind this screen, and above it are seen the three large lancet windows, little too wide in proportion to their height, or our thinking; they would have done with little more jamb and little less glass, but they nevertheless make a fine termination to the architectural vista, and the stained glass here also is very rich and jewelled in effect. The vault cuts rather awkwardly down upon the windows: not more so than in many Mediaeval cathedrals, but it is a defect nevertheless, which it would have been much better to have amended than to have copied; but, of course, we do not expect to persuade modern Gothic architects of that. The general appearance of the chancel is very rich; the steps around the space and around the altar are of Pavonazza marble; the altar frontal is a fine piece of textile design; the rail is a good piece of brass work. The floor here, as in the apse, is the weak point. It is sumptuous enough in its material,—an inlay of various polished marbles; but, in the first place, the designs themselves are commonplace, and present little or no thought or invention, relying apparently only on the beauty of the material (which is the most vulgar source of effect); and, secondly, what design there is is distinctly classical in character and out of keeping with the ruling architectural style of the building.\* Of course something is to be said for convenience of treating the material; circular centres of various colours are a feature to which marble lends itself very well; but more thought might have produced a more artistic and original floor, in keeping with Mediaeval work, without much more expenditure of work in cutting out the marble; and we must not think that in this portion of the building (the marbled floor, by the way, tends over the greater part of the choir, though very much concealed under matting) the effect produced is by no means proportionate to the value of the materials and the work, and a little more care in design bestowed on it would have made a great difference in this respect. How far the architect is responsible for all these details we know not. The choir aisles follow the lower level of the nave, and would seem to be designed to be simply ambulatories, but the southern one is finished with seats. Adjoining this southern aisle is the old aisle of old St. Mary's Church, which reference has already been made, and which is certainly the most interesting and original portion of the interior of the cathedral, which presents at this point an appearance as picturesque as it is unique. The care to preserve the whole aisle, the only portion of the old church, we are told, which is worth preserving, was encountered by the practical difficulty of finding abutment for the air-vault of the cathedral. The manner in which this has been done constitutes, to an architect at any rate, the most interesting point of the cathedral. What would under ordinary circumstances have been the outer wall of the southern aisle becomes an arcade. Three or four feet distant from this is

another arcade, supporting what is really the north wall of St. Mary's aisle. On the other side of this arcade is the aisle itself of the old church. Between the two arcades are solid walls carried by cross arches, on which are seated the buttresses against which, above the roof, abut the flying buttresses which cross the cathedral aisle and take the thrust of the central vault of the choir. These cross walls, where visible internally, are panelled in the manner of late Gothic work, thus making an architectural transition from the early Gothic style of the new building to the late style of St. Mary's aisle. The latter is divided from the cathedral by an arcade of segmental arches, making another of the varied incidents of the interior. A more happy instance of making an architectural beauty out of a constructive difficulty has seldom been seen; it is a thing done in a true architectural spirit, and Mr. Pearson may well be proud of it.

On either side of the choir, towards the east end, are the steps leading down to the crypt, which is a very extensive one, with all the characteristics of an ancient crypt; in particular, the pretence is kept up of its being of an earlier date than the work above it, and the capitals and vaulting ribs are of distinctly Transitional character: a little architectural joke which may be pardoned. It is quite in keeping with constructive requirements that the crypt should be of a more solid and massive architecture than the superstructure; and as we are dealing at Truro Cathedral entirely with reproductions of old styles, it seems quite in keeping to choose an older and more massive one for the architectural treatment of the crypt: if we are doing archaeological architecture let us be quite consistent, and do it thoroughly. The architectural effect of the crypt is marred by its being cut up into vestries, &c., so that the vista through it is destroyed. In the crypt is kept the church plate, which has been mostly specially designed, with the exception of an alms-plate of Renaissance design (not of Renaissance date), presented by a well-wisher; the chalices, patens, and crosses are all of the established Mediaeval pattern, and call for no special remark, with the exception of one presented by the bishop. This represents the value of many rings and jewels, which were presentations to the bishop at different times, and which he wished to consecrate to church use; and a large number of these have been worked into the design; set in the body of the chalice according to a symmetrical scheme. The effect is very good and original. The chalice follows also the usual lines of a Mediaeval chalice, and none could be better, either practically or artistically; but there is a good deal of originality of detail, especially in the manner in which the jewels on the base are set in the middle of a delicate meandering pattern of conventional foliage lines relieved on the surface of the metal.

The reredos, which is crowded with sculpture, is rather injured in architectural effect by a want of duly emphasised architectural lines of construction; it is a mass of carving, rich in effect, but somewhat over-elaborated; there are no plain surfaces or sufficiently prominent mouldings to architecturalise it, so to speak, and the consequence is a somewhat pie-crust effect, taken as a whole; the top line of it is too level and unbroken, it wants outline. The central portion of the sculpture represents the Crucifixion, with our Lord in Majesty above; the side portions are occupied with sculptures of typical events in Old Testament history, and figures of prophets and apostles. The work was executed by Mr. N. Hitch, of Kennington; and in detail there is much fine work in it.

The Bishop's Throne, on the south side of the choir, is a fine piece of woodwork, executed in Burmese teak, by Messrs. Luscombe & Son, of Exeter. Over the seat is a spire of open work and pinnacles, which is very well executed, but seems rather cut short in proportion; it has not the soaring effect which might have been obtained by loftier proportions. The whole of this, however, is excellent carved work of its kind, crisp and effective, and not over-finished; and the poppy-heads to the

divisions between the bishop's and the chaplain's seats are vigorous and original both in design and execution. Two of them contain figures, back to back, so as to face each way, representing St. Gregory, St. Jerome, St. Augustine, and St. Ambrose; the two outer ones are original designs of dragons grappling in combat, their serrated wings extending upwards, and forming the upper surface of the carving.

The grille which encloses the choir, and shuts it out from the side aisles, is a piece of wrought ironwork, consisting of delicate scroll-work between solid uprights. The general effect is very good, but the design does not present any striking originality, and, considering that it is, of course, all wrought work and each portion worked separately, we should have expected to find more variety in the detail, which is, in fact, little more than a repetition of the same forms over and over again. It appears to us that this kind of repetition is exactly what, though inevitable in cast ironwork, we ought to escape from in wrought work. A general similarity with variation in detail is what should be aimed at in such work. The brass lectern, with buttresses surmounted by figures of the four Evangelists, is sound and solid work, but of rather the regulation "ecclesiastical brass-work" type.

The pulpit, which is of polished Hopton wood stone from the Wirksworth quarries, in Nottinghamshire, is designed with plain moulded arches and capitals in the lower portion, supporting a richly-carved upper stage, with panels in which are carved figures of Noah, Moses, Elijah, St. John the Baptist, Christ, and St. Paul. These are well executed, but the grouping of the figure of Christ in a series along with the others, and in no distinctive or prominent situation, seems a little out of keeping. The polished stone has an admirable surface and lustre, having almost the appearance of alabaster.

The Renaissance monuments from old St. Mary's Church have been preserved and set up in different situations in the choir ambulatory and elsewhere; and the principal of these, to the memory of one "Richard Roberts, of Truro," which is placed in the centre of the north transept wall, is a fine example of a well-known type of Renaissance monument of the earlier part of the seventeenth century. It includes two reposing figures of the deceased and his wife, which were originally coloured, and the colouring has been restored from indications which remained. It is probable that the restoration represents very much what was there, but the effect is what might be called rather "gingerbread"; the different portions of the costume are realistically coloured, and it may be doubted whether such a mistake in taste as this was worth restoring and perpetuating. Over the figures is a circular-arched recess carried on coupled marble columns, the space under the arch being occupied by an inscription tablet of dark marble (the inscription cut in English, which is not usual at this date), surrounded by bold strap and scroll ornament filling up the rest of the space. This part of the work is remarkably similar to that on the same portion of the Paston monument in North Walsham Church, Norfolk, to which we referred recently; so like as to suggest the idea of its having been by the same hand, in spite of the distance in locality; but the figures are by no means equal in delicacy of execution to that at North Walsham, and the colouring makes them appear more commonplace in style, perhaps, than they really are.

A work must be added as to the organ. This has been placed in the two north-west bays of the choir triforium,—not the best place for an organ, as it is too high up, both for effect and for the practical purpose of supporting the choir; but we must admit that it is difficult to see where else it could have well been placed without interfering with the architectural effect of the building. The old position of the cathedral organ on a screen across the front of the choir was in itself a very fine and effective one architecturally, but then the old English cathedral organs were much smaller than our

In fact, the character of the work is very similar to that of the floor of the Lateran Church at Rome, of which it is given in page 686 of the present issue.



great modern instruments: the whole organ could hardly be placed there now, and the division of the instrument by placing parts of it below is bad for its effect. The organ is a large one by Mr. Willis, and one of the finest of his instruments that we have ever heard; the cathedral may certainly be congratulated on the possession of it. It has at present no case beyond a mere base or corbel of wood-work. In the position in which it is placed there is scope for doing something very beautiful and effective with the case, whenever funds can be spared for this purpose.

The fittings of the cathedral, it will be perceived, are of a sumptuous character as far as they have been carried out, and if there is a little too much of the "ecclesiastical art-furniture shop" about some of them, this is not the case with all, and there seems to have been a serious endeavour to carry out this portion of the work in a manner worthy of the occasion.

As we have before said, we should have very much wished to have seen the new cathedral made an opportunity for attempting what might have been called a nineteenth-century cathedral in an architectural sense, rather than a mere repetition of the Mediaeval cathedral. In the present condition of clerical leanings on such subjects, it would, we suppose, be hopeless to expect such a thing, even if the architect wished to make so difficult an experiment. If, however, it was a *sine qua non* that we were to have a modern Mediaeval cathedral, it was at least desirable that we should have as good a one as possible; and with the exception of one or two portions of the exterior of the building, to which we have referred, it may be said that this has been done, and that as far as the interior, at any rate, is concerned, Truro has a Gothic cathedral that is as good as a Mediaeval one. In fact, but for the general look of new work everywhere, it would have been difficult to believe sometimes that we were not actually in a cathedral of the thirteenth century, so completely has Mr. Pearson mastered and assimilated the spirit and character of Mediaeval work. In this respect he is without a rival among the architects of the day.

#### NOTES.

**T**HE last number of the *Journal of Proceedings* of the Institute of Architects contains a communication signed by Mr. Cates concerning the question of the "Registration of Architects," in which it is urged that any such step as a Government Registration of Architects would probably be injurious to the character of the profession rather than otherwise, as the limits would almost necessarily have to be so wide that it would certainly take in many who, though they might pass in practical subjects sufficiently, would be no credit to the profession and no advancement to the art of architecture. How far this is likely to be the case has been already pretty well indicated in the nature and methods of the agitation about it which has been attempted by a small knot of persons who are trying to advertise themselves as reformers of the profession. Mr. Cates's suggestion on the matter (which we gather represents the feeling of the Institute Council, though it is not officially so stated) is that if it is considered desirable that the public should have some definite evidence that an architect is a competent and trustworthy member of his profession, that evidence can be most properly as well as effectually furnished by the examination for membership of the Institute of Architects; in fact, that in future, now that the passing of a by no means easy or superficial examination is a *sine qua non* for becoming an Associate of the Institute, membership of the Institute would be in itself a testimonial of qualification as an architect. This has been our opinion all along. The machinery for an examination test is all prepared and complete, by the body which is the proper representative of the profession; and if Government intervention is thought

desirable, nothing is required but that Government should officially recognise the Institute Examination.

**T**HE meeting of the Court of Common Council, which was held on Thursday last week, was mainly occupied in a discussion of the question whether the office of City Architect should be continued, a discussion which ended in a resolution that it should be continued, and in the rescinding of the determination come to at a previous meeting to abolish the office of Architect and appoint a Surveyor only. We could not have desired a more complete endorsement of the views which we have already expressed on the subject. It was urged that it would be a great mistake for the Common Council to endeavour to "economise in brainpower" which was the worst sort of economy in the present day, and that "the primary consideration with the Corporation must be to secure the services of an officer not only competent to discharge with the greatest possible efficiency the duties of the allied professions of an architect and surveyor, but who shall also be possessed of such professional and social status as to justify the Court in entrusting him with the large expenditure and numerous responsibilities which do, and must always, attach to the supervision and control of the City buildings, and the professional management (under the direction of the Court) of the Corporation property in the City." In all which we entirely concur, and congratulate the Court on their decision. It only remains to hope that a really first-class man may be appointed.

**T**HE Government are about to do what a Parliamentary Committee recommended more than fifty years ago, viz., to publish the Acts of each Session in a portable volume at a cheap rate. But this is not sufficient. Each Act of Parliament should be published in a handy form as well as in the large size as at present, so that a person who may not desire all the Acts of each Session may be able to have one or more which are useful to him in a compact form. Thus many who might like to have the Trustee Savings Bank Act of last Session as a convenient leaflet might not wish to have the Technical Schools (Scotland) Act. We have more than once pointed out that sufficient facilities are not given to the public for obtaining Government publications in a convenient form. We hope this intention of publishing the Statutes at a low price will be followed in regard to many other publications.

**I**N reference to the Statutes of last session, it may be advisable to point out that a measure dealing with technical education in Scotland now forms Chapter 64 of the Session. The subjects to be taught in the technical schools must be approved from time to time by the Scotch Education Department, a School Board having previously provided the school, and having fixed the fees. In order, however, to obtain a grant from the Department of Science and Art for a subject, every school provided under the Act must be conducted, so far as the subject is concerned, in accordance with the conditions specified by that body. Yet, in respect of subjects other than these last, the school is to be conducted in accordance with the conditions of the Scotch Education Code, under the heading of "Technical Schools." This seems an absurd division. Clearly the Scotch Education Department is the proper body to have control over all the subjects, and we can see no reason why a grant from the Department of Science and Art should not be made on the application of the Scotch Education Department. But it would be far better to allow grants to the latter from the Consolidated Fund rather than from the Department of Science and Art. We do not propose to go into the further details to be found in this Act, having stated its most prominent features. It shows, at any rate, one thing, that for all practical purposes the Scotch manage their own affairs, for as their Parliamentary representatives agreed to the Bill it became law. Irish representatives, if they were as business-like as the Scotch

members, would get all the Acts they wanted passed in the Parliament of Westminster, and so would England, if her representatives would think more of the business of the nation than of advertising themselves by much speaking.

**F**OR some time scaffolding has been before the old houses forming the Holborn front of Staple Inn, and of course the "Anti-Scraper Society" have been wanting to know what was going on, and meddling and dictating as usual. The building is in the hands of Mr. Waterhouse, and what is being done is simply this: it is necessary to repair the upper stories (the ground floor is let as shops which will remain *in statu quo*, or mostly so), to render them habitable for tenants; and the cement on the front being very much damaged in places, had to be removed. It was then found that there was a nearly complete "post-and-pan" design under the cement. Now Mr. Waterhouse (who we believe is quite a much interested in preserving ancient work where possible as the "Anti-Scraper Society" argued that, as the cement must, at any rate, be removed and renewed, the new coat of cement would be no part of the old work and that it would be much better not to remove, but to show the old woodwork underneath. In a few places the old timbers would require renewing, but the greater part of it is old work in fairly good condition, and the cement it up again merely because some other people cemented it up a good while ago, and because we have got accustomed to seeing it as a cemented front (for those are the arguments of the "Anti-Scraper Society"), would be a perfectly absurd proceeding. In our opinion Mr. Waterhouse has decided on the only course consistent with common sense. Bay windows are to be thrown out on the first floor (another sinful act, of course), but bay windows were there before; and the traces of them are evident, and the reinstating of them is not a merely archaeological point; it is an important addition to the comfort and cheerfulness of the rooms. The old woodwork, when it is exposed, will be over the new stained and varnished, so that even in this respect there will be "no deception whatever."

**I**N regard to the recent fire at Whiteley's and the question of the influence of the expansion of the iron girders in throwing down the walls, Mr. S. Griffith writes to us from "Railway Foundry, Reading":—

"The expansion of the girders in a building where a fire occurs appears to me to occur thus:—  
At the commencement of the fire the girders would expand 0.00006 times their length for each degree of temperature, and this would continue until the iron became so weakened by the heat that the girders would yield to their own weight and drop, so shortening their length. I presume this we may take it that the girders would retain the rigidity until they were at least 600° of temperature, or, say, an increase of more than 500°. This be so, the expansion would be 500 × 0.00006 length of girder, and assuming the length to be 80 ft., we get the total expansion to be 0.03 × 80 ft. = 3.168 in.; the movement would therefore probably be some 3 in. to 4 in. on the two walls, or 1½ in. on each if both were free to move.  
After this the shortening action would probably commence. The power of heat is practically irresistible, and these movements would certainly occur.

I think the above will show clearly what occurred at Messrs. Whiteley's."

Of course no one doubts that the girders expanded with the heat; but there are three questions left in doubt:—1st. Is it certain, even probable, that the series of short girders end to end, as described to have been the construction at Whiteley's, all expanded regularly and equally, under a fire which cannot have attacked all of them from the same moment, so as just to get their maximum expansion altogether at the same moment, which is necessary supposition so as to get a correspondent's "3.168 in."? It must be remembered that it was not a single girder, but length of short girders abutting on each other. 2nd. Is it probable that one wall would remain rigid while the other moved? 3rd. Having regard to our first query, and that it is ve-



little probable that the extreme expansion of the girders was exerted all at the same moment, is it certain, or even quite probable, that a push of 2 in. or 2½ in., let us say, applied very gradually, should overthrow entirely a well-built wall? Did Mr. Griffith ever see a wall that was out of the perpendicular pushed up into its place bodily by hydraulic presses? The operation is the reverse, no doubt, of the supposed one at Whiteley's; but the success with which it has been done in several cases argues that walls are not so easily broken up by a steady push, even of much more than two or three inches.

IN the case of Bird v. Andrew, the Court of Appeal have recently thrown some light on the legal meaning of the words "plentiful supply of good water" to a house in a contract of sale. The judgment would seem equally to apply to a lease or any other form of demise. The house in question had a supply from an adjoining farm; but it, the well was on it. This farm was the property of another person, who had not granted an easement to the purchaser of the house. The easement was afterwards granted, but it only comprised a right to use the water in common with the owner of the farm. It might, therefore, be that the owner of the farm would, acting quite reasonably, take so much water as would leave the house-owner short of this necessary element. The Court, therefore, decided that there was not a supply sufficient to fulfil the meaning of the contract, and therefore the purchase of the estate need not be carried out. The case seems to show that a supply of water from a spring on another person's land will never be regarded as a sufficient supply unless the owner of the house has a priority in its use to all other persons.

Sir Spencer Wells does not succeed, even during his lifetime, in converting a great many people to cremation, it will not be for want of earnest pleading and common-sense. His recent speech before the Medico-Chirurgical Society at Nottingham was full of facts and figures which even a child could understand; and if English society was not so impregnated with sentimentality, that bane of the nineteenth century, English people would see how much cremation would be to their advantage. Sir Spencer shows how urban burial gave place to suburban, which is now described as highly dangerous,—many meteries being overcrowded and surrounded by houses,—though when they were made they are isolated in the country. During the last three months we have added to our London meteries no less than 476 bodies of epidemic patients,—added, it must be remembered, to a ground already seething with myriads of germs and evolving subtle effluvia to the ready overlaid atmosphere. Putting aside such a trifle as health for the living, it is noteworthy what expense would be saved by cremation. As there are no coffins or graves required, two items of considerable cost are at once struck out. For a humble funeral the fees are very small, and even a good middle-class funeral, 10*l*. would cover the whole thing; and when one thinks the small fortunes of which those harpies, the undertakers, fleece the public, by parading the word "sentiment," cremation appears to offer advantages which only want to be better known to be appreciated.

THE reported state of the Rochdale Town-hall, which was only built about twenty years ago, shows how necessary it is not only to design work well, but to see that it is carried out well. It appears that the building has been surveyed, and that it requires immediate roofing, besides other repairs which should have been necessary at this date. At a recent meeting of the Town Council, one of the councillors stated that the contractor formerly employed on the building had admitted to him that he "scampered" the work systematically. If, so, why did neither architect nor clerk works find him out? The result seems to argue a great want of proper supervision during the construction of the building. The Town-

hall was erected from the designs of Mr. W. H. Crossland, architect. A view and plan of the building, with description, will be found in the *Builder* for November 24, 1886; and a view of the interior of the hall was published by us in our number for February 12, 1876.

MR. S. LEE BAPTY, the present Manager of the Manchester Exhibition, has been appointed Commissioner-General for the British Empire Section of the Belgian International Exhibition, which is to be held at Brussels from May to October, 1888. In the list of classes of exhibits it does not appear that the higher branches of the Fine Arts are included; at least, the only direct mention of art is in the heading "Decorative Art," which, as generally used in this country, does not include high-class sculpture and painting. It would be well that this point should be made clear. Among the classes of exhibits in the list which may be of interest to our readers are "Scientific Instruments," "Furniture," "Ornamental Metal Work," "Heating and Ventilation," "Lighting," "Mining," "Metallurgy," "Machinery and Machine Tools," &c.

THE two new pictures by Sir John Millais at Mr. McLean's Gallery, though entitled "Il Penseroso" and "L'Allegro," are not allegorical figures of Pensiveness and Mirth, but portraits, or so we may presume, of young ladies in modern costume. The titles should have been "La Penserosa" and "L'Allegra"; the titles of Milton's two poems, which are adopted here, refer, of course, to the men who are supposed to be the speakers, not to the nymphs who are invoked. "La Penserosa," then (for we prefer to be grammatical), is a portrait of a noble-looking young woman, a brunette, in a dark dress, with a thoughtful expression of countenance, framed in a scene where a mass of foliage on one side, and rather faint indications of distance and sky behind, are blended with the figure into a most delicate harmony of colour, illustrating how much art there is in Sir John Millais's making up of backgrounds for his figures, even when the work seems very slight. One sad defect, however, mars the picture; the waist of the figure is painfully contracted. It is almost impossible that it could have been so in his model, for no young woman could have such a general look of healthy physique with such a waist as that. If it were so, as an abnormal phenomenon, the painter had surely better have corrected it; as it is, it is a blot on a beautiful work, and will be so generally felt to be so that we suspect this portion of the work will have to be ultimately repainted. "L'Allegra" is a brilliant and strong painting of a blonde young woman, with her back nearly to the spectator, and her face turned so as to show in profile. The flesh is painted with great delicacy. The rest of the picture is rather *criarde*, a confusion of bright points and frillery. Between these hangs a grand painting of the head and chest of a lioness, by Mdlle. Rosa Bonheur, remarkable for breadth of style, truth of texture, and the expression of immense muscular power conveyed in it,—a wonderful piece of work for a woman to have produced. Among the other paintings in the same gallery is a remarkably good example of Miss Clara Montalba's work (46), "Amsterdam," a painting of powerful effect, and less mannered than many of hers that we have seen; and a very sweet little figure by Mr. Filles, entitled "An English Maiden" (63). Some landscapes by Neubert have a certain picturesqueness of composition, but are very hard and mannered in execution.

WE cannot say that the winter exhibition at Messrs. Tooth & Son's Gallery is a very interesting one. It contains, however, a beautiful work by Mr. H. W. B. Davis "On the Coast of Bretagne" (51), an effective Cairo scene by Mr. Logsdail (25), totally destitute, however, of artistic finish or refinement; and some good smaller works, especially two small Venetian pictures by M. Gallegos (113 and 120), on either side of a picture by M. Lhermitte, "Toil and Thrift" (117), which should be looked at, though we do not consider M. Lhermitte by any means as great a

master in colour as in black and white. The central picture of the collection, "A Court Matinée" (91), by M. Barbudo, an interior crowded with figures, is supremely clever in the brilliant painting of glittering dresses and details and in the amount of character in the faces of the fashionable mob; but it is disagreeable and staring in colour, and almost revoltingly cynical in feeling. There is a good landscape by Mr. Keeley Halswelle (95), in which he may be congratulated on at last having got a new sky in exchange for his old steely-grey one; another good little Venice picture by M. Senet (99), and one or two figure pictures by M. de Blas, very good work, but only of moderate interest.

WE have been sent an interesting little paper\* on the process of mezzotint engraving, read by Mr. Wilfrid Ball at the little literary and archaeological society which meets under the title of the "Sette of Odde Volumes." It gives a brief account of the process, and the principal difficulties attendant upon it, with an *In memoriam* note at the end on the recent death of "one of the most promising workers in pure mezzotint," the late Mr. C. W. Campbell. Mr. Ball complains that Watt, the inventor of the steam-engine, caused indirectly the decline of mezzotint in England, by suggesting the use of steel instead of copper for engravers. As soon as it became known that 1,000 impressions could be taken from a steel plate, while only eighty could be taken from a copper plate, the latter were driven out of the market, and the depth of tone obtainable from copper gave way to comparative crudity when steel was employed. We have no doubt, however, that Watt thought he was doing the world a service in introducing steel. It is not given to engineers to comprehend these things.

#### ROYAL INSTITUTE OF BRITISH ARCHITECTS:

##### THE PRESIDENT'S ADDRESS.

The first meeting of this Institute for the present Session was held on Monday evening last, Mr. Edward P. Anson, F.G.S. (President), in the chair.

The Secretary (Mr. W. H. White) announced a large number of donations to the library, specially mentioning a sketch-book which had belonged to the late Mr. George Devey, and was now presented by the executors.

The ballot for new members was next taken, when the following gentlemen were elected, viz.:

*As Fellows.*—Mr. J. C. Maddison, of Christchurch, Canterbury, N.Z.; Mr. W. H. Powell (Associate), Southampton-street, Bloomsbury; Mr. J. Jorman (Associate), Paul-street, Exeter; Mr. T. M. Lockwood, Foregate-street, Chester; and Mr. A. Hill (Associate), George-street, Cork.

*As Associates.*—Mr. H. T. Gradon, Saddler-street, Durham; Mr. R. M. D. Fell, Bernard-street, Russell-square; Mr. H. H. Fox, H.M. Indian Public Works Department, Burmah; Mr. G. C. Smith, Gosforth, Newcastle-on-Tyne; Mr. C. J. Marshall, Ebury-street, S.W.; Mr. E. H. Selby, Craven-street, Charing Cross; Mr. W. H. White, Lawford-road, Camden-road; Mr. R. Williams, Holly Bank, Haslemere; Mr. E. J. Bennet, Harmer-street, Gravesend; Mr. J. W. Brooker, Railway Approach, London Bridge; Mr. H. R. Lloyd, Moseley, Birmingham; Mr. F. W. Marks, Harrington-gardens; Mr. J. W. Stonhold, Stanhope-street, Regent's Park; Mr. H. A. Gregg, St. Helen's-place, E.C.; Mr. F. R. L. Harris, Lawford-road, Camden-road; Mr. A. H. Worsley, Stanhope-street, Regent's Park; Mr. T. Moore, Whip's Cross, Walthamstow; and Mr. H. L. Paterson, Wilberforce-road, Finsbury Park.

*As Hon. Associate.*—Sir John Coode, K.C.M.G., Westminster-chambers, Victoria-street.

Mr. Ralph Nevill, while the ballot was proceeding, called attention to the lighting of the library after dark. It was effected by means of argand burners, which, he said, experienced had shown were perhaps the greatest consumers of gas and givers-out of heat and bad products of any forms of lighting. Failing the electric light, he suggested the adoption of the Welsbach

\* Published by E. Dunthorne.



light, which was economical, and threw out little heat or noxious products.

The President said that if Mr. Nevill would write to the Secretaries the question would receive due consideration.

The President next delivered the opening address of the session, which we print nearly *in extenso*. Mr. l'Anson said,—

Gentlemen,—Entering as we now are on another session, and looking back, as is the custom, on the work of the past, I cannot refrain from alluding to the fact that we are passing through, in one great respect, an exceptional year,—the year of the Queen's Jubilee, which has brought to this capital so many of our fellow subjects from all parts of the empire, and also so many illustrious and distinguished visitors, who came to share and enhance our rejoicings.

One of the outcomes of this memorable Jubilee has been the foundation of an Imperial Institute, and the commencement of a new and great building, designed by one of our Fellows, Mr. Colcutt (applause), and obtained by him in a competition limited to a few members of the architectural profession. For the purpose of founding and erecting this Imperial Institute subscriptions have been solicited, and in many cases the invitation has been liberally responded to. We amongst others were invited to take our part in the foundation, but unfortunately architects sadly lack the power to afford that material assistance which their feelings naturally prompt them to give. The larger number of the members of this body who are in a position to subscribe are members of other bodies which have contributed to that fund, and they cannot be expected to send double subscriptions; while, in our corporate capacity, the sum we might be prepared to send, even if we had the power under our constitution,—which I doubt,—would be relatively so small that we could hardly venture to offer it (hear, hear). Nevertheless, I am afraid that this enforced abstinence has been detrimental to architecture, for we live in an age when the *deus des* of diplomacy, and the *quid pro quo* of commerce, are often too rigorously exacted. In the composition of the Executive Council for the Imperial Institute, the representation of architecture is, I regret to say, conspicuously absent, unless, indeed, it is considered that Sir Frederic Leighton, as the President of the Royal Academy, represents Architecture as well as Painting and Sculpture. We are, however, none the less loyal to the principles involved in the foundation and objects of the Imperial Institute; it is only that our pecuniary resources are inadequate,—disproportioned to our good will,—and, this being once understood by the authorities concerned, we may rest quietly assured that a fuller representation of Architecture than now exists on their Council will be deemed not only wise, but essential.

Whilst on this subject, it occurs to me to remark that one most fitting work for the Imperial Institute would be the production of a thorough and complete record,—perfect in all its details,—of the more important architectural monuments contained in India, and the many historical sites and ruined cities to be found within the various dependencies of Great Britain and Ireland. This, no doubt, has already been accomplished to a slight extent by private enterprise and liberality, but there is no complete or national work of the kind; and I venture to hope that there may soon be found means, by the agency of the new Imperial Institute, to furnish the world with at least a catalogue of the Historical Monuments extant within the confines of the British Empire (applause).

In the remarks just made, I have spoken with full cognisance of the responsible position I hold, and I have now to add that, as your President, I have recently fulfilled the sad duty of attending the funeral of the late Mr. Beresford-Hope, one of the most eminent of my predecessors in this chair (applause). Among other professional men who accompanied me on this mournful occasion were Mr. Brooks, Mr. Carpenter, and Mr. Cates. The funeral service was solemnised in Kildown Church, which, with St. Augustine's College at Canterbury and Ely Cathedral, forms one of the chief memorials of his munificence. Although not a member of the profession, Mr. Beresford-Hope always took a lively interest in the promotion of Architecture, and whether in his place in Parliament, or when engaged in the many other duties he undertook, was ever ready to assist

professional architects by his counsel and active support. He was an enthusiastic and a staunch admirer of the works of the Middle Ages in England; and with the movement known as the Gothic Revival his name will always be associated. As President of this Body, President of the Architectural Museum, and, at an earlier period, as President of the Cambridge Camden Society (afterwards called the Ecclesiological Society), he will be remembered among us and our successors. But this is not the time to do more than refer generally to his varied artistic and literary occupations, and to his numerous contributions to the cause of art. His death is a loss to the Institute, both as regards the brilliant Review of which he was the proprietor, and as regards the House of Commons, in which his authority on architectural questions was undeniable.

Mr. Beresford Hope was the only Honorary Fellow who, since the death of the first President, Earl de Grey, K.G., has occupied the chair of the Institute, and it is, I believe, a source of satisfaction to many members that, by the terms of the Supplemental Charter granted to the Institute in the Spring of the current year, Honorary Fellows are still eligible for election as President. It is also agreeable to reflect that, in asking for fresh powers and privileges,—some of which involved the repeal of the larger portion of the original Charter,—we have been permitted to retain any benefits accruing from the relative antiquity of our incorporation. What are these new powers, these new privileges? I doubt, gentlemen, whether you have quite realised the character of them, and so, with your permission, I will recapitulate their principal points. We humbly asked, taking into consideration the importance of this body and the necessity of maintaining a high standard of architectural knowledge in the country, for power to hold Examinations and to grant certificates or diplomas in connexion therewith; and we have obtained the right to hold and establish Examinations not only within the United Kingdom, but also in any Colony or dependency thereof, and in India. We have obtained the right to use distinguishing affixes; and also power to declare, in the year 1892, that every person desiring to be admitted a Fellow must have passed an Examination. In five years' time we shall have the right to say to outsiders, who may wish to become Fellows,—“You shall not enter the corporation of British Architects except through the ranks of the Associate class”; or we may say,—“You shall not enter the ranks of the Fellows until you have passed a special Examination.” Moreover, the Examination test which we ventured, in 1882, to impose upon all candidates for the Associateship is now a right which we are empowered to exercise. These, in my opinion, are powers and privileges the possession of which entails responsibility of a very high character towards the public and towards ourselves; and they form a basis upon which all minor professional questions must rest, if any superstructure is to rise out of them. As for the changes in the constitution of our internal affairs, they are equally important in their character, but to ourselves principally. The property of the Institute, which was originally vested solely and absolutely in the Class of Fellows, is to be vested in the corporate body; the Associates, who by the original Charter could not vote or interfere in the affairs of the Institute, will have the right, with certain exceptions, to vote at the general meetings. The Honorary Associates, who by the original Charter did not exist, are recognised, and will have the right, with certain exceptions and under other limitations, to vote at the general meetings. Moreover, the mode of voting and the number of votes which shall form an effective majority at such meetings are to be decided by By-laws. All these modifications and developments of our original powers and privileges have been obtained not without some difficulty,—not without even some division amongst ourselves,—but I think that we may congratulate the Institute upon the result; nor must we forget the warm and efficient support we obtained in this matter from the non-Metropolitan societies, who shared in our discussions on the subject, and loyally assisted us throughout (applause).

The triennial Conference\* held in May brought us into most agreeable contact with our provincial brethren; indeed, it is a gratifying fact

\* Full reports of the papers and discussions were given in special Supplements to the *Builder* at the time.

that,—owing to the importance of the questions affecting our profession with which we have lately had to deal,—we have been so frequently in close relationship with them; and it is in the highest degree satisfactory to find that, whatever our individual opinions may be on these subjects, when we are brought closely together we act better, understand each other better, and promote better what we may mutually feel to be for the best interests of the important profession to which we belong.

One meeting was profitably occupied in considering the subject of professional education, introduced by an important contribution from the Rev. Professor Babcock, of Cornell University, New York State; and amongst the valuable papers which followed was one by Mr. Lawrence Booth, then President of the Manchester Architectural Association. This gentleman, a Fellow of our body, attempted to show how the authority and usefulness of the Institute could be increased by the adoption of an educational scheme which, if successful in its working, would within a few years lay a solid foundation whereon an appeal to Parliament might be based for stringent powers of repression against unqualified practitioners of architecture. Other papers,—including one by Mr. J. A. Gotch, who was then the President of the Architectural Association,—offered suggestions of like importance, and the whole resulted in a series of resolutions being adopted by the meeting, embodying a practical scheme for organising a complete system of progressive Examinations. These resolutions were:—

“1. That it is desirable that the guidance and direction of the education of those entering the architectural profession should be undertaken by the Royal Institute of British Architects.

“2. That to realise this and the Royal Institute of British Architects should prepare a scheme of a complete system of Examination.

“3. That such system should comprise 1st, *Preliminary Examination* for pupils entering the profession as a test of general knowledge, those passing this to be Probationers R.I.B.A.; 2nd, *Intermediate Examination* for pupils in their third year or earlier, for the general principles of art and construction, those passing this to be students R.I.B.A.; 3rd, *Final and Pass Examination* to qualify for A.R.I.B.A., at twenty-three years of age or earlier; and that no subscription be required from Probationers or from Students.

“4. That this system should be arranged with the cooperation of the local societies by whose agency the details of the Examinations could be carried out.”

At that meeting, Liverpool, Birmingham, Leeds, Bristol, Glasgow, and Dublin were represented, and your Council, feeling that suggestions from so representative a gathering should be duly respected, referred the resolutions to the special Education Committee, for the purpose of considering the manner in which they should be realised.

There are, possibly, difficulties as yet unforeseen, which may impede the carrying out of any complete scheme, but the idea expressed in these resolutions is so good, and so likely to benefit the profession, that I do not hesitate to enlarge upon it. The new Charter having conferred on the Institute the power to hold Examinations, and ultimately to make such Examinations the only means of entrance, it is most desirable that immediately on a young man entering the profession he should be started in a course of study which will ultimately lead him up to the desired end.

The *Preliminary Examination* will test the general knowledge and lead schoolmasters to systematise the studies of the pupil and to direct his attention in particular to those essential branches of knowledge which the Examination will indicate.

The *Intermediate* will be for the probationer a stage at which he will test his elementary architectural knowledge, and in the preparation of which he will lay a solid foundation for his future studies.

The *Final* will give him a standard for the development of his studies so as to place him in a position to enter on the active practice of his profession, ready to apply the principles and details he has acquired, and to further pursue his work until fully prepared to enter on that ultimate Examination which in a few years may be established as a preliminary qualification for the Fellowship.

I hope that when the scheme thus set forth is matured, it may formulate such modes of procedure as may lead to our entrusting the preliminary Examinations to local societies in the manner so well indicated in the paper I have mentioned by Mr. Lawrence Booth.

Meanwhile, in the Spring of 1888, an Examination will be held under the auspices of the Manchester Architectural Society, this centre



having been selected as likely to be convenient to candidates from the great towns in the vicinity, and even to those who may come from further north, and from Scotland. The examination will be conducted on the same terms as those to be held in London this month and in March. The Chairman of the London Board of Examiners will probably attend, and, as at former provincial Examinations, assist the Board, selected by the local society, but composed entirely of Fellows of the Institute. In thus endeavouring to bring examination closer home to non-metropolitan architects and students, the Institute is, I am sure you will feel, studying the best interests of the profession, and doing much to weld the whole profession into one united body.

It has been sought, moreover, to direct the attention of young architects in practice to the Obligatory Examination, which now forms the only entrance to the degree of Associate of this Institute. The number of such architects who would be worthy members of this body, but who have not yet joined its ranks, will, I am convinced, continue to increase, because undoubtedly the preparation for and passing through the Examination, respecting the advantages of which those architects who have expressed themselves warmly, are considerable; and it cannot be too widely known that this Examination is framed so as to have regard to the position of architects in actual practice. Indeed, I know that the Examiners in the habit of giving the fullest consideration to the professional status of such candidates. I therefore most cordially invite all those younger members of our profession who, though not Fellows or Associates of the Institute, are already in practice, to prepare for examination, and thus qualify themselves for admission into our ranks.

To another of the meetings of the General Conference your Council referred the report of the special Federation Committee, in order to elicit an opinion as to the feasibility or desirability of carrying into effect any or all of the proposals made in that report. The meeting was a thoroughly representative one, and the report was returned, after a few slight modifications, with a request that it might be taken into consideration. This has been partly done, and the matter is now in the hands of a special committee engaged in the preparation of draft laws according to the terms of the Supplemental Charter granted to the Institute in the spring of the current year; and I have every reason to believe that before many weeks are over it will be possible to convene a special general meeting for the purpose of considering the same. Meanwhile, without pledging myself as to all the provisions of the report, I say perhaps be allowed to express satisfaction with their general tenor. The Conference of 1887 has resolved that the centre of any federation of the members of the profession within the Empire is and shall be the Royal Institute of British Architects, and the expressed object view is to establish a closer connexion than now exists between British architects generally, and as to promote the advancement of our art, harmony of practice, and intercommunication. For this purpose, roughly speaking, the Institute is to organise periodical conferences in the provinces as well as in London; the local societies, which are to retain their identity and name, and the management of their internal affairs, are to adopt the "Schedule of Professional Practice and Charges" sanctioned by the Institute, with a proviso that, so far as may not be inconsistent with the spirit of such Schedule, they may arrange terms for the guidance of their own members in circumstances not covered by the Schedule; they are also to afford every practicable assistance to students in preparing for the Examination in Architecture; and, further, local examinations are to be held by a society or group of societies, of persons desirous of qualifying for candidature as Associates of the Institute. In return, the Institute is to pay over to the local societies a proportion of the amount received by the Institute in annual subscriptions from their members. These are the main points of the report of our special Federation Committee, and they seem to me, as they seemed to the Conference meeting which discussed them, quite feasible,—indeed, eminently desirable. There are, of course, details, especially of professional practice, which will require care and time to work out and assimilate; but I trust that both in London and in the Provinces the leading men will

exercise mutual forbearance while completing the minor arrangements of a scheme likely to benefit the whole profession, and to the success of which I wish a hearty God-speed.

The consideration of a very important subject,—the proposed "Registration" of architects,—also took place at the Conference, when, after a lengthy discussion, it was resolved to recommend this question to the careful consideration of your Council. The matter is now before a special committee, composed of members whose names are given in the *Kalendar* just issued, and who are fairly representative of both town and country. Mr. Cannon, of Leeds, has accepted the post of Hon. Secretary to the Committee; and those who know the energy and ability of that gentleman will not fail to conclude that the work will not be allowed to flag.

Gentlemen, this is a very important question. It has been strongly pressed upon us from without. It is also clear that many amongst us think it a right step to take. But the critics will ask,—Is it for the good of the public? Is this movement a disinterested one (hear, hear) or is it not? Is it to make a trade-union of the profession (No, no),—to exclude all those who have not been admitted within the inner circle from sharing in the emoluments of those who are within? Will it really protect and guard the public from incompetent men? ("Yes" and "No"). For my part, before venturing upon any conclusion as to the desirability or the reverse of "Registration,"—whatever that term may imply,—I think that we may ask ourselves two very apt and pertinent questions.—First, as to the form in which the registration of architects may be best effected; and, secondly, whether the fact of having passed those Examinations for admission to the Institute, now sanctioned by Royal Charter, and to which I have just referred, will not accomplish,—to all intents and purposes, and sufficient for the present time,—the main object of registration as contemplated by the Conference of May last (loud applause).

Considering that the Institute has now been established for more than fifty years, the passing away of those who in their youth and vigour were among the earliest members of the body must be looked for, and indeed is inevitable. The first of our losses during the past session is that of Mr. George Devey, a Fellow since 1856, who of late years was but little amongst us; he was an able artist in every way, an accomplished architect, and those who know him personally speak of him as kindly and fascinating in his manners (hear, hear). George Vulliamy, a past Vice-President, who was well known to all of us, was a man of courteous and obliging manner, which engaged our cordial esteem. A devoted lover of art, he delighted in discoursing on the great works of the Renaissance. He was, however, comparatively early in life, appointed to the honourable and responsible position of Superintending Architect to the Metropolitan Board of Works, and he had little opportunity of doing any purely architectural work. George Bell, Fellow, of Glasgow, J. R. Botham, Fellow, of Birmingham, and Thomas Henry Sapsford, City Architect at Sydney, are also among our losses; the latter gentleman's decease was announced at the meeting following his election. The next to mention is Sir Horace Jones, and I think I may emphatically say no one was on more friendly terms with the vast majority of the members, or better known amongst us, than he, for he was a truly genial and kindly man (applause); his active career has so recently closed,—the man and his works are so well remembered,—that it is unnecessary for me to enlarge on his personal qualities, or his ability as a professional man. I knew him from the commencement of his professional career, when he went to the same office in the City as I for a time did; and I observe in a memoir of him that he esteemed his position here as your President, as I do, as the crowning honour of his life (applause). Ambrose Poynter, one of the Founders of this Institute, and in the earliest years a very active member, was joint Honorary Secretary, and contributed several Papers to the "Transactions" between the years 1839 and 1848; he had a considerable professional practice many years ago, and his name is worthily continued in the person of his son, Mr. E. J. Poynter, a distinguished Painter and Royal Academician. Robert Parris, Fellow, a member of the firm of

Wiltshire & Parris, was a gentleman who practised honourably and successfully as an architect and surveyor in Lambeth; the firm of which he was a member was originally styled Bailey & Wiltshire, and it was to that office, I believe, the late Sir Charles Barry was apprenticed. George Barnes Williams, Fellow, was the successor to Mr. George Smith, whose architectural practice in the early part of this century was very extensive, and who also had a large business as a surveyor, which class of business was, in my early professional recollections, so almost entirely in the hands of George Smith, David Riddell Roper, James White Higgins, and my late father, that I recollect our much valued Fellow, Mr. George Pownall (who, with Sir Henry Arthur Hunt, is amongst the few of my early contemporaries now living), observing to me, we being then young and ardent aspirants for professional work, that until these men had passed away there could be no work for us (laughter). Mr. Williams was Mr. George Smith's assistant, and succeeded to the Surveyorship of the Mercers' Company, to that of the Morden College Estates, and of others. His principal architectural work, in my recollection, is the rebuilding of the Mercers' Hall, and he also restored the hall of the Vintners' Company. George Goldie, Associate, whose practice was chiefly in ecclesiastical buildings,—his principal works being the Pro-Cathedral at Kensington, and the Church of St. John of Jerusalem in Great Ormond-street,—was an architect of talent, well known and justly much appreciated (hear, hear). Among the Associates I regret to have amongst us the loss of Oswald Adeshed, Thomas Farrer, Harry Saxon Snell, Robert A. Frazer, Andrew Edwards, and Vincent Wing; also J. Stanning Edmeston and Arthur Harland, whose deaths at an early age have just occurred; and among the Hon. Associates that of Major-General Moody, late of the Royal Engineers. In Messrs. Ruprich-Robert and Olivier Rayet, the world of art and archaeology has lost much, and Professor von Neuner, another Hon. Corresponding Member, and an architect of distinction, who resided at Munich, is also deceased.

Amongst the events which have occurred since I last had the honour of addressing you is the election of our esteemed Fellow, Mr. Blashill (applause) to the post of Superintending Architect to the Metropolitan Board of Works, which is a position of much importance. When it is considered that the formation of new streets; the compensation to be paid on the removal of buildings necessary for the formation of these streets; the checking and examination of the returns of the City Surveyors, which are made every month; the sometimes difficult task of regulating new lines of frontage, and advising the Board generally on all building questions arising out of the Building Acts, affecting the interests of some four millions of people, devolve upon this functionary,—you will admit that it is no light or irresponsible work which is placed in the hands of the Superintending Architect. Another noteworthy and to us most interesting event, which has only just been announced, is that the Corporation of the City of London, after having decided to elect a Surveyor to carry on part of the work so ably conducted by our late Past-President, Sir Horace Jones,—a decision which from the first was, I believe, by many members of the Corporation, considered a retrograde movement,—have reconsidered the matter, and have felt it desirable not to depart from the ancient custom of placing an architect on the list of their high officials (applause). They thus recognise, it seems to me, the dignity of our profession, and the strength which the old and powerful Corporation of the City of London feel is thus added to their administrative power by the existence of such an officer (applause). Appointments of this kind are amongst the few advantages incident to our profession; they are posts of high honour, and although the emoluments are not perhaps equal to those which exist in the higher branches of the legal profession, they cannot be said to be other than liberal. Indeed, the office is such as any amongst us might be proud to hold; and I recollect when Mr. Banning was elected, that Sir William Tite, who was afterwards one of our most distinguished, and certainly one of our most able, Presidents, was a candidate for the post (hear, hear).

It has been my most pleasing privilege to place in the hands of our respected Past-Pres-



sident, Mr. Ewan Christian, the Royal Gold Medal; and looking to the importance of some of Mr. Christian's very numerous works, the conscientious care with which he has dealt with those to us most precious national monuments which we have inherited, with which he has to deal,—these considerations, together with the universal esteem and respect in which he is held, induced us to recommend him to Her Majesty as a fit recipient of this honour.

The Exhibition of the Students' work, held in the Conduit-street Galleries last January, was one of the best, if not the best, we have ever had. There can be no doubt whatever that the number of young men who can now produce sketches and measured drawings of the highest quality, both as regards accuracy and artistic power, has largely increased.

The Committee of the new British School at Athens, who report that there is every cause for satisfaction in the progress already made, and that it is intended to provide board and lodging at a moderate rate in the school building for a limited number of students, have just made a proposal to us of some importance and interest. They are prepared to contribute the sum of 50*l.* towards the expenses of any duly qualified architectural student whom your Council may select to send out to Athens during the session now opened (applause). The conditions attached to the grant are,—(1) That the said student shall reside at least four months in Greece; (2) That he shall hold himself at the disposal of the Director of the school to assist in excavations if required (laughter).

I am glad to be able to remind you that the Institute now fosters to the best of its ability the Architects' Benevolent Society, which is administered partly under our care, and within this building. It has an accumulated fund of over 7,000*l.*, which, considering the long time the Society has been established, is but a moderate, I ought rather to say, a very small capital. I fear it must be taken as another illustration of the fact that architects' coffers are not as a rule overflowing with riches. It was proposed to endeavour to increase the fund in the truly British fashion of dining together, and thereby stimulating the charitable sentiments which we all entertain at heart, especially in a cause in which we are so closely interested as the relief of distressed brethren, their widows and orphans. Through the kindness of our Fellow, Mr. Banister Fletcher, one of the Court of the Carpenters' Company, it was hoped that this suggested dinner might take place,—and at Carpenters' Hall, which would have been gladly lent, but at present it has been found impracticable to make any definite arrangements for the purpose.

There is another subject I cannot leave unnoticed,—that is the issue of a further volume of the "Dictionary of Architecture." It is most gratifying to see this work progressing so satisfactorily, as regards the matter it contains. But when will it be completed? Some of us who saw its commencement may not live to see its completion. Nevertheless, let us help as best we may towards this much-to-be-desired result. If, after all, it is too ambitious a work for this Institute, or any Committee of the Institute, to have taken in hand, what honour, what gratitude is due to the devoted few who, as a labour, and a very heavy labour, too,—of love, are bringing this important work to an end! I need but point to the volume just issued to induce you to examine it carefully. I am told by those who know most about the Institute library that very few books in it are more often consulted than the "Dictionary of Architecture," by foreign as well as home readers, and none, I am convinced, afford more information on matters of fact than does this durable monument of Mr. Wyatt Papworth's learning and research.\*

Nothing that has transpired during the past year has induced a belief that the Institute may be brought more closely into relationship with the Royal Academy. Although, in the early part of the year, it was stated that proposals involving serious modifications in the constitution of that body were being considered

by its members, no communication on the subject has been received, and any action that may have been taken by the Academy has been without results as regards ourselves.

On the other hand, an arrangement of some significance has been made between the Architectural Association and the Institute (applause). Before separating for the recess we received a communication from the Committee of the junior body, asking for permission to use our rooms for their ordinary Friday evening meetings, as, in consequence of the present number of classes and an increase of work generally, the Association found the accommodation at their disposal too limited. Since then, your Council, having left the matter to be settled by the Secretaries of the Institute and a small Sub-Committee of the Association, have willingly consented to an arrangement whereby, during this session, our meeting-room will be occupied once a fortnight by the Association, and, I have every reason to believe, with the entire concurrence of the members of both bodies (applause). It is a source of extreme gratification to me to know that the mutual assistance long rendered is thus appreciated by both Societies in a manner so cordial, and, as the excellent President of the Architectural Association showed, in his recent Address delivered from this chair,\* so sincere. The aims of both are identical; we exist for a like purpose. In the Supplemental Charter and its Examination clauses, the objects for which both are working have been defined. The Institute, while urging the members of the younger Society to maintain their absolute independence, will, in my opinion, further the interests of the profession by endeavouring to enlarge the capacities of the Architectural Association as an educational body (applause).

And now, gentlemen, having reviewed the prominent events of the period which has passed since I first had the honour to read a Presidential Address to you,—and this is the last time it will be my privilege to do so,—I commend to your attention some of the important questions which will come before you this session, namely, the settling of the By-laws to be made under our Supplemental Charter; the development of our scheme of Federation; and the consideration of the very important subject of "Registration" (hear, hear). There is also a very difficult and certainly important subject,—initiated here some years ago,—on which we have gathered the opinion of some of our most able and experienced members. I refer to the vexed question of "Light and Air." I have not ventured, although much engaged with the subject, to give an opinion on it myself, but I know that a mass of evidence has been collected by a special Committee of the Institute, the work of which has been transferred to the Standing Committee for Science,—work which well merits further consideration, with a view to the framing of some practical suggestions in regard to this matter.

Gentlemen, a great deal has been written and said of late about the progress of the last fifty years. To many of you I have no doubt that such a period seems a long time, but, believe me, it is barely anything at all in the life of a corporation; and to every one, whether he be an old man or a young man, I would say,—Do not be in a hurry. It was only last year that the London Colleges of Physicians and of Surgeons combined for educational purposes, and for the furtherance of professional education; yet the College of Physicians was founded early in the sixteenth century, and the surgeons can trace their existence back to the reign of Edward II., and even earlier. The position of the English surgeons is now as eminent as that of any other of the learned or scientific professions; but less than a hundred years ago, in 1790, one of the Masters of the College of Surgeons, on retiring from office, wrote to his subordinates an extraordinary letter. "Your theatre," said he, "is without lectures; your library room, without books, is converted into an office for your clerk; and your committee-room has become an eating parlour." Again, in 1844, only forty-three years ago, a Charter granted to the Surgeons constituted a new order of Fellows,—a grade higher than members,—who were to qualify for the distinction by strict examination, or by selection from among deserving members. It is unnecessary to tell you the results of that great step; you will draw your own inferences from the parallel I have ventured to place before you. No class

of men have been reviled, even for centuries, with more bitterness, and with more wit, than the physicians and surgeons. They have been assailed with clamour inside and outside their ranks; they have met with every kind of opposition. Such things, however, do no harm, for, when the cause is good, opposition to it creates no new enemies; on the contrary, it consolidates old friendships, brings back waverers, and strengthens the ties of interest and duty which unite the members of a sound and flourishing Society like that to which you, gentlemen, and I have the advantage to belong (applause).

Mr. A. W. Blomfield, M.A., Vice-President, said,—In the interesting and exhaustive address to which we have just listened, you made a suggestion to which I should like to give practical effect at once, by proposing that a vote of condolence be passed with the family of our former distinguished President, Mr. Beresford Hope, and that our Secretary be instructed to convey it in the usual manner to the proper quarter (hear, hear).

Mr. Ewan Christian seconded the motion, which was carried.

Mr. Blomfield.—It now becomes my pleasing duty to propose a vote of thanks to the President for the very interesting address to which we have just listened. As far as I can judge he has touched upon every point of interest that might have been expected to be alluded to in an address of the kind. I am sure you will all feel with me considerable regret that this is the last time we shall have the pleasure of hearing such an address from him from the Presidential chair. I think, gentlemen, it is hardly necessary for me formally to propose a vote of thanks to the President for his address, for I am sure it will be carried by acclamation (applause).

Mr. John Slater, B.A.—Gentlemen, as representing the Architectural Association, I have been requested to-night to second the vote of thanks to the President of this Institute, which has been proposed by Mr. Blomfield. I esteem it an honour to the Architectural Association, as it is a personal honour to myself, to have had this duty placed in my hands. You, Sir, have alluded to the new arrangement which has been made between this Institute and the Architectural Association, with regard to the use of this room by the younger body, and I am glad to take this opportunity to thank you, and the members of the Institute, for the cordial and ready manner in which they acceded to our request. The gain on our part is undoubted. We shall be very much more comfortable in this room than in the room downstairs, where we were both hot and stuffy. However, I hope the advantage may not be entirely one-sided. A wish was thrown out a fortnight ago that some of the exuberant vitality of the younger body, some of the enthusiasm with which its meetings are conducted, might permeate these walls, and be reproduced at the meetings of the Institute. Whether this be so or not, whether it be wanted or not,—for I am not quite sure that there have not been meetings of the Institute during the past two or three years at which there has been no lack of exuberance or enthusiasm,—I think that anything which makes this Institute and this room the recognised centre of the architectural life and work of the day, whether as regards the metropolis or the provinces, must be an undoubted good (applause). So, Sir, while thoroughly appreciating and strongly advocating a close connexion of this kind between the two bodies, I am very pleased indeed to find you approving and endorsing the views which I put forward as to the work which has to be done, with reference to the profession, being better done by the two bodies independently and under separate executives (applause). To use an illustration from chemistry, I cannot help thinking that the mutual reactions between two independent bodies will prevent the stagnation which would certainly ensue from a complete amalgamation. You have alluded to the probable extension and furtherance of the excellent scheme of Examination. I cannot help thinking it a striking feature of the times that, so far as I am aware, this proposal of extending the Examinations is not met, and is not likely to meet, with anything like the same amount of opposition with which the original institution of the Obligatory Examination was received. I think, Sir, that is most encouraging.

\* We quite concur with the President that there is a mine of information of a certain kind in the "Dictionary," but we must repeat, and with emphasis, that there are articles in it which are utterly unworthy of such a dictionary, either from being out of date in information or scientifically inaccurate in their statements and their literary expression; and we think it is much to be regretted that the President should have publicly given the sanction and approval of the Institute to a dictionary which contains articles that would render it a subject of ridicule to any scientific man or sanitary engineer who took it up.—Ed.



ing. I believe nearly every one is beginning to feel that Examinations, if properly conducted, and I would like to underline these words as strongly as I can,—that Examinations, if properly conducted, are invaluable in fostering and improving architectural education. And that is the sole reason for the existence of the Examination at all. The Examination here must certainly not be framed on any rigid lines. It must not be an Examination the passing of which by students will be dependent upon those students uttering the shibboleth of this or that examiner. They must be widely framed, giving free scope to individual genius,—if you like, to individual eccentricity, but they must be thorough, and they must be such Examinations that a preparation for them will constitute a real education in the fullest and widest sense of the term (applause). I wish every member of the Institute, and every member of our body, would make himself acquainted with, and try to appreciate, the significance of the work that is now being done for and by what are called the lower classes,—I mean the skilled artisans and workmen in and about London and other large cities. On Saturday last I had the pleasure of going over the Finsbury Technical College, and of hearing a most able and interesting address from its Principal. I believe I am not stating more than the exact truth when I say that a young man of ordinary intelligence, who has passed through two years class work in that institution, would be better suited for an architect even than a man who had gone through three, four, or five years of ordinary articles. It would be pursuing the subject too far to point out where this leads to; I will only commend the thought to you, because if I am correct in this belief, and if it is a fact, it becomes a serious question as to what is to become of the class of men who are mere architectural draughtsmen, and nothing else (hear, hear). You have alluded, Sir, and I was pleased you did so, to the cordial relations which subsist between this Institute and our provincial brethren. There used to be a time when the idea was held that possibly this Institute considered itself as representing too exclusively the metropolitan members of the body. I am quite sure that even if any idea or wish existed now to continue that state of things,—and I am quite sure no such wish does exist,—the energy of many of the provincial bodies, and the success to which they have attained, would compel their recognition by this Institute, and would ensure their views and feelings being thoroughly considered in any work which was undertaken. The question of federation is a most difficult one, and I cannot help thinking that we should all do well to lay to heart the wise and weighty words of the concluding sentences of my address; for I am very sure of this, that any attempt to rush through an ill-considered and immature scheme, either of federation, registration, or any other action you like, would be the most fatal mistake which could be possibly made by any one who has at heart the real interests of the profession at large. We must not be in a hurry, but must look at the matter in all its details and bearings, and if we do that I venture to think that the day is not far distant when we shall be really able to mature a lasting federation,—a federation of aims, a federation of interests, a federation of responsibilities, and a federation of honours. That, I believe, is the kind of federation which many of the country members have been looking for, and have come to think is perhaps only a poet's dream to hope for. But if we carry out the suggestions you have made, and seriously consider all the points which bear upon the subject, I think that the members of the Committee who have the subject in charge will be able to do a good deal to speed that long-looked-for day (applause).

Professor Kerr.—I should like to add a few words to the very able speech of my friend who seconded the vote of thanks to our respected and excellent President. Sir, you have to-night, in the course of your remarks, although they were eminently of a practical character, done, in my opinion, a great deal to inculcate that form of exertion for the advancement of the dignity of the profession which I think has always characterised our Presidential addresses here. You have referred to the advancement of that excellent end by education, and by the Examinations which are proposed to be instituted and consolidated for the admission of members into this body. With regard to the

Registration and Federation schemes, you have also said many wise things. I am sure we will all remember what you have said, and act upon what you have advised. But there is another subject to which you have alluded, which my friend, Mr. Slater, has not adverted to, and that is the loss we have sustained by the decease of Mr. Beresford Hope. The motion made for the vote of condolence will stand by itself, and will not prevent my saying a very few words upon the subject of that loss. It has always seemed to me that during the last forty years, the tendency of this profession has been a little downward. You and I, Sir, and some who are of our age, can remember the time when meetings of the Institute were addressed by men who had, as we thought then, very much more exalted aims than we have been accustomed to in public since. Three movements seem to me to have taken place, all under the guidance of exceedingly able amateurs, during the last forty years. There has been the movement identified with the name of Fergusson, which had for its end the advancement of the dignity of the profession by means of learning. Mr. Fergusson's learning was of the most extraordinary kind. There was another movement, the leader of which is still with us,—the movement for the advancement of architecture amongst the other arts by means of emotion,—I refer to Mr. Ruskin. But the principal movement of the three is that which is identified with the leadership of Mr. Beresford Hope, which was the advancement of the profession by means of the influence of tradition. Mr. Beresford Hope was the representative of tradition, and principally of our own tradition, although our differences of opinion on the subject may be of a very lively character. I am pleased to find that some one is to read a biographical notice of Mr. Beresford Hope in the course of the session, and I trust the opportunity will be taken of dealing with that very distinguished man, not as a mere individual unit of a group, but as the representative of a very large aim, and of a very great and considerable movement. I have always thought that, apart from all differences of opinion amongst ourselves on questions of taste, the Mediaeval renaissance of the last generation is one of the most marvellous movements of ability and enthusiasm in art which the history of the world's art can show. It was peculiar to England, and it was peculiarly creditable to England, and it is that movement that I identify with the name of Mr. Beresford Hope. I trust, therefore, when the time comes, we shall be able to enter more fully into the consideration of his career, and that the very distinguished attitude which he assumed and so successfully maintained will not be forgotten (applause).

The vote of thanks was then carried by acclamation, and the President said a few words in reply.

#### ARCHITECTURAL MODELLING.\*

I HAVE been asked to say a few words on a subject not usually regarded as one of the first importance in the education of the young architect, but it is one which, I venture to think, is of the deepest interest to him and his future clients. It is the light and shade of his building; and in assuming that the practice or the art of modelling can help forward this important section of the great art, I must say that it enters into the consideration that should be given to every touch on a building that involves light and shade, which is no less than every particle of relief that is used to ornament the structure. Now the modelled decoration of a single abstract panel is simple enough, and we see in many competitions that are annually held, that it is a question that deals with the systematic, orderly, and pleasant distribution of various details, natural or conventional, in high, or low, or flattest possible relief, but who can say more than that, in itself, the panel, as such, is a pleasant object, not offensive by any disproportion of form, light, and shade or half tone?

But the problem is a very different thing when a panel has to be so made as to take its place among an already distributed arrangement of mouldings or other projections; whether these are the proper attributes of any particular style or the accidental results of peculiar lighting.

\* A paper by Mr. J. C. L. Sparkes, of the National Art Training School, South Kensington, read before the Architectural Association on the 4th inst.

Then the panel has to fit its prescribed place, and the prescription of colour that surrounds it must be thoughtfully consulted and studied, that the designer may forward the harmony of the whole mass.

This involves a very subtle question, namely, that of the colour of a building. Of course, I do not mean anything that relates to pigment, but to the general tone that the light and shade of the plastic mass produces on the artistic observer.

Equally the colour of a statue is, of course, not any pigment with which it may have been tinted, but the value in grey that it presents, and a capable sculptor uses his colour with all the taste with which he is gifted to convey his sense of breadth or complexity, light or dark, whichever quality may best explain his meaning.

The colour of the hair of a sitter may be represented approximately, the depth of the colour of the eye, or the over-balance of some too heavy shadow may be made right by the proper understanding of this vital principle.

Now, colour in a building is much the same as colour in a statue; it requires a large experience; and in architecture as in painting and sculpture, demands a refined taste to express a breadth that shall be perfectly harmonious and never bald. I take as an illustration the diametrically different treatment that a panel designed to be exposed on the south façade of a building in full daylight or sunlight, should receive, from what must be applied to the same panel if its mission is to decorate a staircase with a narrow top light. So consider the different treatment visible in the Venus of Milo, formed to be seen in the broad light of southern daylight in harmony with the large breadths of simple Classic wall surface, and the draped figure of a saint from its position in the over-arching porch of a Gothic cathedral. The colour in the two is absolutely opposite; first in the building, and, of necessity, in the details that decorate it.

Or take a façade of Bramante and one of a Romanesque building, and the difference is as light to dark, breadth of light to its opposite. The conditions under which every portion of the decoration of these opposite and contrasting works of art are so obvious that I suppose no one will take exception to the proposition that follows on, viz., That every detail must be modelled to contribute to the general tone, whether this be in the direction of breadth and light or in massive dark; or, further, that this will demand of the architect a knowledge of effect and a mastery of detail that can only be attained by dealing with each moulding and each relief as a part of a whole. The decoration should be plastic and amenable to each wish or fancy of its author.

Light and shade enter into the ultimate treatment of each angle, cornice, surface, and plane, large or small; therefore all combine to give "colour" to a building. If we accept the truth of this statement, how necessary, then, is it that the young architect should model.

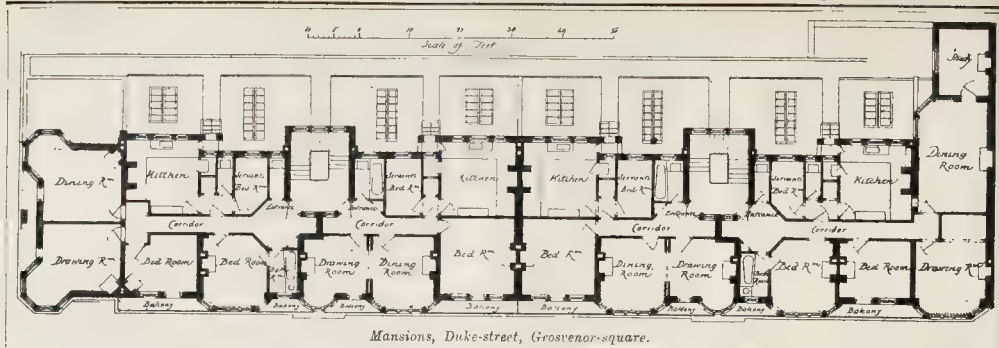
Colour, then, can consist of the aggregate values of light and shade in its largest significance, and must be studied down to its smallest details. And this involves the consideration of how it is to be done.

The historic method,—that is, a progressive course of graduated form from early to late in any particular style,—seems at first sight the most reasonable and satisfactory, so far as mere modelling goes, and is indeed so, if we aim merely to give a clear idea of form, surface treatment, and light and shade of particular parts of any building; and with this in view the student should commence with some rather simple panel, and learn the use of his material from the free imitation of the chosen object, never losing sight of the fact that many beautiful objects, such, for instance, as those carved in hard stone, wherein the greatest fineness of line is possible and is expressed, are clearly not suitable for copying in clay. In such a case a translation may be made.

Or again, a rough piece of wood-carving, partly saw-work and mainly gouge-work, is not to be imitated in clay; here the careful and capable guidance of a good teacher is necessary. But enough remains that is quite right in method for the architect to copy accurately and even soverly.

The genius of the material deserves some study. Clay is plastic; it is added piece by piece, layer on layer, until the desired contours are reached.





Mansions, Duke-street, Grosvenor-square.

This is the very opposite of a carving, when out of a block the desired contour and figure are cut; and it is sometimes difficult for a student to realise that he must not scrape and carve down a lump of clay to some smaller form.

For these reasons the examples should be wisely chosen in consonance with the genius of the material.

With this in view the architectural student should model not only architectural details, but also the human figure, for in this section of study colour will become one of the qualities he will learn to appreciate; and if he should be able to obtain any great power in figure modelling, the question of colour in his work will be constantly before him, and in that case he will, I am certain, not fail to admit its very great importance.

As to where this study can be carried on, I for a few minutes ask leave to call your attention to the isolation, if I may use the word, that surrounds the average Government Art School. The manufacturer does not, to the fall of his requirements or opportunities, use the art school. In many cases the manufacturer is absolutely indifferent,—and a condition of isolation undoubtedly often exists between the school of art and the manufacturer. The connecting link is, I am convinced, to be found in the secondary, or technical, or advanced schools of art, where the classes shall be few, with masters who shall be specialists, the best men in their calling, and where the work shall be essentially practical and technical, and carried on to the farthest possible point. The art school has prepared the ground, the technical school sows the particular crop it is desired to raise, and the manufacturer and employer of art labour see their interests advanced by the excellent teaching their apprentices may obtain in these secondary schools. An important instance of such an extension of art-school work is seen in the Technical Art School at Kensington, which has grown out of the Lambeth School of Art, an institution that, unaided, has done its share of work in helping the local manufacture to a name and an importance that has generally been admitted they have attained.

I invite the attention of all interested in this work to this school, where instruction is given by a modeller and sculptor, capable in all the varied sections of architectural decoration, and in figure no less.

I say sincerely that the entire district is deeply indebted to Mr. William Silver Frith for the work he is doing in the South of London.

I wish to say that the clear-sightedness of the City and Guilds of London Institute has allowed this absolutely necessary work to be done; and further, I here wish to record my grateful sense of their liberality that so fully supports one of the most interesting and useful Art Schools in this city.

[Want of space this week compels us to hold over our report of the discussion which followed.]

**St. John's Church, Macclesfield.**—Mr. R. A. Briggs, A.R.I.B.A., writes:—"I notice that in the account of the consecration of St. John's Church, Macclesfield, in your last issue of the *Builder* you state the architects are Messrs. Valmister & Briggs, of Macclesfield. It should have been Messrs. Killmister & Briggs, joint architects, London."

## Illustrations.

### EXAMPLES OF ANCIENT WORK IN PORPHYRY.

THESE examples are given in this number as affording a kind of practical and artistic comment on the paper on Porphyry read by Mr. Brindley at the recent meeting of the British Association, an abstract of which is given in another column. The two sarcophagi from the Vatican illustrate the use of porphyry in relief sculpture; the seat illustrates its applicability to the symmetrical and conventional forms of classic ornament.



Pavement, Lateran Church, Rome.

The fourth illustration, the Tomb of Costanza, is the most characteristic of the four, giving an example of a treatment in strongly marked and rigid lines of design precisely suited to the nature of the material.

The accompanying illustration of the floor of the Lateran Church at Rome is an instance of the use of porphyry for the larger central masses of the inlay.

### DUKE STREET MANSIONS, GROSVENOR SQUARE.

THIS block of residential flats is now in rapid course of erection in Duke-street, Grosvenor-square, close to the corner of Oxford-street.

The building will form a conspicuous feature from Oxford-street, and will be even more so when the remainder of Duke-street is widened, which work will probably be commenced very shortly. The end flanked by the two turrets faces towards the square, whence an uninterrupted view will directly be obtained, as the Duke of Westminster is about to demolish a block of houses adjoining, and form an ornamental garden in its stead.

The ground floor and basement are intended for business premises, while two entrances (with hooded pediments over), and staircases lead to the residential flats above.

There are four sets on each floor, varying somewhat in size, but each set is complete and self-contained.

The plans will explain the general arrangement, which broadly may be described as having every reception and bed room to the front, while the domestic arrangements, &c., monopolise the back.

The building is being carried out by Messrs.

Howell & Son, of Bristol and London, with the terra-cotta work by Messrs. Doulton, of Lambeth, while Mr. Sprague is acting as general foreman. The architect is Mr. J. T. Wimperis.

The drawing from which the illustration is taken was in the Royal Academy exhibition of this year.

### WILLESDEN NEW PUBLIC OFFICES.

This design was submitted in the recent competition for the above offices by Mr. Arthur Ardron. It was proposed to use red brick and stone dressings for the external fronts, and strawberry-coloured tiles for the roofs, excepting to tower and turret, which would be of lead.

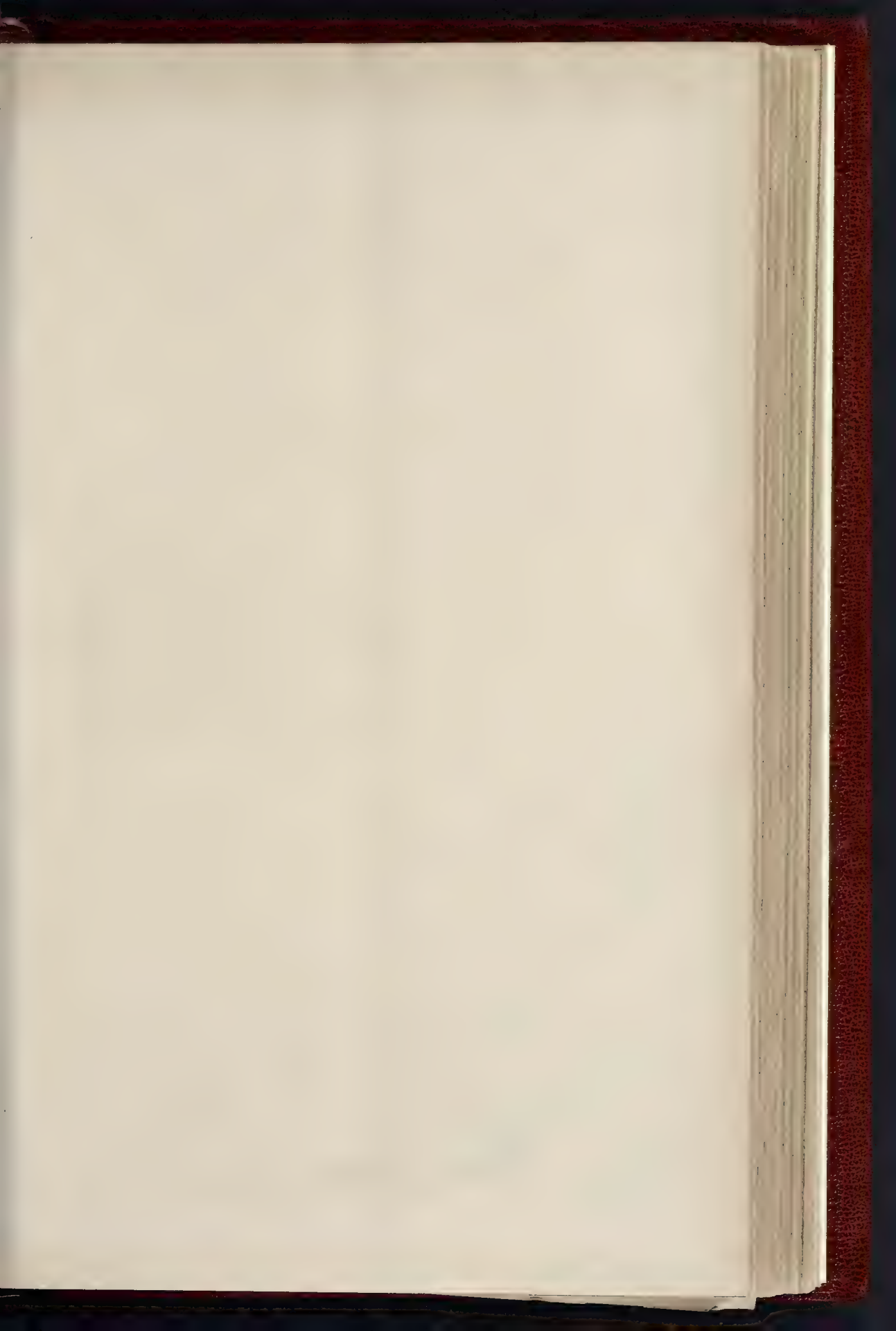
The building to the right of the view shows a public hall proposed to be erected at a future time, and was not included in the stipulated amount of 6,000l. The upper part of the tower would contain chamber for clock, water cisterns, &c.

### CHRIST CHURCH, PAIGNTON.

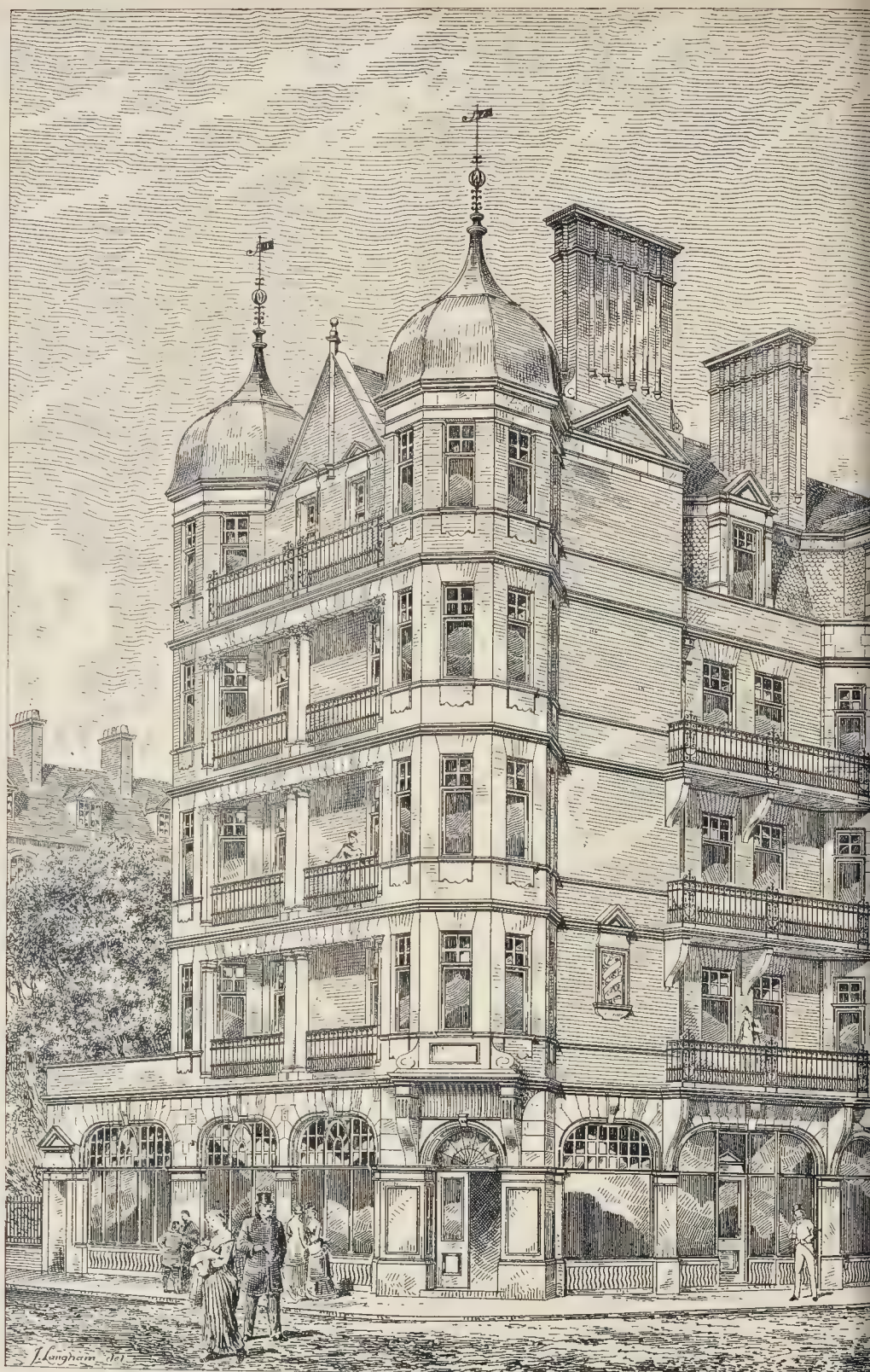
THIS church is being built to supply additional accommodation in the district of Paignton, on a site eligible for church, schools, and parsonage-house, given by the Ecclesiastical Commissioners (who have also contributed towards the endowment). The foundation-stone was laid early in the year by the Bishop of the diocese, and the work by the Bishop was rapidly proceeded with. The church consists of a nave 30 ft. wide, with narrow aisles to be used as passages only, north and south transepts, chancel, 24 ft. wide, with apsidal end, organ-chamber, and vestry. A narthex is provided at the west end giving access both to the nave and aisles. The tower, which is at the south-west angle of the building, serves as a baptistery, and is furnished with a lofty spire, 180 ft. high. Accommodation is provided for 550 persons.

The walls are being built with local red sandstone, squared and toolled on the face both for the interior and exterior, with Bath stone for all dressings, with the exception of the plinth courses, which are of Marychurch limestone. The whole of the floor space, with the exception of the chancel and narthex, is to be laid with wood-block paving.

The design was chosen in a limited competition, and is the joint work of Mr. Edward Gabriel and Mr. W. G. Couldrey, under whose supervision the work is now being carried out.







DUKE STREET MANSIONS, GROSVENOR



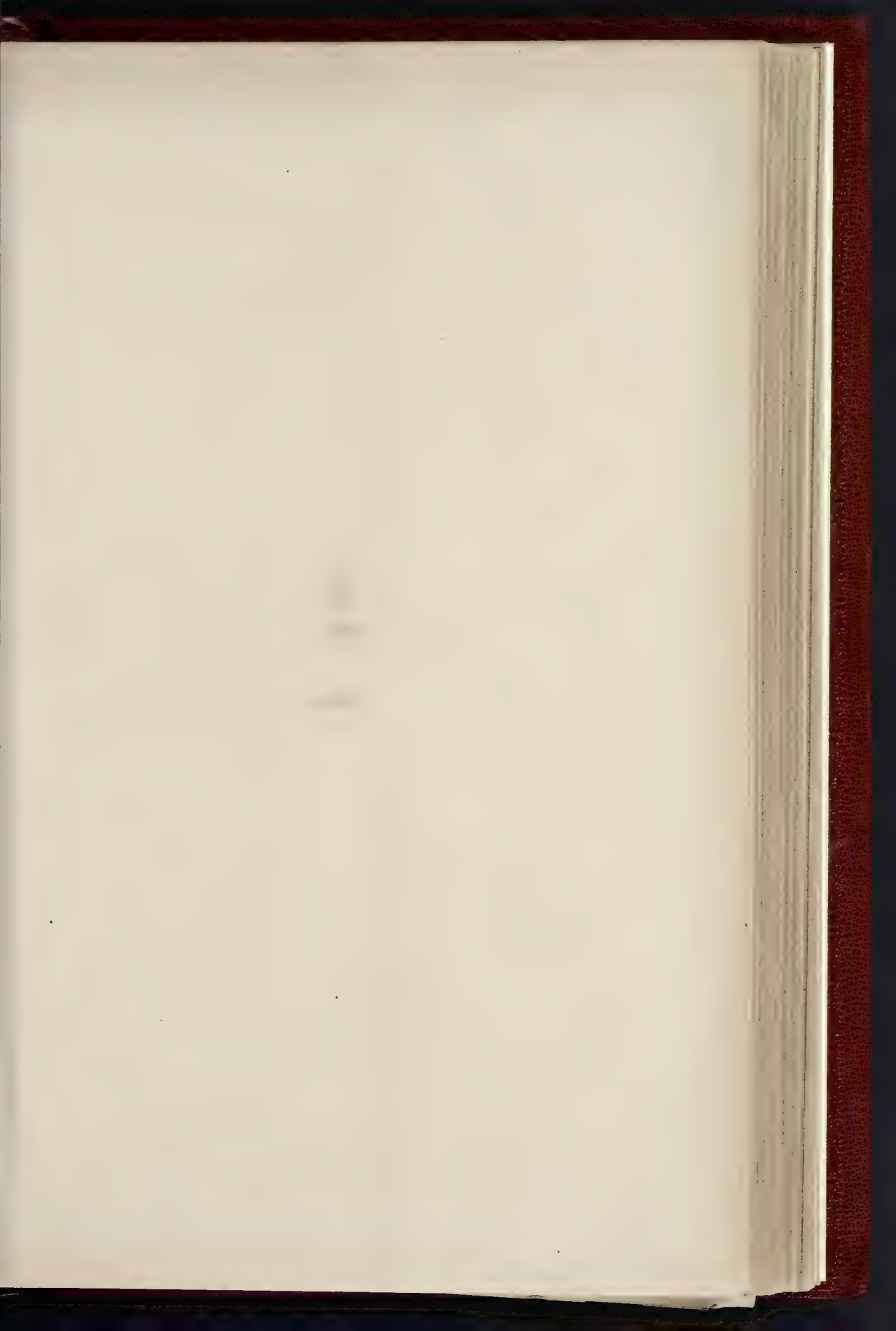


PHOTO LITHO. SPRAGUE & CO. 32, MARTIN LANE (CANON ST.), LONDON E.C.

Mr. J. T. WIMPERIS, F.R.I.B.A., ARCHITECT.



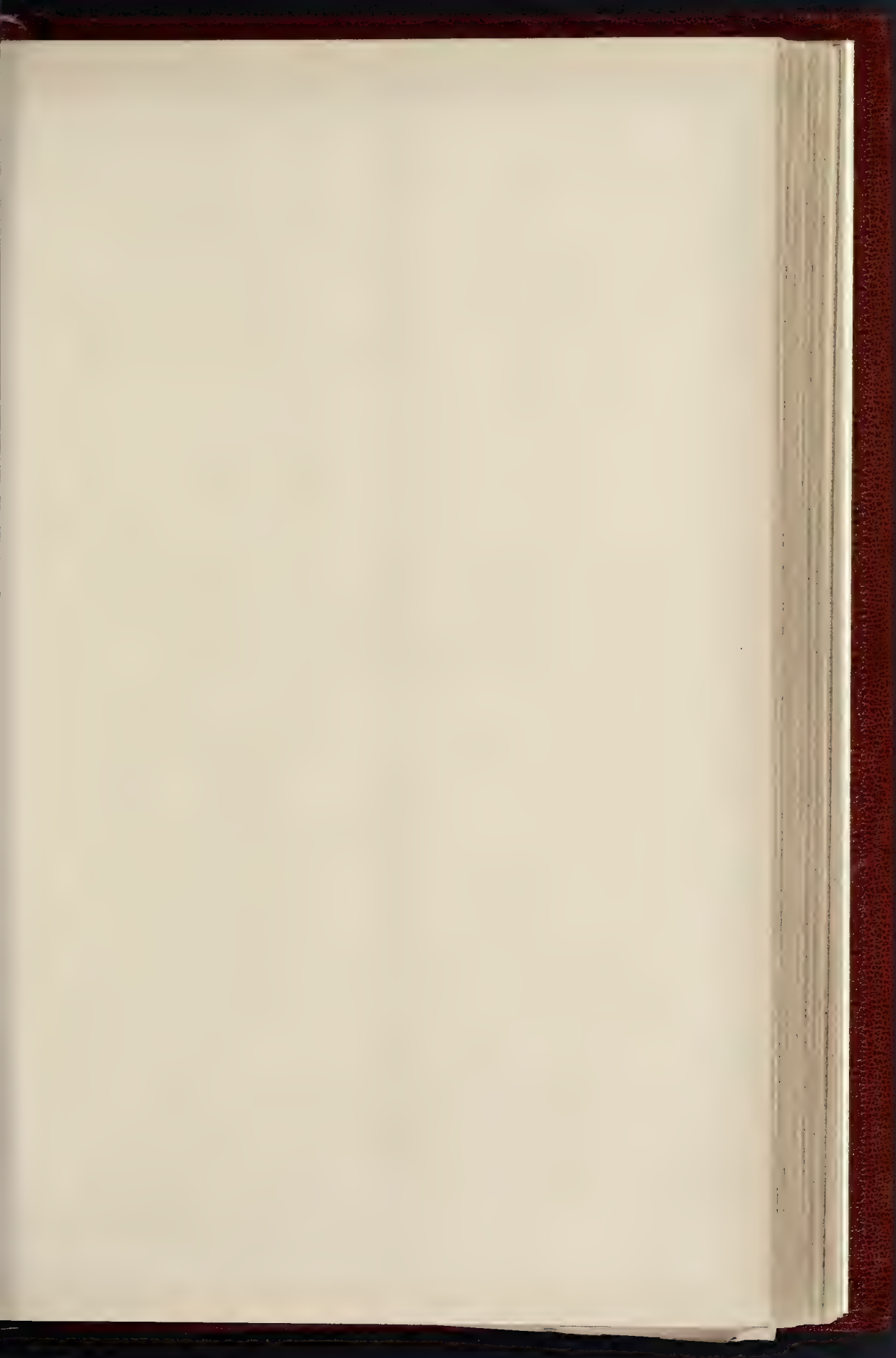






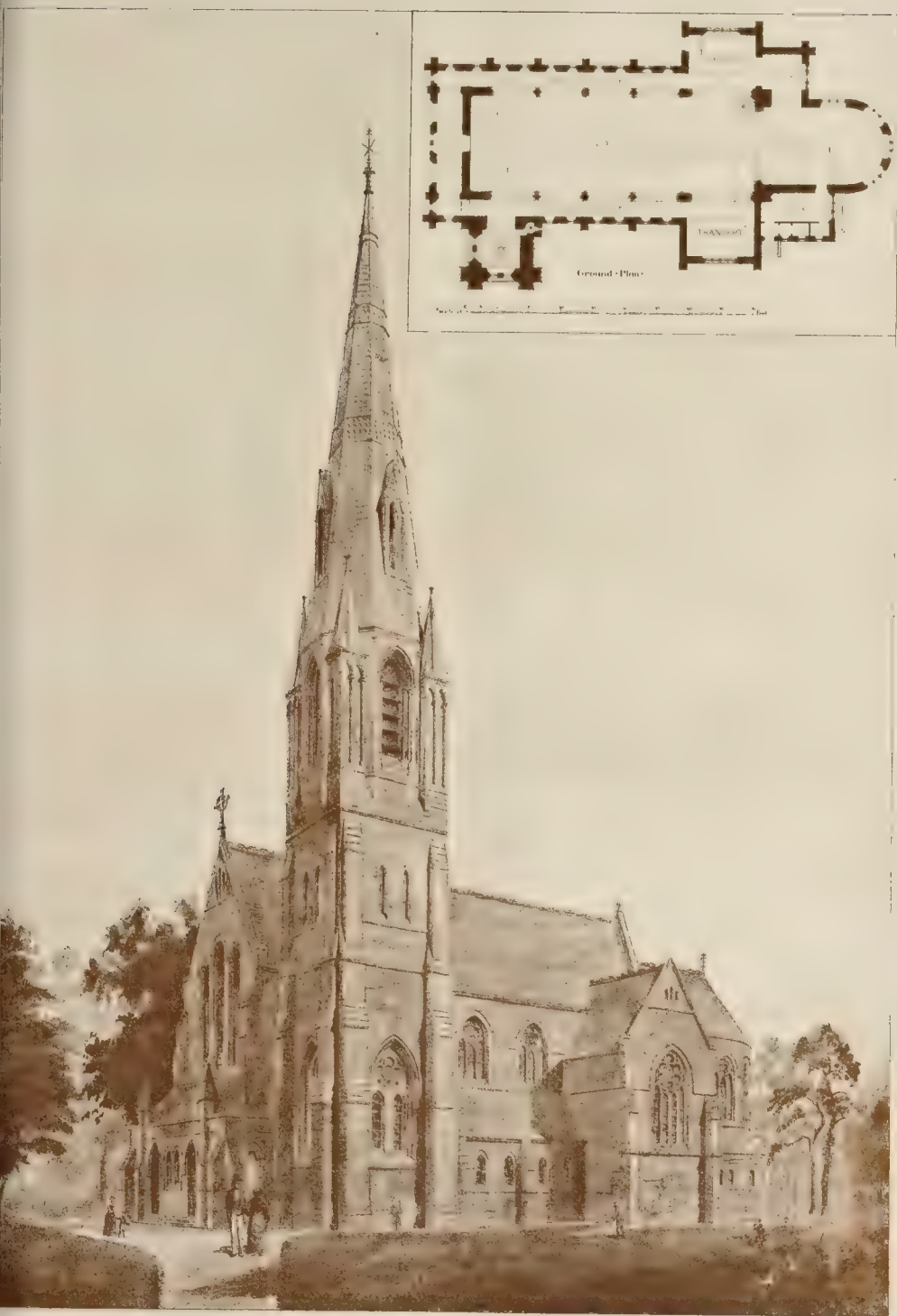


INTERIOR LOOKING EAST, ST. DENIS.—FROM A PENCIL SKETCH BY THE LATE MR. G. E. STREET.









CHRIST CHURCH, PAIGNTON, DEVON.—MR. E. GABRIEL, A.R.I.B.A., ARCHITECT







CHEVET, ST. ETIENNE, CAEN.—FROM A PENCIL SKETCH BY THE LATE MR. G. E. STREET









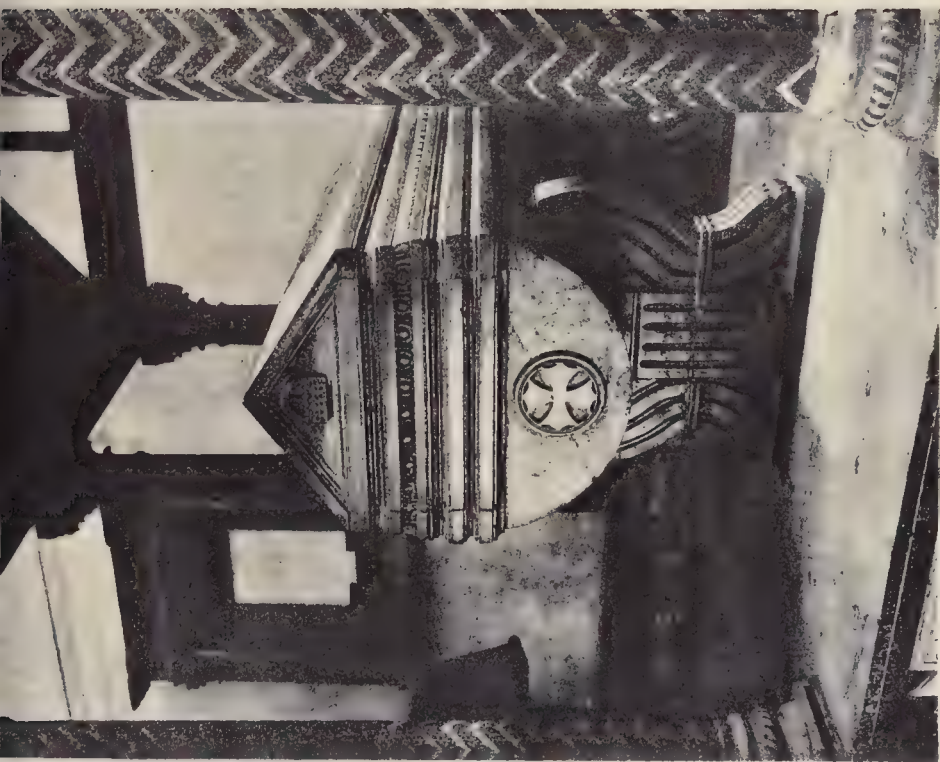
THE BUILDER, NOVEMBER 12, 1887.







SEAL, VATICAN MUSEUM.

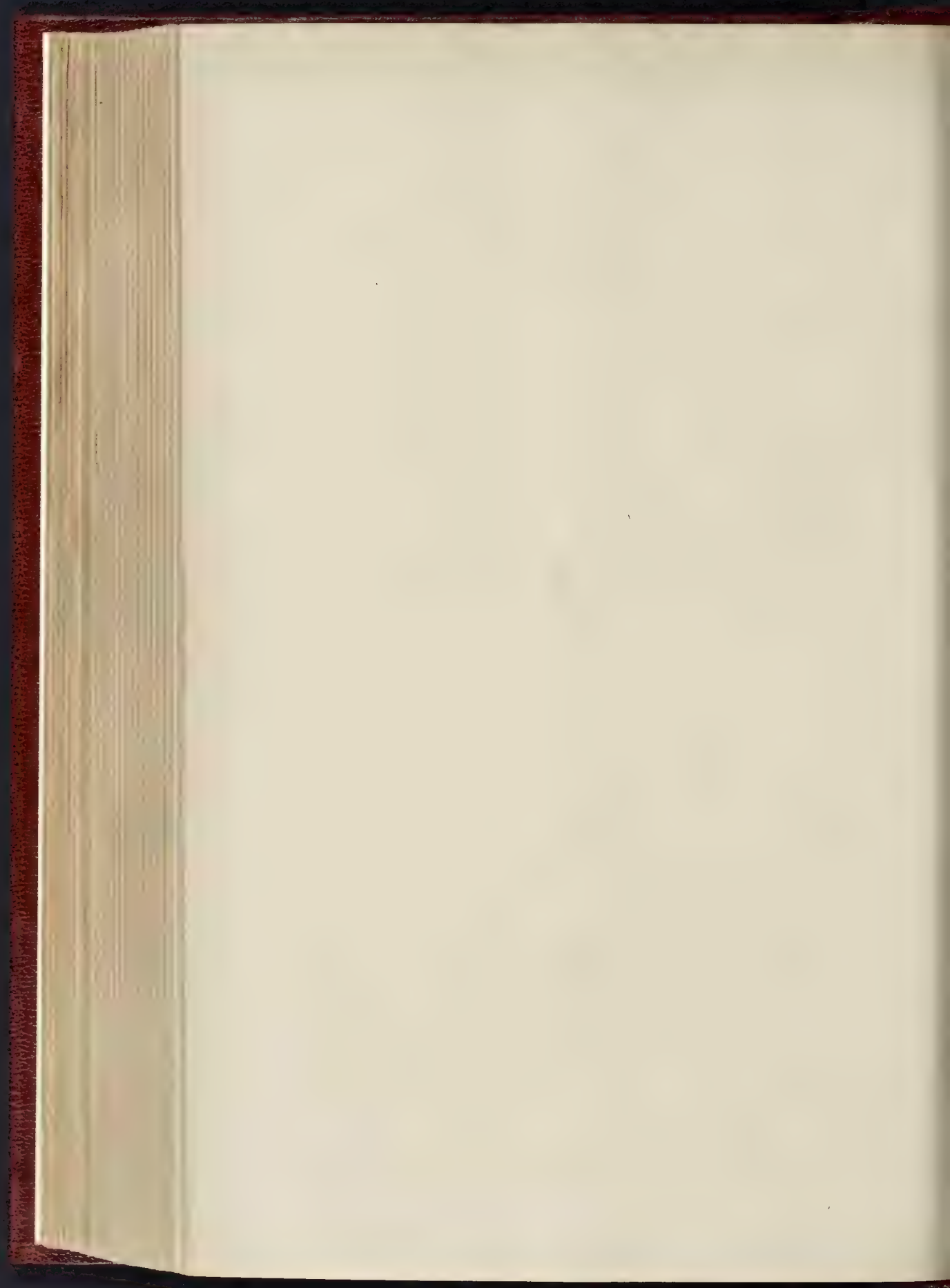


TOMB OF COSTANZA, DAUGHTER OF KING ROGER, PALERMO.

BY GUTH. FOR THE MARYLAND AND N. D. DODGE.

EXAMPLES OF ANCIENT WORK IN PORPHYRY.





the contractors are Messrs. C. & E. E. Drew, of Aighton, Mr. A. Leeming, of Torquay, acting as clerk of works.

#### SKETCHES BY THE LATE MR. G. E. STREET.

THESE are reproduced from pencil sketches by Mr. Street. They are of interest, not only being his work, but as representing a method of rapidly obtaining the facts of a building in sketching, giving the main features in broad outline, and filling up enough of the detail to form a memorandum of the whole architectural treatment.

#### EGYPTIAN PORPHYRY.

THE following is an abstract of a paper by R. W. Brindley, read at the recent meeting of the British Association at Manchester, on Egyptian Porphyry and its Uses, with an account of a recent visit to the ancient Quarries of the Eastern Desert in Egypt.

Many persons ask the question, what is Egyptian porphyry? The reply being, it is a deep-purple coloured stone of considerable hardness, susceptible of a high polish, containing white and pink crystals of felspar in a silicious matrix. It was called porphyry from its colour, the imperial purple, the hair apparent to Constantine the Great being named the porphyrogenitus, or born in the porphyry room, which was at Constantinople. In architecture under the Cæsars it was the most valuable material the empire could produce, and has remained so down to the present day, it being long sought after by art collectors of the world. Grand examples are seen in the monolithic columns of St. Sophia, Constantinople, and in some of the edifices of Rome. It was used for sculpture, sarcophagi, &c., and during the Middle Ages immense quantities were cut up for costly pavements, similar to the one the sanctuary of Westminster Abbey, where a slab may be seen in the tomb of Henry III., bearing which Dean Stanley remarked "it is the abey."

Ancient writers differ as to the whereabouts the old quarries, Pliny saying they were in Egypt, and capable of producing blocks of any size. These quarries were actually rediscovered by Burton and Wilkinson in 1823, and visited by Lepsius in 1845, but as neither of them had brought away specimens, nor taken any notes as to the quantity of porphyry remaining, their information was not of the practical value it might have been, and as in late years it has been announced that the quarries have been discovered first in one country, then in another, became somewhat perplexing.

I have had the pleasure of examining rock specimens of all the localities mentioned by the modern authorities, and have found that none of them are antique porphyry, and therefore resolved to follow the footsteps of Wilkinson.

In company with my wife, in February this year I arrived at Cairo, and was fortunate, through Sir Evelyn Baring, in being introduced to Dr. E. A. Floyer, a gentleman actually conversant with this Desert, and who was able to supply me with a map from Kenah on the Nile to the Red Sea. We then proceeded to the ancient granite quarries that supplied Egypt with materials for her temples and obelisks. Here I observed that these quarries only supplied the deep red, but the rose and grey also, the colours often coming in combination in the same block. The so-called obelisks of other large blocks remaining in the quarries all of Roman date, and the system of working was, in my opinion, by metal wedges, not wood, as is generally supposed,—the method being used to break up the immense granite statue of Rameses at Thebes, running now to Kenah, where our caravan was met,—first of nine camels, which ultimately amounted to fifteen, and nineteen attendants, all water, tents, and bedding, with provender for the camels, having to be carried for three days in case of emergency,—after several days through the obstruction of the Mudir, the obsequies of the Bedouin sheiks, we at last got on our way, and, passing through streets of mud-brick, soon reached the outskirts of the Desert. The first day we went through a wide sandy, with a well-trodden camel road.

The next day we encamped at an ancient station, protected by a picturesque fort on an adjoining height, where fragments of

Egyptian porphyry were found. The following day at noon an important station, with reservoir, fort, and wells (now dry), was passed. The road now lay through an extensive open plain. In the evening the low rocks of the igneous range were reached, the gradual ascent from the Nile to this point being 600 ft.

The next day till noon our way was between hills of red granite and black shaly trap rocks; here part of a porphyry column was passed. At luncheon time another important station called the Monastery was reached, where lay a number of porphyry blocks partly buried in the sand. A ride of fifteen miles, through picturesque rocks with the high mountains in the distance, brought us to the charming valley of Waddi Kittar, homed in on three sides with precipitous mountains 5,000 to 6,000 ft. high, the valley leading to a gorge in which is a dripping well of excellent water, with ferns, figs, and palms. Here the camels drank, a day's rest being taken in this valley, where was another Roman station. Soon after leaving Kittar we reached the watershed, the altitude being 2,400 ft., the drainage going respectively to the Nile and the Red Sea. The immense porphyry mountain of Gebel Duchan we were now alongside of, and arriving a few hours afterwards at an old Roman station, with an interesting fort at the foot of a mountain pass, we decided to encamp, whilst I made my excursions on Gebel Duchan to find the old quarries.

The Desert route thus passed over, with its forts and wells, must be older than the Christian era, as Strabo, who visited Egypt in the reign of Augustus, remarks about this route to Myos Hormos, which was the high way to India, as follows:—"Now watering places are provided, water is also obtained by digging to a great depth, and rain-water is found, although rain rarely falls, which is also collected in reservoirs."

I began my mountain ascent at 5:30 the next morning, in company with a Bedouin and a Luxor Arab. We followed an ancient Roman road which went direct from a well near our camp to the pass of the mountain. At an altitude of over 2,000 ft., we found a station similar to those in the desert. From hence to the summit of the pass the road is a narrow tract zigzagging on one side of a ravine, and very difficult of ascent, being partly covered with fallen rocks. At 8:30 we arrived at the top of the pass, the height being 3,100 ft. Here is a square watch-tower. I had now got very disheartened, not having found in ascending a fragment of porphyry. The view on the other side revealed a regular amphitheatre of rocks, all desolate, like an extinct volcano; while in the bottom could be seen an old town (the Medeneh), where my companions thought I was going, but by spying, by the aid of a good field-glass, porphyry colouring on the opposite mountain, I resolved to go thither. To this my attendants most positively objected. What further encouraged me was that the old path I could see divided half of the way down,—one part going direct to the town, the other to the purple tinting opposite. We went on to the junction, my companions stopping behind, I taking from them my cold tea, lunch, and sketch-satchel, making them tempting offers of good "backsheish" to accompany me, but all with no avail; so I proceeded alone, when in about seven minutes I heard a noise and found they were following me. On arriving at the foot of the opposite mountain my delight knew no bounds, the ground being strewn with pieces of the most sumptuous porphyry, while a little farther on was the actual pitched way or slide, some 15 ft. wide, down which the blocks came, with piers at the sides for lowering them, while a number of blocks, some of large size and others broken, lay here; there were also adjoining a number of workmen's sheds. This road for a short distance was very good, but after awhile it became strewn with masses of rock, and in many places was utterly destroyed by the periodical torrents, the scrambling and climbing being most difficult under a cloudless sky. Near the top the road was good again, but, instead of it leading me into the quarry, I found it going over the mountain and could trace it winding down another valley. It was now noon and I was completely exhausted; so, finding shade under a ledge of rock, we took our lunch, after which I made a hasty sketch of a most marvellous view over the Red Sea, with Sinai in the distance. Now refreshed and retracing my steps, I began again to climb, shortly arriving at a number of workmen's huts, and next an extensive face of rock, in

which I expected to find worked veins of porphyry, but nothing could I see but "ochre" colour, when presently I noticed that the rock and all the loose masses were covered with wedge-holes the same as in the granite quarries of Assouan. I was at a loss to know for what purpose this stone had been quarried, or what it really was, it looking much like felspar; so knocking off with the hammer a flake chip, I immediately discovered that it was porphyry, all the solid rock and everything under my feet being the same precious material, the surface colour being simply an ochreous wash from some rocks above. Further examination showed me where the Romans had extracted their grandest masses, and not only do these quarries produce the usual spotted variety, but all the brecciated sorts and green greys. I noticed one plaster block of large size, partly wedged off by a series of holes in the vertical face of the rock. It would have been almost impossible to expand wooden wedges with water in this position. I feel sure they used iron, or rather steel tools, for dressing the stone, and I do not see why they should not have used metal for wedges.

The road I mentioned before as going down in another valley I think was the road for blocks at a later date, as this would save twenty-five miles between this spot and the Monastery station; and in this valley is another town with workshops containing unfinished porphyry objects.

The altitude of the great quarry I found to be 3,650 ft. I now determined to return by a path I could see going towards the "Medeneh" (the old town). This path led me alongside of a number of small quarries, of thin bed, but good colour, the porphyry being in a grey coloured granite, extremely rotten, breaking up like dried earth or decayed Purbeck marble. At one spot I observed a bust roughly shaped, and mortars part finished. We got into the valley at about 3:30, and found the old town on a slight elevation, out of the way of the torrents. It was much larger, but very similar to the stations along the Desert road. In the plain of the valley there is also a cistern, with piers all round, and plastered, on which are scratched rude drawings of ships with single masts.

Further up the valley is a small Roman temple, the portion of which is in granite, with a Greek inscription of the time of Hadrian, which reads thus:—"For the safety and perpetual success of our Lord the Emperor Hadrian and his whole house, this temple and its precincts were dedicated to the Sun-god, great Serapis, and the gods associated with him, by Epaphroditus Sigerianus, a slave of the Emperor, when Rhamnus Maritima was Prefect of Egypt, Marcus Ulpianus Chresimus procurator of the quarries, and Rufus proculianus [superintendent of the marble works]." In a similar inscription at Djebel Fateeh, Epaphroditus dedicated another temple to Serapis, A.D. 418, he is called "lessee of the quarries." Inside is a small altar. The whole is now in ruins. On the plastered wall of the cell, in large red letters, are W. 1823, L. 1845, S. 1877-78; following which bad example, I added, in indigo, "W. B. 1887, and quarries," the letters meaning Wilkinson, Lepsius, and Schweinfurth, according to which later authority there is another station down the valley, and a depot further back for the loading of the blocks, which were taken to the Nile, a distance of 96 miles. The new route will be by a gentle incline to the Red Sea, which is about 25 miles. The Bedouin found in a ravine some good water, and we now made our way back for the camp, arriving at the Saddle Pass at five, it being sunset, and quite dark before we well reached the plain. When going on in single file, the Bedouin disappeared into a deep ravine, escaping with a cut leg, which he plastered with sand. We arrived at the camp very late, the dragoman having posted lanterns on the rock hillocks to guide us. After a day of rest and sketching, we returned for Kenah by the same route, arriving safely at the Nile after thirteen days spent in the Desert, and 170 miles of camel riding. Lastly, getting back to Cairo, terms for a concession to rework the quarries were agreed upon, which have since been ratified.

**Trinity College, Dublin.**—The alterations which were being made at this College are now completed. They include improvements in the ventilation, Boyle's ventilators being used.



BUILDERS' BENEVOLENT INSTITUTION.  
ANNUAL DINNER.

The fortieth anniversary dinner in aid of the funds of this Institution was held on Thursday, the 3rd inst., at Carpenters' Hall, London-wall. Mr. Herbert H. Bartlett (of the firm of Perry & Co.), President of the Institution, occupied the chair, and was supported by Mr. H. Clifford Smith (Master of the Carpenters' Company), Mr. Basil E. Peto, Mr. H. Colls, Mr. T. F. Rider, Mr. George Plucknett, J.P., Mr. L. H. Isaacs, M.P., Mr. Banister Fletcher, F.R.I.B.A., and other friends of the Institution.

The Chairman gave the toast of "Her Majesty the Queen, the Prince and Princess of Wales, and the rest of the Royal Family."

Mr. Basil Ellis gave the toast of "The Army, Navy, and Reserve Forces," Major Bruton replying for the "Army and Navy," and Col. Banister Fletcher for "The Reserve Forces."

The Chairman, in proposing the toast of the evening, "Success to the Builders' Benevolent Institution," said that the history of the charity was an honourable one. Since its foundation it had granted relief to no fewer than 234 pensioners. During the past year ten deaths had occurred among the recipients, and nine persons who had been waiting for the benefits of the charity had been elected. The total number of pensioners on the Fund was now thirty-two men and thirty-three women. There was a large annual expenditure, and the committee were deeply anxious to obtain new subscribers, as many who had given regularly to the Institution had been removed by death. The income of the past year had not been sufficient to meet the expenditure, and it had therefore been found necessary to withdraw the balance of the reserve fund. There had been a large increase during the year in the number of applicants seeking election, and that would continue to be the case as the building trade and the population went on extending. The expenses of administration were as low as they could possibly be, and no expensive machinery was employed. It might be news to some of his hearers to learn that the building trade gave employment to more people than any other single trade in this country. It was an important trade, but was at the same time a life of great uncertainty, being continually subject to untoward events, any one of which was quite sufficient to plunge a man from a comfortable position into a condition of need. The fall was often very sudden, and it was important that those who were able should do all they could to mitigate and alleviate it. Good as donations were, annual subscriptions were much more valuable, as they could put the Association on such a basis as would enable the committee to provide not only for what they had actually in hand, but also for the claims which were always coming in. He was sorry to find that the annual subscriptions had fallen off, as many of the subscribers had died, while others, from causes beyond their control, had been obliged to discontinue their annual payments. He would, therefore, impress upon his hearers the desirability of each of them getting at least two friends who would be willing to give a small annual amount, as it would give the Committee greater confidence in administering the funds of the Institution.

The toast having been duly honoured, the Chairman next gave "The Health of the Carpenters' Company." The builders, he said, felt almost like "brother chips" in meeting in that fine hall, and chips, too, of a good old block. The Carpenters' Company had done much good work in building schools and establishing scholarships, and it gave the Builders' Benevolent Institution quite an important standing before the world when it was seen that they were being recognised and helped by one of the great City Companies.

The toast was very heartily received. Mr. H. Clifford Smith (Master of the Carpenters' Company), in returning thanks, said that there was a close connexion between his Company and the Builders' Benevolent Institution, for the carpenters were the only recognised builders at the time of the creation of the Company. They were all working on parallel lines for the benefit of the craft, although at opposite extremes. The Institution was holding out the hand of benevolence to those who had failed in the battle of life, while the Company was striving to prepare the rising generation to take a higher stand than their predecessors had occupied. He concluded by making an appeal

to the great employers of labour to make the Exhibition to be held by the Carpenters' Company in the Spring a great success.

Mr. L. H. Isaacs, M.P., gave,—"The Chairman and President,"—adding that he had watched Mr. Bartlett's career with great interest, and it had not surprised him to find that gentleman occupying the chair on such an important occasion.

The toast was well received, and the Chairman replied in suitable terms.

Mr. T. F. Franklin proposed the toast of "The Vice-Presidents and Trustees," which was responded to by Mr. Thos. F. Rider and Mr. Howard Colls.

Mr. Basil E. Peto proposed "The Treasurer" (Mr. George Plucknett, J.P.), and referred in feeling terms to Mr. Plucknett's unremitting interest in the welfare of the Institution.

Mr. Plucknett, in replying, remarked that if all the London builders would exercise their privilege of subscribing to the Institution, the Committee would not have year by year to make such an urgent appeal to the old subscribers.

Mr. W. Shepherd gave "The Architects and Surveyors." Those engaged in the building trade knew how important it was to have the sympathy and consideration of the two professions. To a certain extent the destinies of the builders were in their hands. The architectural profession had improved wonderfully, and great credit was due to the Royal Institute of British Architects for their efforts in raising the tone of the profession. As to the other portion of the toast, he did not know who would not place himself in the hands of a proper quantity surveyor. He coupled with the toast the names of Mr. Banister Fletcher and Mr. C. B. Arding.

Mr. Banister Fletcher said he thought such meetings of architects and builders were of the highest value and usefulness. He begged the builders to consider the enormous difficulties under which architects laboured. Architects were commonly supposed to be antagonistic to the builders, but that was not the case. They wished to let the public know that their desire was simply to see that the work was honestly carried out, and that the builder should have his fair profit.

Mr. C. B. Arding responded for the Surveyors.

Mr. C. E. Edwards gave the concluding toast, "The Committee and Stewards," which was responded to by Messrs. J. T. Bolding and J. Hill.

In the course of the evening subscriptions and donations amounting to 701l. (of which sum 457l. appeared on the President's list) were announced.

## ELECTION OF A DISTRICT SURVEYOR.

THIRTY-TWO gentlemen presented themselves at the Metropolitan Board of Works on the 4th inst. as candidates for the vacancy in the District Surveyorship of Charlton, Lee, and Kidbrooke, caused by the death of Mr. J. S. Edmonston, who was only elected to that office in January last.\* The election was conducted by ballot, in accordance with the Standing Orders of the Board of 1st April, 1887 (No. 8), regulating the election of District Surveyors, viz. :—

"That on the occasion of future elections of District Surveyors the number of candidates be reduced to six, at a Meeting of the Board, by one ballot, at which each Member may vote for six persons whose names are in the printed list; and that the result of such first ballot be ascertained by scrutineers, consisting of two Members of the Board, to be appointed for that purpose, together with the Clerk or his representative."

"That the six candidates selected in the manner prescribed by the foregoing Resolution be balloted for, each Member of the Board voting for one candidate only, until some one candidate has the votes of a majority of the Members present; and that at each ballot the name of the candidate having the smallest number of votes, and also names of all candidates who have less than 20 per cent. of the total number of votes, be struck off the list."

The following are the names of the candidates, the figures appended thereto indicating the number of previous applications made by each :—

Blackbourn, H., 3; Bridgman, H. H., 23; Brooker, J. W., 2; Cheston, H., 18; Coggin, C. T., 1; Cowper, P., 6; Eales, F. E., 5; Edwards, G., 10; Farrow, F. R., 3; Ferguson, J. M., 23;

\* See *Builder*, Feb. 5, 1887, p. 216.

† This information was, for the first time, printed on the cards distributed amongst the Members of the Board, but does not appear to have influenced the voting so much as might have been expected.

Francis, R. F. C., 10; Goodchild, J., 3; Grollier, W., 24; Hamilton, F. W., 5; Hamilton, J., 12; Hamilton-Gordon, G., 8; Harcastle, W. J., 10; Haslehurst, E., 12; Hoyos, A., 5; Inskip, G., 18; Jackson, G., 18; Lean, G. A., 15; Nash, W. H., 17; Pelly, H. A., 8; Saunders, C. G., 5; Saunders, M. L., 8; Slater, J. B.A., 1; Spiers, W. L., 15; Stevens, W. H., 15; Stock, H. W., 18; Swatman, E. L., 3; and Woodthorpe, E., jun., M.A., 3.

The results of the voting were as follows :—

	First Ballot.	Second Ballot.
Bridgman, H. H. (24th application)	23	6
Grollier, W. (25th)	16	—
Harcastle, W. J. (11th)	31	6
Saunders, M. L. (9th)	19	8
Spiers, W. L. (16th)	38	23
Stock, H. W. (10th)	27	7
Woodthorpe, E., jun. (4th)	18	—

The foregoing seven names were returned, by the scrutineers as having the highest number of votes cast in the first ballot to reduce the number to six, but as there was a tie here between Messrs. Grollier and Woodthorpe, the Board resolved by show of hands to strike out both names without balloting as to which of the two should be retained, although not without the question being raised by Mr. Hughes whether that course could fairly be taken, having regard to the terms of the Board's Standing Orders, previously quoted.

The second ballot gave the results above indicated, and as there were fifty-one members of the Board present at the time it will be seen that all the candidates except Mr. Spiers received less than 20 per cent. of the total number of votes, and so Mr. Spiers was declared to be duly elected.

## AWARDS AT THE ADELAIDE EXHIBITION.

THE following are among the awards which have been made to exhibitors at the Adelaide Jubilee Exhibition. The order of merit gained is indicated by the figures in parentheses, the first order being notified by 1, the second order by 2, and the third order by 3 :—

John Hall & Co., Stourbridge, glazed bricks, white and coloured, firebricks, &c. (1).

J. Cowan & Son, Blaydon-on-Tyne, fireclay, gas retorts, and firebricks (1).

Maw & Co., Shropshire, encaustic tiles (1).

Godwin & Son, Withington, near Hereford, encaustic and other tiles (1).

Webb's Worcester Tiles Company, Worcester, window and other glass (1).

Mark Abraham, Weymouth-street, London, Hayward's patent prism lights (1).

H. A. Cawkwell, High-street, Malvern, mosaic and encaustic tiles (1).

Ashton & Green (Limited), tiles for pavement (2).

E. Smith & Co., Coalville, Leicestershire, ornamental wall and floor tiles (1).

Maw & Co., Shropshire, majolica vases and plates (1).

Belleek Pottery Co., Belleek, Ireland, china, Parian, and earthenware (1).

Watcombe Pottery Co., Devon, terra-cotta ornaments (2).

E. J. D. Bodley, London, chinaware (2).

Adderley & Lawson, Stoke-on-Trent, china and earthenware (3).

The Plastic Decoration and Papier Maché Co., 21, Wellington-street, Strand, London, fibrous chair, carton-pierre, and papier-maché ornaments (1).

Hayward Tyler & Co., Whitecross-street, London, steam pumps (1).

F. W. Reynolds & Co., Acorn Works, Edward street, Blackfriars-road, London, wood-working machinery (1).

The Registration of Plumbers in Manchester.—A meeting of the District Council recently formed for the promotion of the registration of plumbers was held last week at the offices of Mr. Fred. Scott, 100, King-street.

Mr. William Jaffrey was asked to take the chair, and there were also present nineteen members of the Council, representing master plumbers, operatives, and the public.

On the motion of Mr. Jaffrey, seconded by Mr. M. Ingram, Mr. John Holden, F.R.I.B.A., was appointed Chairman of the Council, and thereupon Mr. Jaffrey vacated the chair for him.

A communication from the Plumbers' Company of London, offering guidance to the local Council in organising, and containing a statement of the conditions of registration at present enforced by the London Company, was read.

A Sub-committee, including representatives of operatives and masters, was appointed to collect information and draft rules.

NOTE.—THE FIRST SIGHT READ OFF THE LEVEL STAFF IS BOOKED AS A BACK SIGHT, AND GIVES THE HEIGHT OF THE LINE OF COLLIMATION IN THE INSTRUMENT—ABOVE THE POINT ON WHICH THE LEVEL STAFF IS PLACED.—

THE LAST SIGHT READ OFF THE LEVEL STAFF BEFORE CHANGING THE POSITION OF THE INSTRUMENT, GIVES THE VERTICAL DISTANCE BETWEEN THE LINE OF COLLIMATION, FOUND AS ABOVE, AND THE POINT ON WHICH THE LEVEL STAFF IS THEN HELD.—THIS SIGHT IS BOOKED AS A FORE SIGHT, AND THE LEVEL STAFF IS REFLECTED ON THE SAME POINT AS THAT UPON WHICH THIS LAST FORE SIGHT IS TAKEN, FOR ASCERTAINING THE FIGURES TO BE BOOKED, WHEN RADING THE NEXT BACK SIGHT, IN CONTINUING THE LEVELLING.—

BACK INTERME SIGHT DATE	FORE SIGHT	RISE	FALL	REDUCED LOCAL LEVELS—TION	REMARKS
2:20				60.00	A
1:11	12:09	9.89		50.11	B
2:30	11:70	10.59		39.52	C
8:26	7:51		5.21	34.31	D
11:00	1:90	6.38		40.69	E
6:37	3:30	7.70		48.39	F
2:39	8:81		2.44	45.95	G
	8:92		6.53	39.42	H
33:65	54:23	14.08	34.66		

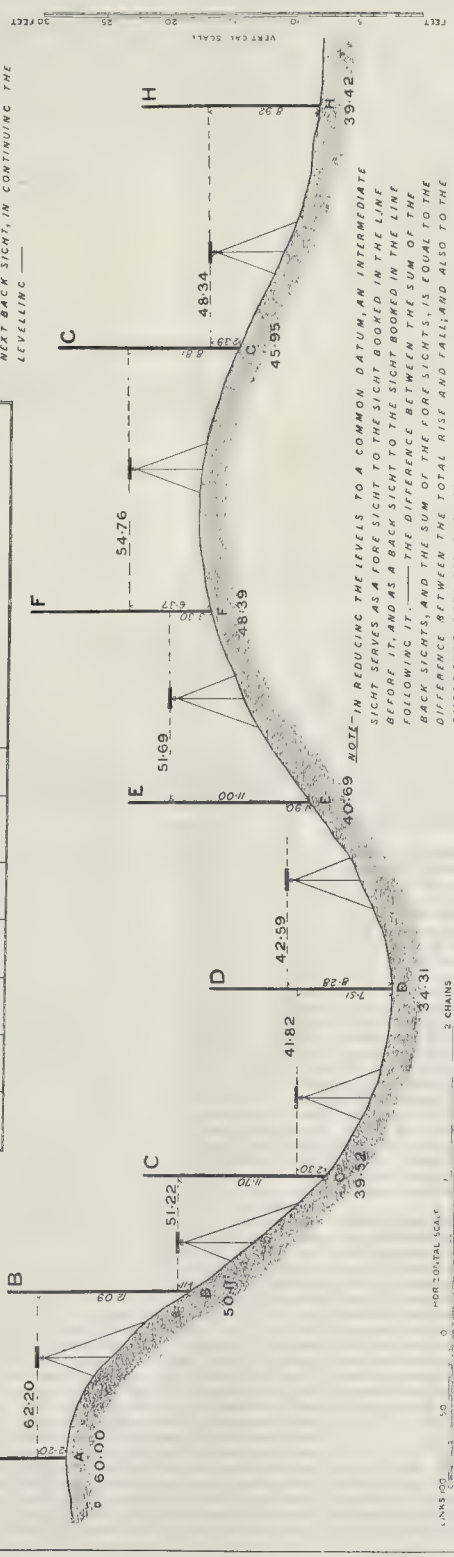
NOTE.—THE POSITIONS OF THE POINTS, AS SHOWN IN THE LAST COLUMN, SHOULD BE INDICATED ON A PLAN.

FEET—

54.23 34.66 60.00  
33.65 14.08 20.58  
20.58 20.58 39.42

NOTE.—HORIZONTAL MEASUREMENTS ARE EXPRESSED IN LINKS, AND LOCALIZED BY DESCRIPTION.

THE COLUMNS MARKED REDUCED LEVELS AND LENGTHS ARE THE COLUMNS USED IN PLOTTING THE LEVELS.



**The Student's Column.**

**LAND SURVEYING AND LEVELLING.**

XX.—LEVELLING.

THE field work connected with the process of taking levels may be illustrated by the diagram headed "flying levels," that is, levels in which a description is not required of all the intermediate points upon which the staff is to be held in order to connect the work. Suppose the level of the point A is known by previous levelling to be 60 ft. above a given datum, and that it is simply required to ascertain the level of the point H. The distance apart, as well as the uneven nature of the surface of the ground between the points A and H, render it necessary to call upon intermediate points, such as B, C, D, E, F, and G, and to re-set up the instrument between each change of position in the level staff. The instrument is set up level between A and B; the staff is placed upon A, and found to read 2:20. This is booked as a back-sight, because we are looking back upon a point the level of which is already known. The telescope is then revolved horizontally; the staffman is directed to move forward to B, or to a point where the observer can read as great a height upon the staff as possible, owing to the falling inclination of the ground. The staff at B is booked as a fore-sight, because the observer is here looking forward to a point the level of which he does not yet know. Having read B he then moves the instrument forward, while the staffman is entrusted to maintain the foot of the level-staff very carefully upon the point B. To assist the staffman in so doing he generally employs a foot-plate or iron peg (*Builder*, May 7th, p. 688), and waves the staff upon it to and from the telescope, over a vertical line as there shown (fig. 6) when the observer is reading the divisions. With the instrument in the new position between B and C, placed so as to read as low down as practicable upon the staff, the sight 1:11 is then read. This is booked as a back-sight, because when the level book is reduced, the level of the point B can be arrived at before the sight 1:11 is considered. Suppose the ground to be such that the instrument is placed upon the left hand of A, when the sights 2:20 and 12:09 are read, or upon the left hand of B, when 1:11 and 11:70 are read with the telescope pointing in the







"ST. AUGUSTINE."  
SIR,—In your article on the restoration of the rear screen of St. Alban's, published October 29th, on speak of Saint Augustine. May I say that Mr. Surtees has, I believe, conclusively proved the prefix of "saint," when applied to the famous apostle, to be incorrect. I quote the following in support of my assertion, from his essay in the *Journal of the Archaeological Association*, pp. 295 & 301, vol. x.—

"A not uncommon error amongst archaeologists to write and speak of Augustine, the monk archbishop of Canterbury . . . as Saint Augustine, a title of canonisation which alone of the two Augustines should belong to St. Augustine, the father and Bishop of Hippo, who died 430 A.D., and to whom, by common, universal consent, it has been invariably given. . . . Churches undoubtedly have been, and are being, occasionally dedicated to Augustine of Canterbury as *Saint* Augustine; but Mr. Fuller, Southey, and the best writers on English Church history term him *Augustine* only."

Wheatly, in the calendar for the month of March, when naming Pope Gregory, has observed that his memory was celebrated in England for founding "Austin the monk [not St. Austin], with authority of canonisation, to convert the Saxons." Proceeding next to Wheatly's calendar for the month of August, 28th of that month, we find it thus writes:—"Saint Augustine (that is, the father and author) was born at Tagaste, a town in Numidia, in Africa, in the year 354." . . . But, further, if additional authority is wanted, we may turn to the *Prayer-Book*; thus, in the latest edition, we find "August 28. Augustine, Archbishop," and "August 28, Saint Augustine, Bishop."

H. LITTLEHALES.  
Bexley Heath, Nov. 4.

KENDALL ROAD SCHOOLS,  
COLCHESTER.

SIR,—In accordance with an advertisement appearing in your last issue [p.x.] which "invites architects to send in plans for schools to accommodate 300 children, about to be erected in the Kendall-road, Colchester. All particulars, with the programme of competition, I made application of, and was duly favoured with a copy of the full particulars," which I considered to be totally adequate (evidently drafted by a novice) and inefficient to enable any one to prepare drawings with any degree of certainty as to what is really required. I regret, too, very important points being omitted, the first of paramount importance, viz., the cost per seat; not even the roughest approximation being volunteered, whether 5s. or 10s. per seat. Second. Who is to be the judge of the merits of the drawings sent in, and as to their being in accordance with the requirements of the Education Department? Further than this, it is not stated whether the premised design may or may not be rewarded with a handsome bonus of 10s., or whether its contributor may get the work at the usual 5 per cent., and 2s. per cent. for quantities? It is to be hoped the persons who can afford to throw away time and money on such a speculation will be rewarded.

ONE WHO DECLINES, WITH THANKS.

RECENT PATENTS.  
ABSTRACTS OF SPECIFICATIONS.

15,759, Heating Apparatus. R. P. de Ridder and W. Bennett.

This invention relates to the "small bore" system hot-water pipes, and the improvements are in the method of providing for the escape of air or steam any should be generated in the pipes, or should be in combination with a heating pipe, is placed at the highest point of the heating pipe, and safety-valves of special construction whereby air and not steam or water is allowed to escape are used. By the use of a relief valve the pressure can be regulated desired.

3,256, Covering for Roofs. G. F. Jefferoy.

In some roof coverings in common use felted material is used, but this is liable to the inconvenience that when once laid, and after short exposure to the weather, it is difficult to remove the material intact, so as to be equally serviceable in other places. The present invention is designed to obviate this defect. A fabric of jute is dressed with tarring (a mixture of drying oil and white lead or alkali), a second coating is applied to the outside face, and the covering is ready for use.

7,846, Dovetailing Machines. J. Anderson.

Upon a suitable frame or stand are mounted two or more horizontal spindles in adjustable ranges, capable of being placed any desired distance apart, and having cutters fixed at either end, driven from a suitable countershaft. On each side of the main frame or stand is fitted in vertical position a bracket, carrying a table upon horizontal slides, upon which the wood is secured. Beneath

this is a rotating shaft carrying suitable cams, giving motion to the brackets, and lateral motion to the table, so that as the wood rises to the cutters, the desired angle is obtained to form the pin or tenon on the one piece, and on the other piece the holes or tails formed by the corresponding cutters. Dovetails of any space and size can be made.

11,787, Cupboard Turn. E. V. Bailey.

Instead of making the turn in a single piece, it is (according to this invention) made in two parts, jointed at their outer ends; one part is screwed, the other has a square gap at its end. The first is screwed on, and then the second piece turned back, so that it locks and fixes the turn on the square screwed spindle.

12,031, Paints and Compounds. H. J. Allison.

This invention consists in grinding the pigments with oil obtained from the germs of Indian corn or maize, instead of linseed oil. It is claimed that the colours are more permanent, work much smoother, do not "chalk" or scale, and that the paints are cheaper. Dryers are mixed when found necessary, but corn oil has in itself considerable drying properties.

NEW APPLICATIONS FOR PATENTS.

Oct. 28.—14,663, P. Monro, Guides for Band-saw Blades.—14,666, A. Crossley, Refractory Bricks for Lining Furnaces, &c.

Oct. 29.—14,716, A. Hopkins, Fastening and Securing Wood-block Flooring, &c.—14,734, S. Carnaby, Opening and Closing Balanced Windows, Ventilators, &c.

Oct. 31.—14,776, S. Timings and S. Hill, Spring Catches or Fasteners for Doors or Windows.

Nov. 1.—14,847, B. and C. Townend, Preventing Draughts under Door-bottoms.—14,851, J. Coulter, Dressing Machinery.—14,851, D. Nichol, Construction of Temporary Structures.—14,897, P. Von Krystoffovitch, Artificial Granite.

Nov. 2.—14,955, D. Bostel, Syphon Flushing Cisterns.

Nov. 3. 14,973, P. Justice, Ventilating Buildings, &c.—15,002, H. Reinecke, Ventilating Closets.—15,008, W. Brandt, Fireproof Compositions, &c.

PROVISIONAL SPECIFICATIONS ACCEPTED.

12,291, W. Fraser, Automatic Door Closer and Check.—12,473, A. Harrison, Wood-block Flooring.—12,691, L. Chinnery, Window-sash Silencer.—13,075, T. Potter, Door Checks.—13,680, J. Season, Construction of Roofs.—13,692, J. Miller, Extension of Fires in Theatres, &c.—13,826, G. Smith, Flush Cistern Appliances for Closets.—13,786, T. Holtwell, Fixing and Securing Sheets of Glass, Zinc, Slate, &c., to Roofs, Flats, or Sides of Railway Stations, Greenhouses, &c.—13,856, A. Heath, Securing Knobs to Spindles.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

14,934, T. Cooke and W. Byrnes, Raising, Lowering, and Holding in Position Sliding Windows or Sashes.—424, W. White, Roads and Pavements, and Paving Blocks for same.—609, G. Brodie and J. Prior, Firebricks.—12,632, J. Lyman, Waterproof Compositions or Paints.—16,809, E. Hughes, Circular-saw Benches.—16,956, W. Stevens, Ventilating and Flushing Water-closets.—43, W. Martin, Domestic Firebricks.—4,046, P. Chinnery, Window Fasteners.—11,283, W. Bull, Roofing Tiles, &c.—12,307, J. Peckover, Saws and Machinery for Sawing Stone.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

SEPTEMBER 21.

By G. B. SMALLER, Esq.  
Woking—1, Chertsey-road, freehold ..... £450  
11, Chertsey-road, The Temperance Hotel ..... 600  
Goldworth-road—Six freehold villa residences ... 1,875

OCTOBER 13.

By WOSEFOOT & HATWARD.  
Ringwood, Kent—Two freehold houses ..... 305  
A plot of freehold land, 3a. 0r. 30p. .... 601  
Three plots of land ..... 103

OCTOBER 25.

By P. D. TRUCKETT & Co.  
(At Kingston.)  
Kingston—Eleven plots of freehold land ..... 874

OCTOBER 31.

By CHATFIELD & SONS.  
High Holborn—No. 185, freehold ..... 2,380  
Paddington—32 and 37, Amberley-road, 76 years, ground-rent 13s. .... 285  
Clapham—37, Grandison-road, 96 years, ground-rent 8s. 10s. .... 230

By Mr. DEAN.

Clerkenwell—3 to 7 and 15, Spa Cottages, 23 years, ground-rent 24s. .... 740  
Buckhurst Hill—Three freehold plots of land ..... 158

NOVEMBER 1.

By A. RICHARDS.  
Westminster—23, 24, and 26, Pombey-terrace, 43 years, ground-rent 18s. .... 1,030  
28a, Pombey-place, and 3, Rochester-street, 41 years, ground-rent 10s. .... 870  
Totterham—7, 8, and 9, Williams-place, freehold ..... 355  
Edmonton—1, Adelaide-place, 62 years, ground-rent 2s. 10s. .... 125

By E. & H. LUMLEY.

Regent-street—9, Carnaby-street, freehold ..... 1,620

By F. HARRIS.  
Blackheath, Humber-road—The Chestnuts, freehold ..... £1,490  
East Greenwich—19, Edward-street, freehold ..... 380  
Peckham—48, 50, 52, and 56, Dennett's-road, freehold ..... 1,275

By SKENEWICK, SOVE, & WALES.  
Bushey, Herts—The Horse and Chains, freehold beer-house ..... 770  
Four freehold cottages ..... 385  
Harrow—Two plots of freehold land ..... 77

NOVEMBER 2.

By HUMPHREYS, SKITT, & HUMPHREYS.  
Lewisham—13 and 15, Moleworth-road, 71 years, ground-rent 5s. 14s. .... 350  
Millbrook, Hants—The residence Roselands, and 14 acres, term 74 years, subject to the Lives of the Prince of Wales and the Duke of Edinburgh, also a Policy for 1,000s., subject to the said lives ..... 1,190

By TEMPLE & MOORE.

Stepney Green—No. 96, freehold ..... 315  
Old Ford—37 and 39, Auckland-road, freehold ..... 785  
14 and 16, Chisenhale-road, ..... 295  
Ground-rent of 80s., reversion in 78 years ..... 445  
Milton, next Gravesend—1 to 7, Elizabeth-terrace, freehold ..... 380  
Sevenoaks, near—A plot of freehold land, 1a. 0r. 21p. .... 180  
Wimbor, Clewer Green—1 and 2, Prospect Cottages, freehold ..... 810  
A cottage, and 10a. 2r. 4p. freehold ..... 1,200

By C. A. RICHARDS.

Wesley, Essex—Four cottages, and a plot of land. The freehold residence, Mount Pleasant, and 8a. 1r. 7p. .... 800  
Two enclosures of land, 4a. 3r. 4p., freehold ..... 310  
Thorpe-le-Soken—Two enclosures of land, 4a. 1r. 18p. .... 200  
Mile End-road—No. 307, 80 years, ground-rent 7s. .... 400  
Tulse Hill—4, 5, and 8, Park Villas, freehold ..... 1,300

By R. E. EMAY & SON.

Mile End 62 and 64, Scepter-street, 28 years, ground-rent 7s. 11s. .... 120

NOVEMBER 3.

By ROBINSON & RUTKIN.

St. Luke's—A ground-rent of 5s. 10s., reversion in 30 years ..... 180  
Ilington—Ground-rent of 21s. 12s., reversion in 40 years ..... 600  
Ground-rent of 4s., reversion in 32 years ..... 125  
Ground-rent of 8s. 6s., reversion in 34 years ..... 315  
Ground-rent of 8s., reversion in 24 years ..... 320  
Ground-rent of 9s., reversion in 33 years ..... 300  
Ground-rent of 5s., reversion in 40 years ..... 140  
Holloway—4 and 41, Grove-street, freehold ..... 590  
70, Eden Grove, 80 years, ground-rent 3s. 3s. .... 180

By WALTON & LEE.

Chester-square—No. 29, term 34 years, ground-rent 36s. .... 3,500  
35, Royal Oak Mews, 34 years, no ground-rent ... 475

By NEWBORN & HARDING.

Ilington—10, Colebrook-row, 38 years, ground-rent 10s. 10s. .... 375  
Stoke Newington—63, Lordship-road, 66 years, ground-rent 8s. .... 360  
66, 68, and 70, Lordship-road, 66 years, ground-rent 24s. .... 1,020  
Hornsey-road—107, 109, and 111, Corby-street, 83 years, ground-rent 18s. 18s. .... 730  
135, Corby-street, 83 years, ground-rent 8s. 6s. .... 240  
148 and 152, Thorpe-road, 83 years, ground-rent 11s. 5s. .... 415  
Stoke Newington—34, Woodlee-road, 86 years, ground-rent 5s. 10s. .... 225

By ROBERT BOTOR.

Bethnal Green 26 and 27, Morphet-street, 54 years, ground-rent 8s. .... 675  
Old Ford-road—No. 107, term 98 years, ground-rent 6s. 10s. .... 360  
Bethnal Green-road—120, Canrobert-street, 64 years, ground-rent 2s. 15s. .... 150

By P. D. TRUCKETT & Co.

Forest Gate, The Plasnet Hall Estate—Eighty-three plots of freehold land ..... 3,244

NOVEMBER 4.

By WATSON & SON.

Stockwell—28, 28, and 30, Editha-street, 87 years, ground-rent 15s. .... 645  
Brixton—105, Loughborough Park, 35 years, ground-rent 7s. .... 350

By W. HALL.

Cheshunt—1 and 2, Victoria Cottages, copyhold ... 200

The Society of Arts.—The first meeting of the one-hundred-and-thirty-fourth session of the Society of Arts will be held on Wednesday, the 16th of November, when the opening address will be delivered by Sir Douglas Galton, K.C.B., D.C.L., LL.D., F.R.S., Chairman of the Council. Previous to Christmas there will be four ordinary meetings in addition to the opening meeting. During the session there will be six courses of Cantor lectures, including "The Elements of Architectural Design," by H. H. Statham; "The Modern Microscope" (being a continuation of the recent course of Cantor lectures on the "Microscope"), by John Mayall, Jun.; "Alloys," by Prof. W. Chandler Roberts-Austen, F.R.S.; and "The Decoration and Illustration of Books," by Walter Crane.

Destruction of an Ancient Castle by Fire.—Last week the famous Polish castle belonging to Prince Gartoryski, near Cracow, was totally destroyed by fire. The building—one of the finest in Poland,—dated from the sixteenth century. The fire, which originated in the Prince's bedroom, destroyed the valuable library, the collection of paintings, and many other costly works of art.



## MEETINGS.

MONDAY, NOVEMBER 14.

*Surveyors' Institution.*—The President, Mr. W. J. Beadell, M.P., will deliver the opening address of the Session. 8 p.m.

*Leeds and Yorkshire Architectural Society.*—Mr. Basil Champneys on "Victorian Architecture and Originality." 7:30 p.m.

TUESDAY, NOVEMBER 15.

*Institution of Civil Engineers.*—Sir F. A. Abel, C.B., F.R.S., on "Accidents in Mines." 11. 8 p.m.

*Manchester Architectural Association.*—Mr. J. Corbett on "House Water Fittings." 7:30 p.m.

WEDNESDAY, NOVEMBER 16.

*Society of Arts.*—Sir Douglas Galton, K.C.B., F.R.S., Chairman of the Council, will deliver the opening address of the Session. 8 p.m.

*British Archaeological Association.*—(1) The President, Sir James A. Picton, F.S.A., F.R.I.B.A., on "The City Walls of Chester." (2) *Minutes of the Session 1886-87*, by Mr. T. Morgan, F.S.A. 8 p.m.

*Royal Meteorological Society.*—7 p.m.

*Builders' Foremen and Clerks of Works' Institution.*—Ordinary meeting. 8:30 p.m.

*Liverpool Engineering Society.*—A special General Meeting to consider alteration of rules. 7:30 p.m.

THURSDAY, NOVEMBER 17.

*Parkes Museum of Hygiene.*—The Earl of Meath on "The Importance of Open Space." 5 p.m.

*Royal Engineers' Institute, Chatham.*—Mr. F. R. Conder, on "Treatment of Sewage by the Iron Process, as used at Chichester Barracks and Windsor Castle." 6:30 p.m.

FRIDAY, NOVEMBER 18.

*Architectural Association.*—Mr. H. D. Appleton on "Our Sketching Club Scheme." 7:30 p.m.

*Institution of Civil Engineers (Students' Meeting).*—Mr. John Holliday on "Boiler Experiments and Fuel Economy." 7:30 p.m.

## Miscellaneous.

**Birmingham Architectural Association.**—On the 4th inst. the opening *conversations* of this Association for the present session was held in the Assembly Rooms, Edgbaston. About 500 ladies and gentlemen attended. The Association, as many of our readers know, is the only provincial society affiliated with the Architectural Association of London. Drawings, &c., were lent by Messrs. Aston Webb, W. H. Bidlake, W. Millard, F. Evans, Osborn & Reading, Henman & Timmins, Proud & Faulkner, Essex & Nicol, D. Arkell, Dunn & Hipkiss, J. J. Bateman, J. Cotton, J. A. Chatwin, V. Scruton, George & Peto, T. W. F. Newton, W. Hale, Hawley Lloyd, H. Naden, W. Lethaby, Phené Spiers, M. J. Landell, Ingall & Son, J. P. Osborne, R. W. Edis, J. A. Cossins, J. Brooks, J. Douglas, E. J. May, A. Lee, J. Oldrid Scott, Freeman Smith, A. B. Phipson, Crouch & Butler, Wood & Kendrick, and C. E. Bateman. Mr. Harold Baker lent a collection of photographs. Amongst the visitors present were Mr. W. Kenrick, M.P., Mr. G. Dixon, M.P., Mr. Jesse Collings, M.P., Mr. L. Tait, Mr. Malins, Mr. Tilden, Professor Smith, Professor Hillhouse (Mason College), the Rev. R. L. Porter, the Rev. J. Wood, the Rev. F. Williams, Mr. B. Windle, T. Bunce, R. F. Martineau, H. Rogers, W. Player, J. R. Holliday, Major Brooks, Col. Tarte, Mr. J. Hardman, &c. Apologies for non-attendance were received from Sir T. Martineau (Mayor), Mr. R. Chamberlain, M.P., the Right Hon. J. Chamberlain, M.P., Sir James Sawyer, Mr. Dale, Rev. Canon Bowlby, the Rt. Hon. R. W. Lytton, Mr. S. Timmins, Mr. T. Pratt, Messrs. A. Webb, E. I. Bell, J. D. Mullins, W. S. Till, J. H. Shorthouse, L. Smith, &c., and from the President of the Royal Institute of British Architects and the Presidents of seven other architectural societies.

**The Public Library, Edinburgh.**—Estimates for the erection of the Public Library Buildings, in Edinburgh, have been accepted. They amount to 19,385*l.*, which is 4,000*l.* or 5,000*l.* less than was anticipated. This leaves a margin of 10,000*l.* for furnishing, electric lighting, &c. The plans submitted by Mr. Washington Browne, which secured the first premium in the competition, have been altered to some extent both as regards the exterior elevations and internal arrangement. These alterations are considered as decided improvements and as giving enhanced value to the exterior, which has been raised 2 ft. in height, the projecting wing to the north now having its cornice on a level with the rest of the elevation. The high-pitched roof over the main building has also been heightened, the lantern at its summit being now 10 ft. higher than before. The total height from the level of George IV. Bridge will now be 118 ft. An alteration has also been effected on the principal doorway, which is now the centre of three equal arches, and a fourth arch has been repeated in the large window of the projecting wing.

## Conference on Technical Instruction.

An exceedingly interesting and important conference was held on Saturday evening at the Finsbury Technical College, to discuss the question of technical education, particularly as it affects the apprenticeship system. Mr. J. Rowlands, M.P., presided. Professor Silvanus P. Thompson (Principal of the City and Guilds of London Institute) opened the discussion with a paper on "The Present Position of the Technical Instruction Question." He referred to numerous institutions in the metropolis and the provinces wherein educational work of a technical character was going on, especially alluding to the group of agencies now established by the City and Guilds of London Institute, and contrasted the great efforts which were being made on the Continent to promote technical instruction with what had been done in this country. With regard to the future organisation of technical instruction, he contended that the Science and Art Department did not understand its first principles, and did not comprehend that the adaptation of the teaching to local wants and the adaptation of the design to the material were the very essence of technical instruction. The friends of the technical education movement might congratulate themselves that the Technical Instruction Bill of last Session was withdrawn before it reached Committee. The first and most important point of all for the national organisation of technical instruction was to secure the creation of a real Education Department under a real Minister of Education. We have some notes of the discussion which followed, but owing to pressure on our space we cannot give them this week. Mr. Owen Roberts (Clerk to the Clothworkers' Company) said that at a meeting of the Court of that Company a few days ago, a decision was come to to turn all the scholarships given by that Company to the London School Board into technical scholarships.

**The Late Mr. Hew M. Wardrop.**—We regret to hear of the death of this young Edinburgh architect, which took place at Uday Castle, Aberdeenshire, on the 4th inst. Mr. Hew Montgomery Wardrop was the second son of the late Mr. Maitland Wardrop, of the firm of Wardrop & Reid, architects. He received his early training as an architect in his father's office, and he was for some time thereafter an assistant to Mr. G. E. Street. He spent a year or two also abroad in the study of the great cathedrals of the Continent, and he was in the colonies also for a time on account of his health, which was never robust. On the death of his father, four or five years ago, he took his place in the business. Mr. Reid dying shortly thereafter, new arrangements were made, and the firm was merged in that of Wardrop, Anderson, & Browne. Subsequently it became Wardrop & Anderson, the senior partner being Dr. Rowland Anderson. Mr. Wardrop, who was only thirty-one years of age, had a very extensive county connexion, and had designed or carried out the restoration of several mansion-houses in various parts of the country. Among these may be mentioned Tillyfour House, Aberdeenshire; Pitmedden House, Aberdeenshire; Ballochmyle, Ayrshire; and Hoddam Castle.

**Society of Engineers.**—At a meeting of the Society of Engineers, held at Westminster Town-hall, on Monday evening, November 7th, Professor Henry Robinson (President) in the chair, a paper was read by Mr. Perry F. Nursey (Past-President), on "Primary Batteries for Illuminating Purposes." The author commenced by observing that there was a wide field open for electric lighting by primary batteries in houses generally, owing to the costliness of the steam-driven dynamo-electric systems. He then explained the principles of the primary battery, and outlined its history; after which he laid down the leading conditions which should obtain in a battery for electric lighting on a broad and general scale.

**The Old Chelsea Vestry-hall** has lately been externally renovated and re-decorated throughout. The contract has been carried out by Mr. W. H. McLachlan, of Barners-street, under the supervision of Mr. George Strachan, the Surveyor to the Vestry.

**House, Palace Court, Bayswater.**—Referring to our account of Mr. Fellow's House, Palace Court, Bayswater, we are asked to mention that the carving and sculpture is the work of Mr. Gilbert Searle, of Walworth.

**Inquests on Fires.**—We consider that the powers which the coroner formerly possessed of holding inquests in cases of fire where no death occurred should be again restored to him. That he had this power in times past is certain; and, further, his power extended to the inquiry of other felonies, such as burglaries and prison breach. Hawkins, in his "Pleas of the Crown," contends that the power of the coroner in those cases was conferred upon him by statute (Edward I.), and was never expressly taken away from him. Some few years ago an attempt was made to establish the authority of coroners to hold inquests in cases of fire, but the question was settled by the leading case of "Regina v. Herford," in which Lord Chief Justice Cockburn, in delivering judgment, said: "We have the authority of three of the greatest writers who have expounded and illustrated the law of England for saying that the office of coroner with reference to felonies is limited to cases of homicide on view of the body." Again, Lord Cockburn stated the coroner for Manchester, who had commenced an inquisition as to a fire, with this judgment: "As to the importance to the public that coroners should have the jurisdiction, there are two opinions. I express none. Some of the coroners in modern times have exercised this jurisdiction, some have not. If they are to exercise it in this and other felonies after the disuse of it for five or six centuries, let it be given them by the Legislature, and not revived by this court." The late Sir John Humphreys, coroner for East Middlesex, held an inquest at Hackney in respect of a fire where no life was lost. This he did at the special request of the churchwardens and inhabitants of the district, as fires were of such frequent occurrence. The case turned out to be one of arson, but the magistrates refused to reimburse the coroner for the expenses incurred in the holding of the inquest, on the ground that the said inquest was not legally held. *Lancet.*

**Decrease of the Iron Manufacture in France.**—The influences supposed to operate by those who take a pessimist view of the state of British industries, will not find much support from the recent returns concerning French iron and steel trades and mining industries. The *Journal Officiel* brings the following statistics concerning French mines, &c., for 1885 and 1886:—The number of mines at work had sunk from 504 to 476, or a reduction of 28. Of 1,380 concessioned mines, therefore, only 904 were worked. Of the 476 which are worked only 204 yielded any profit. Two-thirds of the mines which are worked are collieries, and they employ nine-tenths of all the miners, and had an output of 19,500,000 tons of coal, 500,000 less than in 1884, and 2,000,000 less than in 1883. The selling price fell 60 c. as compared to the year before; still the selling price at the mines reached 11.73 f. per ton. The cost of getting fell 43 c. from that of 1884. The number of workpeople engaged was 111,500, nearly 10,000 fewer than in 1884, and 15,000 less than in 1883. There was an increase of output of 543,000 tons in 1886, against that of 1885. The decrease in the production of iron is remarkable. In 1883 it amounted to two million tons of manufactured iron and steel; in 1884, 1,872,000 tons of crude, and 1,380,000 tons of iron and steel; in 1885, the two quantities were 1,634,000 tons and 1,336,000 tons; and in 1886, 1,508,000 tons and 1,234,000 tons. The number of steam-engines working steadily increased, but for the most part in small factories and in agriculture, whilst those in large industrial establishments decreased. The number of steam vessels, curiously enough, has remained almost stationary, although, by the law of 1883, the State has paid to the commercial marine, as premiums for registered bought vessels, for building new ones, and on cargo freights, a sum of twenty-six million francs, not reckoning the regular subventions to post-steamers. Equally noteworthy is the fact that the number of locomotives on the railways had decreased from 9,241 to 9,150, although 1,461 km. of new lines had been opened. *Engineer.*

**Liverpool Corporation Free Lectures.**—Mr. MacBride, whose lectures on sculpture at the British Museum we have before referred to, has been giving a course of four lectures on sculpture at the Rotunda Lecture Hall in Liverpool, which have been, we learn from the Liverpool papers, very largely attended. Sir James Picton occupied the chair at the opening lecture.



TIMBER (continued).

<b>TIMBER (continued).</b>		<b>L. s.</b>	<b>d.</b>	<b>L. s.</b>	<b>d.</b>
Mapple, Bird's-eye .....	.....ton	8	0	5	7
Rosa, Horse .....	.....ton	8	0	0	11
Bahia .....	.....ton	7	0	9	0
Brazil .....	.....ton	6	10	12	0
Satin, St. Domingo .....	.....foot	0	0	5	0
Porto Rico .....	.....foot	0	0	6	0
Walnut, Italian .....	.....foot	0	0	3	0
<b>METALS.</b>					
Iron—Bar, Welsh, in London .....	.....ton	4	15	0	0
"    "    in Wales .....	.....ton	4	5	0	10
"    Staffordshire, London .....	.....ton	5	10	0	0
<b>COPPER—</b>					
British, cast and ingot .....	.....ton	49	0	0	0
Best selected .....	.....ton	50	10	0	41
Sheets, strong .....	.....ton	54	10	0	55
Chili, bars .....	.....ton	46	2	6	46
Yellow Metal .....	.....lb.	0	4	0	5
<b>LEAD—</b>					
Spanish .....	.....ton	12	17	6	0
English, common brands .....	.....ton	13	5	0	0
Sheet, English .....	.....ton	14	2	6	0
<b>SPELTER—</b>					
Silesian, special .....	.....ton	18	17	6	0
Ordinary brands .....	.....ton	18	12	6	15
<b>TIN—</b>					
Straits .....	.....ton	131	10	0	0
Australian .....	.....ton	131	10	0	0
English ingots .....	.....ton	133	10	0	0
<b>OILS.</b>					
Limeed .....	.....ton	19	0	19	5
Cocconat, Cochon .....	.....ton	30	0	32	0
Ceylon .....	.....ton	24	6	0	0
Palm, Lagos .....	.....ton	22	0	0	0
Happed, Red .....	.....ton	25	10	0	0
"    brown .....	.....ton	23	15	0	21
Cottonseed, refined .....	.....ton	19	15	0	0
Tallow and Oleine .....	.....ton	25	0	46	0
Lubricating, U.S. ....	.....ton	5	0	8	0
"    Lined .....	.....ton	6	0	12	0
<b>TURPENTINE—</b>					
American, in casks .....	.....cwt.	1	4	0	0
<b>TAXES.</b>					
Stockholm .....	.....barrel	0	15	0	0
Stochangel .....	.....barrel	0	10	0	0

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um and Floor-Cloth Designs .....	Mitcham Linoleum Co...	2001. ....	Not stated...	ii.
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al of Refuse .....	St. Luke's (Middlesex) Vestry .....	do.	do.	ii.
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up and Paving Roads .....	Wandsworth Local Bd.	H. S. Ridgway .....	Nov. 22nd	ix.
aking and Paving Works .....	Oxford Local Board ..	W. H. White .....	Nov. 24th	ii.
ecting Bridge .....	Met. Board of Works...	<i>Official</i> .....	do.	ii.
aving, &c. ....		Maxwell & Tuke .....	Not stated...	ii.
nion Buildings, Brussels .....				

ASHTEAD (Surrey).—For the erection of a lodge to  
 Breville Park, for Mr. J. Hogett. Mr. Lionel Littlewood,  
 architect, 9, Great James-street, Bedford-row, W.C.:—

Harris & Son, Woking .....	£707	0	0
Harris, London .....	610	0	0
Batchelor, Leatherhead .....	598	0	0
Skilton, Leatherhead .....	479	0	0
Jackson, London .....	523	0	0
Hards, Ewell (accepted) .....	497	0	0

Hards, Ewell .....	£1,085	0	0
Harris & Son, Woking .....	1,050	0	0
Graham, London .....	867	0	0
Jones, London .....	750	0	0
Jackson, London .....	679	0	0
Batchelor, Leatherhead .....	667	17	6
Skilton, Leatherhead .....	640	0	0

Hards, Ewell.....	£1,149	0	0
Graham, London .....	1,028	0	0
Jackson, London .....	950	0	0
Jones, London .....	943	0	0
Skilton, Leatherhead (accepted).....	837	0	0

W. Walkerdine.....	£1,120	0	0
R. Weston .....	1,085	0	0
T. Kelham .....	1,039	0	0
H. Vernon .....	1,038	2	0
C. Wagg .....	1,030	0	0
G. Pemberton .....	1,028	10	0
W. Eaton (accepted) .....	1,014	0	0

A. Bingley, Nottingham.....	£89	10	0
Astle & Co., Derby (accepted) .....	77	0	0

Maple, Bird's-eye	0	0	5	0	0	7
Rose, Rio	8	0	0	11	0	0
Bahia	7	0	0	9	0	0
Box, Turkey	5	0	0	12	0	0
Satin, St. Domingo	0	0	5	0	0	9
Porto Rico	0	0	8	0	0	10
Walnut, Italian	0	0	34	0	0	5

Iron—bar, Welsh, in London.....	4	15	0	6	0	0
"    "    in Wales .....	4	5	0	4	10	0
"    Staffordshire, London .....	5	10	0	6	0	0
Copper—						
British, cake and ingot .....	49	0	0	49	10	0
Best selected .....	50	10	0	51	10	0
Sheets, strong .....	54	10	0	55	0	0
Chili, bars .....	46	2	6	46	10	0

Pig, Spanish.....	ton	12	17	6	0	0	0
English, common brands.....		18	5	0	0	0	0
Sheet, English .....		14	2	8	0	0	0
SPELTER—							
Silesian, special .....	ton	16	17	6	17	0	0
Ordinary brands.....		16	12	6	16	15	0
TIN—							
Straits.....	ton	131	10	0	0	0	0
Australian .....		131	10	0	0	0	0
English ingots .....		133	10	0	0	0	0

Linseed	19	0	19	5
Ooconut, Cochín	30	0	32	0
Ceylon	24	0	0	0
Palm, Lagos	23	0	0	0
Rapeseed, English pale	25	10	0	0
"    brown	23	15	24	0
Cottonseed, refined	19	15	0	0
Tallow and Oleine	25	0	45	0
Lubricating, U.S.	5	0	8	0
"    refined	5	0	12	0

Tar—						
Stockholm .....	barrel	0 15 0	0 0 0	0 0 0	0 0 0	0 0 0
Archangel .....		0 10 8	0 0 0	0 0 0	0 0 0	0 0 0

KENSINGTON.—For the erection of a workshop, Stamford-road, W. Mr. Lionel Littlewood, architect, 9, Great James-street, Bedford-row, W.C. :—  
Humphreys, Hyde Park (accepted) ... £195 0 0  
[Seven tenders received.]

KENSINGTON.—For the erection of new premises off Stamford-road. Mr. Lionel Littlewood, architect:—

Bryon .....	£837 6 0
Willcock .....	548 17 6
Kent .....	437 0 0
Liney .....	420 0 0
Jones .....	389 0 0
Olson (accepted) .....	336 0 0

KENSINGTON.—For various alterations, 191, Earl's Court-road, S.W., for Messrs. Blake & Co. Messrs. Morley & Lettis, surveyors:—

Wright & Co.....	£250	0	0
Toten & Sons, Gloucester-road* .....	195	0	0
* Accepted.			

KENSINGTON.—For sanitary and decorative repairs at 12, Fenywern-road. Messrs. Morley & Letts, surveyors:—  
Hook, Belgrave-road (accepted)..... £144 0 0

KENSINGTON.—For finishing No. 45, Nevcrn-square, S.W., for the Executrix of the late Robert Whitaker, Messrs. Morley & Letts, surveyors, Earl's Court-road :—

Rugg .....	£217	0	0
Oldrey .....	167	0	0
Toren & Sons, Gloucester-road* .....	148	0	0
* Accepted.			

KEW.—For decorations, Ellesmere, Kew-road. Messrs  
Morley & Letts, surveyors:—  
Blasby, Kew (accepted)..... £112 0 0

**LEICESTER.**—For the construction of about 470 yards of pipe sewers, with manholes, lamp-holes, and other works in connexion therewith, in the Borough of Leicester. Plans, specification, and quantities by J. Gordon, M. Inst. C.E., Borough Surveyor:—

T. Smart, Nottingham.....	£743	8	0	...	Alternative.
J. Dickson, St. Albans.....	459	17	1	...	—
Innes & Wood, Birmingham	425	1	9	...	£437 9 7
B. & E. Bentley, Leicester*	366	2	2	...	414 7 0
				...	350 19 2

\* Accepted.

LONDON.—For the Victoria Concert Hall, Langham-place, Regent-street. Mr. T. E. Knightley and Mr. C. J. Phipps, F.S.A., architects. Quantities by Messrs. Batterbury & Huxley.

J. Morter	..	\$48,714	0	0
Holliday & Greenwood	..	47,420	0	0
Howell		46,900	0	0
Boyes	.....	46,880	0	0
Hughes	.....	46,840	0	0
Mowlem	.....	46,485	0	0
Nightingale	.....	45,826	0	0
Perry & Co.	.....	45,789	0	0
Low & Southampton	.....	45,685	0	0
Stanley Bird	.....	45,680	0	0
Breese & Son	.....	45,565	0	0
Parnell, Rugby	.....	45,400	0	0
H. J. Greenwood	.....	43,386	0	0
Peto	.....	43,380	0	0
Patman & Fotheringham	.....	43,340	0	0
Stephens & Bastow	.....	43,477	0	0
Bywaters	.....	43,367	0	0
Kilham	.....	43,346	0	0
Charles Wall	.....	43,346	0	0
Lucas & Son	.....	42,225	0	0

LONDON. For extra works at the Old Cock Tavern, Highbury, for Mr. Richard Baker, Mr. Arthur W. Saville, architect, 99, Strand, London, W.C. :—

<i>Decorative Work for Grill Room.</i>		
C. E. Birch	£368	10 0
Doulton & Co.	353	0 0
Webb & Co.	350	0 0

Simpson & Sons (accepted) .....	360	0	0
Carter, Johnson, & Co. ....	345	0	0
Campbell Tile Co. (part only) .....	183	0	0

<i>Gas Fittings.</i>		
Strode & Co.....	£300	0 0
J. Dodson .....	245	0 0
Vaughan & Brown (accepted) .....	218	0 0

E. Pragnell .....	193	0	0
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*Grill and Hot-water Fittings*

T. Waller & Co. (accepted)..... £100 0 0

LONDON.—For alterations at the Milford Haven  
Lavern, Caledonian-road. Mr. E. A. Lewcock, architect,  
S, Bishopsgate-street Within, E.C.:—

Stephenson .....	£204	0	0
Goodall .....	155	0	0
Spencer & Co. ....	153	0	0
Steel Bros. ....	147	0	0
Ivory .....	135	0	0

LONDON.—For repairs to No. 14, St. Luke's-road, W.,  
or Mr. John Hughes. Mr. Arthur W. Saville, architect,  
9, Strand, London, W.C. —

J. Cutting & Sons .....	£185	0	0
C. H. Cutting & Sons.....	181	0	0
Spencer & Co. ....	170	0	0
G. E. Lupton & Sons (accepted).....	141	0	0



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LIST SENT ON APPLICATION.

# The Builder.

VOL. LIII. No. 2327.

SATURDAY, NOVEMBER 19, 1887.

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### Recollections of M. de Lesseps.



THE two volumes of autobiographical reminiscences of M. Ferdinand de Lesseps, an English version of which has been published in London,\* contains less of interest to architectural and engineering readers than might have been expected, considering the nature of the work in connexion with which its author's chief reputation has been made. The rôle played by M. de Lesseps, who is, perhaps, more truly a citizen of the world than any other living man except Prince Metetrach, has been as much that of a diplomatist, a politician, and a financier, as of an engineer; and his two volumes are good deal occupied with matters which very seldom would be said to lie outside of our special province. Of engineering information, in the strict sense of the word, there is in truth little or nothing. M. de Lesseps appears, in connexion with the Suez and Panama canal schemes, rather in the light of a general director and a diplomatic negotiator than an engineer. There is, however, good deal in regard to the correspondence about the Suez Canal scheme showing the working of various interests behind the scenes, which is of considerable significance now that the canal, once so condemned and prophesied to fail in this country, as a thing impracticable and vain, has been long ago quietly accepted as an accomplished fact. The statement of the Panama scheme from M. de Lesseps' point of view is also of some interest, though this is only sketched in a brief and general manner. M. de Lesseps is not autobiographical, in the usual and complete sense; he does not begin, at least, with a sketch of his parentage and genealogy, or an account of his boyhood. "Recollections" open with an account of his mission to Rome in 1849, and as the whole of this portion of the work is entirely political, it may pass it over here without further remark. But the greater part of the rest of the first volume, as well as a portion of the second, is occupied with "The Origin of the Suez Canal," a title which, in fact, is made to include the main history of all the negotiations, disputes, and difficulties connected with its coming to a close,—the latter, we regret to say, entirely emanating from England.

The whole thing came about in a more or less accidental kind of way than would be generally imagined now. M. de Lesseps, having the good luck to have a mother-in-law who was both very wealthy and very much attached to him, was, after his recall from Rome, living on and managing for her an estate in France, on which he had restored an ancient castle which had belonged to Agnes Sorel. While thus occupied, he heard of the death of Abbas Pasha, the Viceroy of Egypt, and the succession of the youngest son of Mehemet Ali, whom he had known and taught to ride as a boy. On hearing of his former pupil's accession to power, he wrote congratulating him, and received in reply what he evidently wished for, an invitation to come to Cairo. The question of a Suez canal had been a favourite one with M. de Lesseps long before, and he had already, he tells us, studied it in every detail. Here was the opportunity, and the former riding pupil was primed with the idea, and seems to have fallen into it in a most docile and teachable spirit. As riding was the beginning of his acquaintance with the Viceroy, so riding seems to have had some influence in getting him the concession for the canal; or, at all events, M. de Lesseps thought so. The Viceroy called together all his generals to consult them on the question. "As I rode out with them on horseback, and as they were inclined to think more of a man who could jump a fence than of a *savant* and a book-worm, they were well disposed towards me." The Viceroy told the generals to seat themselves on some chairs in front of the divan, repeated the conversation he and M. de Lesseps had just had together, and asked for their opinions on the proposals of "his friend." "They stared at me and looked as if they thought that their master's friend, whom they had just seen put his horse over a wall, could not be otherwise than right; they raised their hands to their heads as their master spoke, in sign of assent. The dinner was brought in on a salver, and, just as we had been of one assent, so we all dipped our spoons into one and the same tureen, which contained some excellent soup. Such is the faithful and true narrative of the most important negotiation I ever undertook or am likely to undertake."

The idea of the canal had been made a favourite one in M. de Lesseps' mind by the perusal of the report of Napoleon's engineer, Lepère, in favour of the scheme; a report made by Napoleon's command during his early campaign in Egypt. Short and simple as was the first step, the consent of the Viceroy, there was much work to go through before the funds could be raised and the diplomatic fears and objections of various Governments overcome, England being, as every

one knows too well now, the principal and most persistent opponent of the canal; and the correspondence on the subject with Lord Palmerston and other persons high in power in this country, in which the same objections (very selfish ones, by the way, from an international point of view) were repeated over and over again, is not pleasant reading for Englishmen, and ought to be a lesson against the violent and pugnacious opposition of a scheme of the kind merely because it is new, or because it is supposed that somebody or other's interests will be hurt by it. The perseverance, energy, and diplomatic tact which M. de Lesseps showed in combating against this opposition comes out very well in the series of letters printed, and the author may be excused for his obvious egoistic satisfaction in the publication of correspondence which shows how everybody said he was wrong, and how, nevertheless, he was right all the time. It would hardly be in human nature, and certainly it was not much M. de Lesseps' nature, not to indulge in a good deal of the "I-told-you-so" spirit, with such unusually good material for it. His diplomatic instinct is displayed at an early period of the narrative, when at an audience of various important officials, including all the representatives of foreign powers, the Viceroy announced that he had resolved to open up the Isthmus of Suez by a maritime canal, and to entrust M. de Lesseps with the formation of a company, composed of capitalists of all nations, to which he could cede the right to execute this enterprise. "Then speaking to me, he said 'Is not this so?' I then spoke a few words, taking care to let the spontaneity and merit of the decision remain with him, to avoid ruffling the susceptibilities of foreigners." The Viceroy observed to the Consul-General of the United States, "Well, M. de Leon, we are going to start an opposition to the Panama Canal" (which was then a scheme talked of in America), "and we shall be done before you"; which, indeed, has proved strictly true.

It was a singular coincidence, as M. de Lesseps notes, that the house assigned to him by the Viceroy, the "Palace of the Muqafira," was the one which had been the residence of the Egyptian Institute at the time of Napoleon's expedition, and that it was here that the scientific committee appointed by Napoleon to consider the practicability of the canal used to meet; so that there seems a remarkable continuity of events in the fact of the actual carrying out of the canal being designed and directed in the same house. M. de Lesseps himself seems to have been treated quite as a potentate, and was informed that he had twenty horses at his disposal, ten for harness



and ten for riding, besides "a state coach richly gilt, a barouche, a landau, and 'my lord.'" When he drove away from a conference with the Viceroy, in his state coach drawn by four white horses going at full gallop through the narrow streets of Cairo, the footmen, in spite of his admonitions, delivered blows with their staves right and left to keep off the native foot-passengers, who stood up unresentingly against the walls, exclaiming, "Ah, there is a great lord going by; glory be to God." Another little story shows in a more serious manner the amount of influence which M. de Lesseps possessed. Every one remembers the incident of the French men-of-war steaming away in procession before the bombardment of Alexandria. From M. de Lesseps' account, it appears that this movement, which occasioned such comment throughout Europe, was pretty directly due to him.

"Being in London at the time of the English Expedition, I learned that Alexandria was about to be bombarded. No one else knew of it, so I came at once back to Paris, and begged MM. de Freycinet and Ferry to come from the Elysée, where a cabinet council was being held. I said to them, 'I warn you that Alexandria, which we have created, and which, thanks to the engineers, sailors, &c., whom we have sent out, has prospered, is about to be bombarded. Well, France must not be responsible for the carriage. When I know it it had a population of 45,000, now it has 200,000 inhabitants. It was created by France, and we cannot bombard it.' A telegram was then sent to our fleet ordering it to withdraw. I relate all these facts, as they are but little known. Our Government, which behaved very straightforwardly in the matter, quite understood the situation, and could have no part or lot in the destruction of the town."

This, we admit, is "politics," very much so; but it throws such a light on the power and influence, in his own country, of the maker of the Suez Canal, that we cannot forbear quoting it.

The long story of the English opposition to the canal, about which much may be read in these pages, we cannot go into in detail. The account given of Lord Palmerston's objections and his reasons for them, both as to the matter and manner of them, is little creditable either to his judgment or his good taste or courtesy; but, naturally, M. de Lesseps may be supposed to make the worst of him. The point which M. de Lesseps specially wishes to lay stress on about England is, that it was actually to our immediate interests to have a direct way to India, and yet we opposed the canal. The letters of this portion of the book give a vivid idea of the author's untiring and ubiquitous energy in opposing the opponents of his scheme, to which in general, however, he found the commercial magnates of this country favourable. Among the opponents was Robert Stephenson, strangely enough, who appears to have relied on a rather partial survey of the ground made by him in conjunction with some French engineers in 1847. M. de Lesseps says in a letter from Constantinople to Barthélemy St. Hilaire, "Mr. Stephenson admits, in a letter to the *Times*, that he only visited a part of the Isthmus. I know what part that is, for I myself saw the tracks of his carriage-wheels, which did not extend more than a league beyond Suez." Stephenson should have remembered in what a desert country he was travelling, and have had his wheel-marks obliterated. One of the principal bugbears which the author had to contend against was the idea entertained by many persons, based on the result of a survey made by Napoleon's engineers, that there was a considerable difference of level between the seas on either side of the isthmus. M. de Lesseps appears to have declined any belief in this theory from the outset,—he is one of those men who is not disposed to believe anything that is adverse to his own schemes; but in this instance a more careful survey, or one made under more favourable conditions (for that of Napoleon was made in the midst of warlike operations) dispelled this illusion, though with some difficulty; for so great was the respect entertained (and with reason) for Napoleon's brilliant band of *savants* of the former generation, that some of those who had


taken part in the more recent, and, as it proved, more correct survey, were at first inclined to doubt their own results.\* It is worth note that this is one of the very difficulties which have been made a good deal of in regard to the Panama canal, and M. de Lesseps, of course, argues from the one case to the other. He had declared from the first that the canal would not require locks, that it was to be essentially a maritime, and not an inland canal. In the course of his remarks on this point, in the first volume, he says (p. 141):—"I stuck to my text in spite of all opposition, and my obstinacy has had its reward. I intend to act just in the same way at Panama, though many engineers would prefer, on account of the difference in level, not of the seas but of the tides, to construct a lock. I would not have one at Suez, and I do not intend to at Panama, as thus I effect a saving of more than a million and a half." M. de Lesseps does not, however, explain in this passage, as he means to work a canal without a lock, when there is a difference of some 20 ft. between the tide at one end and that at the other end of the canal; and more, when we come to the remarks on the subject of the Panama Canal, at the latter part of vol. ii., we read that in consequence of the Pacific tide being 19 ft. 6 in. at Panama, while the Atlantic tide at Colon is only 2 ft., "which would cause currents of four or five knots an hour in the canal, and create a danger to navigation," the method will be adopted of having a waiting basin and a tidal gate at Panama. That is not exactly the same thing as a lock, in one sense, but it is the same essentially, and means something very different from a maritime canal of the same class as that of Suez; and it is odd indeed after this to read (page 193) that "upon the proposal of the engineers of the Suez Canal the Commission [for inquiring into the Panama Canal scheme] decided by a large majority against the system of locks, and declared strongly in favour of an open canal on the level, the feasibility of which seemed quite clear if the Colon-Panama line were adopted." So that apparently M. de Lesseps sees no difference between an open canal "on the level" and a canal with a tidal gate and a 19 ft. rise and fall of tide.

The summary given of the various schemes proposed for the Inter-Oceanic Canal is of considerable interest, as it gives the main facts as to what has been proposed within a small compass and in a readable form. The subject occupied the consideration of the International Congress at Paris in 1875, and a kind of international jury was formed to collect the necessary information and give an opinion in detail. This Jury or Congress was divided into five Committees, with the object that each should thoroughly inquire into one branch of the subject, one taking probable traffic, another probable income, another the question of rents, &c. Several schemes were ultimately brought before the Congress. Señor de Garay, on the part of the Mexican route, proposed a route by the Tehuantepec isthmus, with a canal 150 miles long, a summit level of 975 ft., and sixty locks, and which would have required twelve days for the passage of a vessel,—a scheme which was rejected at once. The Nicaragua scheme, of which a pretty full detail, with some illustrations, was given in our columns recently,† had, M. de Lesseps admits, a good deal to recommend it, and he speaks well of it as admirably conceived and propounded; which, it may be observed, is a good deal more fairness and courtesy than M. de Lesseps and his scheme have received at the hands of the projectors of the Nicaragua scheme. This and the Panama scheme alone were seriously entertained for final consideration by the Congress, and the Panama route was deliberately selected as the one possessing the greatest advantages, requiring no series of locks, with their costly constructions, and promising a quicker passage than any of the others. The voting for it, on May 29, 1879, was by the

large majority of 78 to 8, with 12 non-voters; some of whom, however, were the official or professional representatives of other schemes.

M. de Lesseps does not go into the present financial aspect of the canal scheme, no doubt because that would be very dry reading for a book of this kind. Nor does he say much about the progress of the works since 1879, which would also be dry reading. He brings before the reader at every opportunity the parallel between the opposition and the prophecies of failure which were made against the Suez Canal, and its triumphant success in spite of all; and the moral we are intended to draw is obvious; indeed, if it were not, the author saves any trouble by drawing it himself, on more than one page of his book, but avoids drawing any attention to the enormous discrepancy between the two schemes in regard to the natural difficulties of site in the two cases. He roundly asserts that the canal will be open in 1889. No one would be more glad to see it than we should, but we cannot at present see our way to accepting M. de Lesseps' *couleur de rose* prophecies. That the canal will ultimately be completed we believe, because France is so far committed to it now that it has become almost a point of national honour to carry it through, and it is in reality only a question of time and money; but how much of these two measures of value will be consumed over it yet remains to be seen.

#### DESIGNS BY THE LATE W. BURGESS.

 We noticed briefly some time ago a few of the first-published photographs of this series of illustrations of Burgess's decorative designs, edited and annotated by Mr. Pullan. The portfolio, including twenty-three subjects, is now complete, and forms a highly-interesting collection of designs,—not all, certainly, of the same interest, but all marked by the strong individuality of style and manner which belonged to everything that Burgess produced.

The photographs numbered 2 and 3 illustrate the design for the decoration of St. Paul's, which, though it was undoubtedly a remarkable piece of work in its way, was such a preposterous scheme when regarded as a work to be actually carried out, that only a very doubtful kind of credit attaches to it, though it was, perhaps, worth while to keep the memorial of it. We are disposed to think, however, that Burgess never regarded the design as one that would be carried out; in fact, he himself said to us in speaking of the St. Paul's decorative scheme, "Nothing will be really done"; and we suspect that, knowing that the scheme was out of the pale of practical probabilities, he simply amused himself with showing how he would have decorated St. Paul's if he had built it. It is impossible that he could ever have seriously supposed that he would be allowed to hack away the whole interior masonry to replace it with slabs of marble; and almost impossible to us to imagine that he could ever, in his inner mind, have seriously wished to do this. If he did, it said little for his critical judgment or his respect for the work of a distinguished predecessor.

Nor do the sculpture subjects which are illustrated entirely justify their position. We cannot say how much superior they may have looked in Burgess's original drawings, for they are the work of carvers, not of sculptors,—like most of the work done in modern churches. The selections from the Waltham Abbey reredos look much better in these photographs than in the actual work, because we get them apart from the tawdry colour with which the work has been bedizen; the figures have much point of pose and expression, they tell their story well, in a sense; but they are only like Medieval sculpture a little better modelled than usual, though the decorative adjuncts are very good. It is otherwise when we come to purely decorative work. There Burgess was always picturesque, and always original, and forcible in his treatment of his subject and

\* See a summary of the matter at this stage given in the *Builder* for January 26, 1886.  
† *Builder*, October 1, 1887.

\* Published by B. T. Batsford.



material. Plate 9, for instance, gives us the stall-ends from Cork Cathedral. Here there are no antiquated "poppy-heads" of the accepted form, which has been imitated *ad nauseum*, but pierced open-work scrolls of conventional foliage, graceful in design but perfectly solid and substantial in their full and well-fed stems and leaves, each with a bird sculptured in the centre of the principal compartment, and seen in outline in the midst of a nearly clear space. This is a charming bit of work, and an excellent study of what conventional foliage in its best form really means. The Pastoral staff, plate 14, of which, by Mr. Pullan's permission, we give a reproduction (see plate in this number), is a good example of the characteristic vigour with which Burges reproduced a Medieval idea; the crockets, and the position of the sculpture in the curve of the staff, are derived from Medieval work; but the device of the St. George and the Dragon, and the bound woman below, is completely original as here applied, and the dragon growing out of the staff-end is Medieval in the best sense; it has the Medieval spirit, quite apart from anything like copyism. Still more may this be said of the decanter designs, of which also we give a reproduction; the force and vigour of the griffin handles, with their strongly-marked lines and savage grip on the bottle with their fore-paws, can hardly be too highly rated; this is one of the best pieces of modern grotesque to be seen. The basket-work business on the top of the decanters is a mistake, and forms an annoying blemish in an otherwise remarkably fine piece of work. The bodies of these decanters are glass, the necks of malachite and porphyry, the metalwork of silver, and the bosses inlaid with Greek, Roman, and Byzantine coins. These were designed by the artist for his own use, he having been in the habit of applying such fees as he got for literary work or in competitions in the production of objects of this kind made from his own design. A collection of glasses, with mountings, plate 21, shows also some curious and picturesque fancies in design, especially a bottle standing on two claws, and with a bird's head and beak for stopper.

It was hardly worth while to include in the set Burges's grotesque design of St. Simon Stylites—a good joke for the moment, no doubt, but not worth stereotyping: and it may be some question whether the kind of Medieval force exhibited in this collection generally will retain its hold permanently on the taste and interest of the modern generation. While the memory of Burges's career and talents is still present, all the work into which he put his own interest will be valued; but we doubt whether many people, even now, would care to furnish their houses with this type of work. It is powerful, but somewhat heavy and inelegant; admirable work of its kind, but not the kind to retain its hold on another generation. Its highest interest, perhaps, arises from the fact that it is thoroughly well done in its way, and that there is evidence in every line of it that the man who designed it enjoyed doing it,—a kind of interest which, unfortunately, very little modern decorative work does exhibit.

#### THE METROPOLITAN BOARD OF WORKS AND THE LAW OF LIGHT.

**W**EST week we published [p. 686] a report of Mr. Edwin Lawrence's speech at a meeting of the Metropolitan Board of Works in regard to the law of light, the result of which was that the subject has been referred to a Committee of the Board. We have no wish to prejudge the report of the Committee in question, but it appears to be very doubtful if any improvement in the law in regard to the obstruction of light can be made without altering it *in toto* in respect to the erection of new buildings. So far as obstruction by new buildings for public purposes is concerned, the law is clear. It is laid down in express terms in Roscoe's "Digest of the Law of Light," in Article 33:—"An easement of light being an interest in land for which compensation may be claimed under the

Lands Clauses Consolidation Act, 1845, a person the light of whose house is obstructed by works in course of erection by a public body created by the Legislature to whose undertaking the provisions of the Act are applicable cannot bring an ordinary action for damages or proceed for an injunction, but must proceed under s. 68 of the Lands Clauses Act to obtain compensation." That statement of the law is based on several cases, in one of which it was attempted to obtain an injunction against the School Board for London. But these have lately been approved and, as it appears to us, amplified by Mr. Justice North in the recently-reported case of Wigram v. Fryer, "Law Reports," 36 Chancery Division, p. 87 (October monthly number, 1887). In that case the defendant Fryer had obtained, on a sub-lease from the executors of one Pink, a plot of land for the purpose of erecting thereon artisans' dwellings. Pink, in his turn, had obtained his lease from the Metropolitan Board of Works, who had taken the land in question under a special Act in order that artisans' dwellings might be built upon it. Through what we must regard as an extraordinary legislative oversight, the Board had no powers themselves to erect the buildings. "It cannot be done," said Mr. Justice North, "by the Board erecting the buildings themselves; it can only be done by letting or selling to some person who is to do the same thing." Fryer obstructed certain ancient lights belonging to Wigram, and the question was whether the ordinary rule of law, viz.: the granting of an injunction or of damages, applied to such a case as this. We do not propose to go through the reasons by which Mr. Justice North arrived at his decision. Suffice it to say in his own words that "the contention that by the Board's disposing of the property the right against them has ceased, and that there can be no right against Mr. Fryer for compensation, and therefore that there must be a right for an injunction, cannot be sustained." Finally, he said, "I am of opinion that what is being done here is in compliance with the Act, and that the plaintiff's remedy, if he is injured, should be by obtaining compensation and not by injunction." In this case the buildings were in a sense buildings for a public purpose; but, on the other hand, when the Board for the purpose of public advantage makes a new street, and, as a consequence thereof, persons under leases from the Board erect new buildings of a private nature, then there is really but an infinitesimal difference between the two cases. In the latter case, compensation should be granted in the way in which it is given under the Lands Clauses Act, and the ordinary legal remedies should be suspended. That, as we understand it, is Mr. Lawrence's contention, and this recent case of Wigram v. Fryer seems to extend the law so much that there should be no difficulty in carrying it a step further. Without a careful perusal of a number of statutes it would be unwise to hazard an opinion on the actual rights at present of the Board or of the lessees, in the case of the erection of shops or other similar buildings. But it may possibly be found that even now the Acts, if there is an obstruction of light by such erections, override the ordinary law. If they do not, it would be but a slight step to make the law as laid down in the decision we have referred to, and others which precede it, applicable to all cases in which new buildings are constructed by the Board or their lessees.

#### NOTES.

**T**HE new "Sheffield Society of Architects and Surveyors," which held its opening meeting at the Montgomery Hall, Sheffield, on Tuesday last, seems to have made a good beginning, and promises to be an active and energetic Society. More than fifty members were present at the meeting, at which the President, Mr. T. J. Flockton, read the opening address, in which he described the objects of the Society, which included the formation of classes among the associates and students in the subjects of the design, construction,

and the history of architecture; the preparation of candidates for examination by the leading societies; communication and exchange of opinion with the Royal Institute of British Architects, the Surveyors' Institute, and other kindred societies, and the receipt of their papers, and the ultimate formation of a library. He concluded by quoting the closing words of the President's address at the meeting of the Architectural Association, in which he counselled his hearers to uphold and extend the dignity and usefulness of their profession. Mr. C. Hadfield proposed a vote of thanks to the President, which was seconded by Mr. J. B. Mitchell-Withers. A number of paintings and engravings, lent for the occasion, were exhibited; among others, drawings in oil and water colours by Mr. Mitchell-Withers, and a design by the late Godfrey Sykes (lent by Mr. Hadfield) for decorating the ceiling of the old telegraphic newsroom at Sheffield, a design which unfortunately had never been carried out. Mr. Frederick Fowler, Vice-President of the Society, exhibited a number of photographs of the Forth Bridge work, of which his brother, Sir John Fowler, is chief engineer. Among the papers already announced for the session are one on "Registration," by Mr. T. Wreghitt Canon; on "the Value of Association and Federation," by Mr. J. Murgatroyd; on "Interest in Architectural Design," by Mr. C. Hadfield; and on "Architectural Education," by Professor Roger Smith. The Society at present numbers, it appears, seventy-three members, so that a large proportion of the actual members attended the opening meeting. We hope the Society will progress in numbers and in usefulness. The papers already announced, as noticed above, are all on rather general subjects; no doubt special subjects of artistic and scientific interest will be taken up in due time: this should be kept in view, as, after all, the real object of professional societies of this kind should be, in the words of the Charter of the Institute, "to advance the art of Architecture."

**T**HE important paper on accidents in mines, read by Sir F. Abel last Tuesday at the Institution of Civil Engineers, brings forward one curious and unexpected source of danger, arising out of the improved ventilation of mines in the present day. The old lamps of Davy, Stephenson, and Clanny were really safe, he said, in the very moderate ventilating air-currents then to be met with in coal mines; but the improvements in the ventilation of coal mines have led to a great increase in the velocity of air-currents therein, under which the old lamps are no longer safe, as, when exposed for a short period to currents of air charged with fire-damp and travelling at high velocities, a communication is likely to be established between the flame and the gas and air mixture surrounding the lamps. Sir Frederick Abel, as might have been expected, regarded a portable incandescent electric light as the miner's safety-lamp of the future; the two principal difficulties connected with this being those relating to cost and weight. The lamp must carry its own battery, primary or secondary. Mr. Swan has made a secondary-battery lamp which weighs only 7 lb., though this is heavier than desirable; thirty of them, however, have been in use at the Risca Colliery for three months. Since then Mr. Jas. Pitkin has constructed one with equal results, and between 5 lb. and 6 lb. weight. Sir Frederick referred to several primary-battery lamps, by Messrs. Trouvé, Coad, Schanschiff, and Blumberg, which were successful, except in regard to the length of maintenance of light, which does not appear to have been got up to the requirements of mining work as yet, with primary batteries. The recharging of small primary batteries is more troublesome than the restoration of power in secondary batteries; the latter, however, pre-suppose the possession of a generator. As, however, there is every probability that a general electric lighting system will before long be in use in all important mines, the power for recharging will be at hand, and therefore the secondary electric lamp, all things considered, seems likely to be the safety-lamp of the future for coal mines.



**CAPTAIN SHAW'S** report on the Exeter Theatre fire is very strong in condemnation of the construction of the theatre, enumerating no fewer than twelve defects of construction in regard to danger from fire. Among these he specially mentions the introduction of shops into the side of the building most suitable for providing easy means of exit, for the purpose of securing a rental of 35*l.* a year only, so that for the sake of this small sum the audience were placed in continual additional jeopardy. Three other special points noted by Captain Shaw are that there was no provision made for dealing with an outbreak of fire in the flies, which was the very part where the greatest danger necessarily existed; that many of the passages and corridors which, according to the agreement and understanding, were to have been constructed of fire-resisting materials, supported and enclosed by brick walls, were of wood, enclosed by lath and plaster or by match-boarding; and that the exit from the stalls and dress-boxes, as originally designed, was cramped and tortuous, and was only partly rectified by the emergency exit, which brought the occupants of those parts into direct conflict with the whole of the occupants of the gallery and a portion of the dress-circle. Captain Shaw places the real responsibility for the disaster with the licensing authorities, considering that having accepted the theatre as built, and having licensed it, they had no right after that to shift any part of the responsibility on the architect or on other persons, and that the jury in censuring the architect have laid the foundation of a precedent which would lead, if adopted, to endless difficulties; and he asks why they should not also include the contractor, the clerk of works, the masons, plumbers, &c. This is not quite logical, as all these are supposed to work according to the architect's directions; but in his main position, that the authorities who have licensed the theatre are, from that moment, the really responsible people, is, no doubt, correct. This, of course, does not in any way preclude the moral responsibility of the architect in all such cases, as the designer of the theatre; it only places the legal responsibility on the proper shoulders.

**FROM** a letter published in last week's *Athenæum*, it appears that Mr. Penrose, after visiting the Tyrins remains in company with Dr. Dörpfeld, and making a more minute examination of them, has come to the conclusion that the objections which have been made to the assumed antiquity of these remains, and which he brought under the consideration of a special meeting at the rooms of the Society of Antiquaries some little time back,\* cannot be sustained. Mr. Penrose says in his letter (addressed originally to a member of the Hellenic Society):—

"The suspicious points [in regard to the remains at Tyrins and Mycenæ] were sufficiently brought forward in the discussion which took place in the summer of 1886, in the rooms of the Society of Antiquaries. I do not think that their discussion was unreasonable, but my late visit convinced me that they were all capable of explanation, and that both at Tyrins and at Mycenæ the parallel antiquity of Dr. Schliemann's recent discoveries and the great Pelægic works can be established. An important point in the controversy related to the use of the stone saw. It was argued that the evidence of this instrument on some of the stones in the palace proved it of later date than the walls of the citadel; but I found that this argument broke down; for there were evident marks of its use on the pillars of the great gateways both at Tyrins and Mycenæ.

Another very natural difficulty arose from the badness of the construction of the palace walls and the smallness of the stones used. The walls are certainly more carelessly built than one would have expected, and are generally composed of small stones; but there are exceptions, and one remarkable stone, which forms the floor of the bath-room, would have required as difficult handling as any of the stones of the fortress. There is also a harmony both in direction and extent, as marked by special quoins and returns, between the external walls and those of the palace, which very strongly points out their contemporary construction."

\* See full report in the *Builder* for July 10, 1886, p. 48.

**THE** Greek Government have decided to re-erect the great stone lion of Chæroneæ. Dr. Dörpfeld is to choose the exact spot, and to superintend this important work. The lion, it will be remembered, was seen by Pausanias. He says, speaking of Chæroneæ, "as one comes to the city there is the sepulchre of the Boeotians who fell fighting against Philip. There is no inscription, but the figure of a lion stands over it, a symbol of the brave spirit of these men. The inscription is left out, I suppose, because it was the will of the gods that the fortune of these men should not equal their courage." Of the 300 bodies originally buried there, 260 have been discovered, some with the lance-heads still adhering to the skull. The skeletons have been preserved by Fiorelli's gypsum method. The lion itself is a splendid specimen of fourth-century work. We are specially glad it is to be set up over the grave of the fallen, as it is one of those monuments which can only have its due artistic value when set up *in situ*.

**M. KIESERITZKY**, Sub-director of the Hermitage Antiquities, publishes,—we regret to say in Russian,—an interesting account of a statue of Aphrodite, recently acquired for the Hermitage Collection. The statue goes by the name of the Gatschina Aphrodite. Till quite lately it stood in that portion of the park of the Gatschina Palace known as the Menagerie. It is to the credit of the sculptor, M. A. Chijoff, that at the revision of the Gatschina sculptures, he called the attention of the Director of the Hermitage, M. A. A. Vassilichikoff, to the statue, and at his instance, "by the supreme goodness of his Imperial Majesty," it was safely lodged in the Imperial Museum. Truly, the climate of Russia is not well suited to the *al fresco* exhibition of valuable marbles. The statue is an excellent replica of the Capitoline Aphrodite type, with the accessory dolphin of the Medici type. It is in Parian marble, and of fine execution. It will certainly displace at once in public favour the wretched statue which goes by the name of the "Hermitage Venus." The most interesting point about the Gatschina statue is the head. The body accords so closely with the Capitoline statue that no further comment is needed. The head differs markedly. In fact, such resemblance as there is, is purely external, *e.g.*, the arrangement of the hair. The head, M. Kieseritzky thinks, must be compared, not to the Capitoline statue, but to a head in the Vatican Museum (Museo Chiaramonti, No. A, 513), found near the Baths of Diocletian, and representing a later, more idealised, less animate Aphrodite type. We are bound to say we take the comparison on trust from M. Kieseritzky, whose excellent eye for style is well known; the phototype plate that accompanies his paper is so utterly bad that no judgment can be based on it.

**HARROW SCHOOL** has long been in possession of a valuable collection of antiquities presented by Sir John Gardner Wilkinson, partly during his lifetime and partly by bequest on his death. These antiquities consisted of Egyptian antiquities, Classical antiquities, coins and medals, and fossils and stones from Derbyshire. When some years back we paid a visit to the collection, specially with a view to the inspection of the Greek vases, we found the objects of our research covered with dust and dirt, muddled up with fossils and odds and ends of every description, in the Vaughan Library. A boy must, indeed, have had a keen archaeological "dair" to discover their merit. But as regards the Classical antiquities, Mr. Cecil Torr,—whose name, like that of another hero, should be written in golden letters on some Rhodian shrine,—has changed all that. With no small difficulty he got permission to attack the collection, mount, set up, and arrange the specimens, and have them transferred to the Museum of the School, where they are now duly exhibited. The catalogue of the Egyptian antiquities is by Mr. Budge, of the British Museum; that of the Classical antiquities by Mr. Torr himself. Both are printed at Mr. Torr's expense. Mr. Torr's

catalogue will, of course, be mainly in use by visitors to the Harrow Museum. It is well, however, that it should be widely known that the book is much more than a catalogue. To begin with, there is an excellent preface marked by the writer's well-known vigour of view and directness of expression, and dealing with that now momentous question, the claims of archaeology in classical education. In the plainest fashion he gives a boy or a beginner of any sort directions how to set about Classical archaeology, what books to read, and what to expect to get out of them. Further, each department of antiquities is preceded by a few introductory remarks, just enough to set the student looking aright; so that in vases, bronzes, terra cottas, gems, there is, at least, a solid foundation laid, and in the matter, *e.g.*, of Etruscan moulded vases and Samian red ware, just the information is given which the student often looks for in vain. We would only suggest the addition of a very brief bibliography of the subject, just to point boys on to the right literature.

**WE** have received from Mr. Stephen W. Williams, F.R.I.B.A., a reprint of his interesting paper read at the last annual meeting of the Cambrian Archaeological Association, at Denbigh, August 23rd, 1887, on the remains of Strata Florida Abbey, in Cardiganshire. This was an abbey of Transitional date, of which the principal portions now standing are the west doorway, with a very deeply-moulded round-arched doorway, and the north-west portion of the north transept, but there appear to have been sufficient remains to make out the complete plan of the church, which is the usual plan of a Cistercian church, with a small square-ended choir, of no great length, and transepts with a series of six chapels, three on each side, on the eastern face of the transepts; these chapels are square-ended, not apsidal, as they are often found. Mr. Williams makes out the nave piers to have been large square piers with semi-cylindrical shafts of large size at each end, the whole giving a large oblong mass of masonry more than twice as long as its thickness; on the sides towards the aisles each pier had a flat plaster or respond. The bases of the tower piers have been uncovered, and it is found that one peculiarity is that the west and eastern piers did not correspond; the western piers ranged with the thickness of the nave arcade piers, but the eastern ones, standing between the chancel arch and the range of openings of the transept chapels, are of larger area and of greater elaboration of plan. We should think it doubtful whether the western piers of the crossing were, as shown on Mr. Williams's plan, of less mass and length east and west than the ordinary piers of the arcade; it is certainly quite contrary to what we usually find in the tower piers in early work. Mr. Williams says, "Fragments found in the immediate vicinity of the piers which have been uncovered lead me to believe that the nave arcade was of pointed arches richly moulded, and carried on square piers with semicircular attached shafts on the line of the arches carrying the inner members, and with three-quarter nook shafts in square recessed jamb-moulds carrying the outer members of the arcade." He has not as yet found on the outer walls of the aisles any responds corresponding with those on the piers. From fragments found in the neighbourhood of the crossing it is believed that the tower arches were pointed and richly moulded.

**SOME** recent numbers of the *Venice News*, an English journal published at Venice, contain a short series of papers by Signor Boni, translated from *La Riforma*, on the ancient building called the Fondaco dei Turchi. The object of the paper is partly to give a history of the old building, and partly a history of and a protest against the restoration of it, which has practically amounted to rebuilding it. The ancient building had fallen into decay, but Signor Boni's position is that decay might have been arrested and the remains of the building preserved. Instead of this, it was determined to restore it, and, according to



nor Boni (who, however, takes rather strong view of these matters), it was rebuilt from the foundations, the sculptured walls touched up and improved, and the decoration, commenced in 1860, carried out scrupulously, as not to leave us the hope finding any part, even the smallest, which may look upon with confidence as a relic of ancient palace." The Fondaco is now, says nor Boni, faced with marble, but an old man who remembered the ancient structure, told him the primitive walling was brick and stone dressings. We confess we should like to see this *cum grano*. The marble seems more probable. Some remarks on the towers which now added we may quote at length:—

Any one who compares the modernised façade of the Fondaco with that which is seen in photographs of the ancient palace will perhaps find himself embarrassed on account of the addition of side towers, and the ornamental emulating of cornice. The existence of these towers is entirely proved by the wood engraving of 1560, once attributed to Dürer, and although the new towers cannot be considered as authoritatively correct, it is interesting to remember that the early Venetian palaces had the appearance of massive structures of brick, with strong towers at the angles, and against the frequent popular revolutions, and not the incursions of the pirates, *paganica et bellicosa gens*. These forms became familiar to minds of the Venetians, and two or three centuries afterwards, when the city became richer, and when there was no more fear of incursions, the Venetians began to beautify itself, the principal uses of its primitive palaces were preserved, and were adorned by clothing the brickwork, or building in sculptures or discs of precious metals, developing the vast breadth of brick wall, and the columns brought from the East, and enriching and decorating the battlements.

The twenty-first Annual Convention of the American Institute of Architects was held in Chicago on the 19th, 20th, and 21st of last month. A long and interesting communication or report on education was presented by Secretary to the Committee on Education, the course of which it was remarked that such has been said in regard to the elevation of the profession by a State system of examination and licences for architects, but it is to me that this but partially tends towards the end in view, and that a more rational method is to raise its foundations by giving the professional training as good as possible, than to lift it by the hair, so to speak, by compulsory examination. Real improvement will only come through the better education and preparation of its members, however obtained, and by the resulting gradual elevation of ignorant men; an opinion from another side of the water which may be of some interest here at the present moment. Adler read a paper on the "Paramount requirements of Large Theatres," giving a valuable and comprehensive survey of the subject, though containing nothing that would be new to most of our readers.

We have more than once called attention to the need of making the underground ways a connecting chain between the great way termini of the metropolis. An advance recently been made in this direction, though it should have been done long ago. We refer to the opening of a subway between the station at Western station and Praed-street station. Liverpool-street and Paddington on the north are now, therefore, directly connected by the Metropolitan Railway. It should be possible to make some kind of connexion with London, which is in many respects the most "unpleasant" terminus in the metropolis, being unconnected with the underground lines out of the direct route of omnibuses.

The thirteenth volume of the "Proceedings of the Association of Municipal and Sanitary Engineers" contains a number of papers on sanitary and practical subjects, including one on Cremation, by Mr. Eassie, on the Construction and Maintenance of Sanitary Roads, by Mr. J. W. Brown. Jones's paper on Refuse Destructors, with discussion which followed, of which we have not yet given the substance. The volume includes also papers on the Drainage of

Portsmouth, by Mr. H. P. Boulnois; description of the Sanitary Works of Kidderminster, by Mr. A. Conner; Asphalt and Concrete Pavements, by Mr. Strachan, &c. A great deal of the last-named paper, and of that on the Portsmouth drainage, also appeared in our columns at the time they were read.

It has been decided that the architectural section of the Glasgow Exhibition, for which a gallery has been set apart in the Exhibition buildings, is to be distinctly international in character, and an effort will be made to get together representative works from different countries. It has been also decided to admit photographs of work designed by the exhibitor only, and accompanied by drawings, if possible. The committee will also endeavour to get together some good models, and a limited selection of decorative objects, church-plate, &c., of the highest class, in order to give further interest to the Architectural Gallery.

**THE Mitcham Linoleum and Floor-cloth Company**, we are glad to see, are offering prizes to a considerable amount for the best designs suitable to linoleum and floor-cloth. There is every room for improvement on the commonplace designs usually seen, and it is perfectly possible to render linoleum an artistic covering instead of a mere collection of commonplace trade patterns, and that without even adding to the expense of manufacture. The awards will be made by the Directors of the Company, assisted by Mr. G. H. Birch. It is to be hoped that some good designs will be secured in response to an invitation the spirit and intent of which are highly to be commended.

**THE** acquittal of the driver and fireman of the train which caused the Hexthorpe calamity will have come as a surprise to many who read the evidence given before the Coroner; but there can be very little doubt that this leniency towards the men who immediately caused the disaster is really a kind of indirect expression of the opinion of the jury that the company were even more to blame than the men, and that after the evidence which had been given as to the confusion in signalling, and the culpable laxity and want of method in the arrangements made for an occasion of extra traffic and consequently extra danger, the blame resting with the higher authorities of the Manchester, Sheffield, and Lincolnshire Railway was so great that it would have been unfair to make scapegoats of the engine-driver and fireman. We do not see the logic of this. The extra difficulties put in the way of the men, and the want of properly worded and methodical instructions to them, would have been a good reason for a mitigation of sentence; but there is no doubt from the evidence that the driver was careless and did not see or attend to signals which he ought to have seen; and the culpability of his superiors does not remove all responsibility from him. The case is a very creditable one to the railway company principally concerned, and though they cannot be made criminally responsible, we hope they will not be allowed to hear the last of it with the close of this trial.

#### Sanitary Institute of Great Britain.

At an examination, held November 10th and 11th, sixty-two candidates presented themselves, eight as Local Surveyors and fifty-four as Inspectors of Nuisances. The Institute's Certificate of Competency to discharge the duties of Local Surveyor was awarded to Messrs. Adam H. Campbell, John W. Hunt, and Donald Grant Macdonald. The Institute's Certificate of Competency to discharge the duties of Inspector of Nuisances was awarded to Messrs. W. J. Addiscott, F. A. Aris, R. Bell, R. Butland, W. S. Devey, T. J. M. Flower, W. Fordham, C. T. Gardner, T. W. Golds, W. Grant, H. Hilliam, R. A. Houghton, P. Hoy, R. W. Jasper, D. Jones, T. A. Kitchen, J. W. Lear, W. Lee, D. G. Macdonald, A. McNair, S. Minty, A. R. Patrick, A. Perry, G. M. Pettit, J. Shelton, T. D. Stewart, J. Taylor, T. Thomas, E. Winter, R. White, and W. Yeo.

#### THE SURVEYORS' INSTITUTION.

MR. W. J. BRADLEY, M.P., who is President (for the second year) of the Surveyors' Institution, delivered the opening address for the session on Monday evening last. After a few introductory remarks he said:—

I do not forget that with my present term of office closes the second decade of our existence as an Institution. It is not necessary to dwell at length upon what has been accomplished during that comparatively brief period in the life of a professional society; but this may be said, without fear of contradiction, that this Institution is an instance of progressive prosperity difficult to match elsewhere, whether regard is had to its early incorporation, to the status it has secured for its members, or to the extent to which it represents the profession in whose interests it exists. I wish it were possible to look back over the twenty years of our annals with unmixed satisfaction. As in all human affairs, if we have successes to chronicle so have we losses to deplore. Happily, our first President, Mr. John Clutton, is still with us (applause), and long may he remain so; but we cannot help calling to mind on occasions like the present the many honoured contemporaries who have assisted in building up this Institution, and who are no longer by our side. . . .

Before passing to more special subjects, let me refer to an event which makes the year 1887 an *annus mirabilis* in our history.—I allude to the Jubilee of the reign of one of the most illustrious and most beloved of Sovereigns. This Institution, incorporated under a Royal Charter granted by her Majesty, availed itself of the opportunity of assuring her, in a dutiful address, that the surveyors of England were among the most loyal and devoted of her subjects (hear, hear).

The mention of the Jubilee year naturally leads one's thoughts to the vast changes in all matters relating to property which have taken place during the fifty years of Queen Victoria's reign. This period (comparing great things with small) as nearly as possible coincides with the age of the Land Surveyors' Club, which was, in a certain sense, the nucleus out of which this Institution was developed. It is no reflection on the memory of those who founded that Club to say that they would have been astonished could they have foreseen the enormous multiplication of transactions in every kind of property which has distinguished the intervening period of fifty years, and which all fall more or less within the province of the surveyor of the present day.

This great increase in the extent and variety of the surveyor's duties necessitates a more careful and accurate training for his life's work; and it is the boast of this Institution that it made haste to recognise the fact by making provision for the careful education of its professional successors. Among the Students whom I see before me is seated, no doubt, a future President of this Institution. If so, I hope, and am sure, that he will remember in his inaugural Address to do us the justice of admitting that we did the best we could in our day to secure for those who will follow us the position to which we consider the surveyor entitled, but which he cannot attain without the special and exact training long looked upon as necessary in other professions (hear, hear).

It is impossible to exaggerate the importance of our Examinations with reference to the future of the Institution. When we applied for and obtained our Charter of Incorporation in 1881, it was resolved, after long and careful consideration, to postpone the compulsory Examination for Professional Associates for three years from the date of the Charter, and for Fellows for ten years from the same date, meanwhile introducing both Examinations in a voluntary form, in order to avoid the shock of a sudden transition from the old state of things to the new. Ten years seemed a period remote enough in 1881, and, as a matter of fact, was looked upon as too remote by some of the more sanguine promoters of our Examination system. More than six years of this period has, however, since expired, and we are now, so to speak, almost within sight of the time when our system of admitting members will undergo a complete change by the operation of Clause 29 of our Charter, which finally closes, in a year or two's time, the access to Professional Membership against all who are unwilling to submit themselves to the Examina-



tion tests. It has never been, and I trust never will be, the policy of this Institution to canvass for new members; but it is only just to remind those of our professional brethren who are eligible for membership, but who, being of mature years and of established professional position, are not likely to offer themselves for examination, that the period within which they can join the Institution without examination is rapidly drawing to a close under the terms and conditions of the Charter. I find that an impression prevails to some extent that the compulsory Examination for Fellows has already come into force; and I think it well, therefore, by this explanation to dispel the misapprehension.

It will be of some interest to review the progress made during the last six years towards leavening the Institution with examined men, in anticipation of the more exclusive system towards which we are hastening. Since the year 1881, 503 candidates of all classes have offered themselves for examination, of whom 345 have satisfied the Examiners. Of those 345, 185 were candidates for Studentship and 160 for Professional Membership. Of the 160 who have passed the Professional Qualifying Examinations, 127 (a large proportion) have since been elected, or are in process of election, as Members, and a large majority of the remaining 33 are taking steps for joining the Institution. Placing these 127 Members, by Examination, in comparison with the whole Professional Membership (that is, excluding Honorary Members, Ordinary Associates, and Students), it appears that the Members who have actually qualified by Examination, at the present date, already amount to nearly 15 per cent. of the whole Professional Membership, which, as I have already said, represents a very respectable leaven of the new order of things (hear, hear). This calculation leaves out of account about 100 Students who have already passed the first step in the Examination system.

It is impossible to forecast what the total increase in the number of Members will be (it will probably be considerable) in the next four years, but assuming, as we are justified in doing by statistics, that not less than forty will pass the Professional Examinations during each of those four years, it will be seen that we shall have on our Register at the end of the period the names of upwards of 300 Members possessing a certificate of having passed an Examination of the most exhaustive but most practical description in every kind of professional knowledge not absolutely dependent upon long experience.

It may be stated in connexion with our education system that the Institution carefully abstains from anything in the nature of teaching functions, and it is, therefore, with the greatest satisfaction I record the fact that the most cordial working relations exist between ourselves and valuable centres of professional instruction, such as the Royal Agricultural College, Cirencester, and the College of Agriculture, Downton (hear, hear).

Altogether, the Institution has reason to be proud of the success which has attended its efforts to secure a sound technical education for the rising generation of surveyors, a success far beyond the most sanguine anticipations; and it only remains to urge all surveyors and land agents of standing (whether members or not of the Institution) to co-operate with the Council in this direction by seeing that their sons, their pupils, or their assistants do not lose the opportunity which our Examination system offers of obtaining certificates of competency, the value of which, in relation to their future career, must be admitted (hear, hear).

The remainder of Mr. Beedel's address was devoted to agricultural matters, and to the legislation or proceedings in Parliament in relation thereto. We quote one passage from this part of the address:—

The Select Committee on Forestry, to which I alluded last year, being reappointed, held another series of sittings, during which Mr. John Clutton and another of our members, Mr. Evan Powell, were called upon to give evidence, and a report of considerable value and interest has been issued, taking up very much the line of the views put forward by our Secretary, Mr. Rogers (hear, hear). The Committee, whose recommendations cannot be said to err on the side of extravagance, were apparently not altogether satisfied as to the possibility of establishing a School, and pro-

pose, as an intermediate step, to constitute a Board of Forestry, composed of delegates from various bodies, such as the Royal Agricultural Society of England, the Highland and Agricultural Society of Scotland, and this Institution. A Board so constituted would, no doubt, be better fitted for dealing with the subject than a sub-Department of State, and might be trusted to carry on its operations on sound and practical lines, and with a view to actual needs and possibilities. Steps are, I understand, being taken to ascertain the extent to which the societies invited to send delegates to the Board are prepared to co-operate in giving effect to the recommendations of the Committee. I believe I am not saying too much on behalf of our institution in stating that we shall be willing to do anything in this or in any other way which may seem to offer a prospect of bringing relief, however small, to the landed interests of this country (applause).

On the motion of Mr. E. P. Squarey, seconded by Mr. Wheeler, Q.C., a vote of thanks was given to Mr. Beedel for his address.

#### LUTON SEWAGE WORKS.

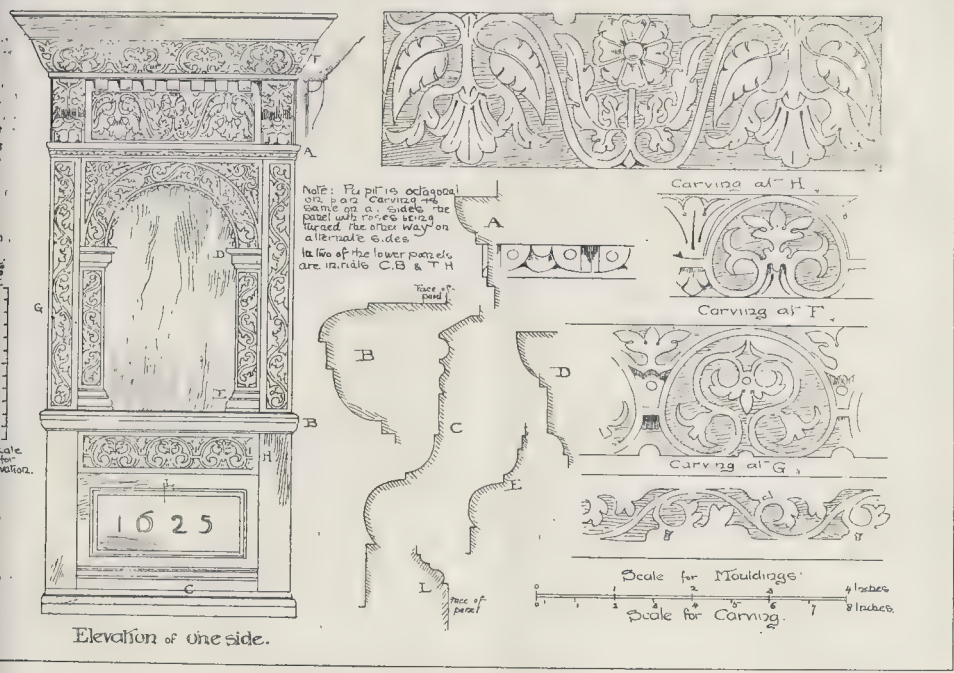
A Home Counties District Meeting of the Association of Municipal and Sanitary Engineers and Surveyors was held at Luton on Saturday, the 29th ult. The members met in the Council Chamber, there being present Mr. J. Gordon, of Leicester (President), Mr. Lewis Angell (West Ham), Mr. Ellice Clark (West Sussex), Mr. J. P. Barber (Islington), Mr. John Lund (Bedford), Mr. E. Sharnan (Wellingborough), Mr. G. Cannon (Aylesbury), Mr. W. H. Wilde (Hertford), Mr. J. P. Norrington (Fulham), Mr. C. Jones (Ealing), Mr. W. Weaver (Kensington), Mr. G. Weston (Paddington), Mr. W. B. Bromley (Heston and Isleworth), Mr. T. G. Lawson (Southgate), Mr. W. Santo Crimp (Wimbledon), Mr. R. S. Lloyd (Messrs. Hayward Tyler & Co.), Mr. T. de Courcy Meade (Hornsey), and others. Also the Mayor (Councillor H. Blundell) and other members of the Corporation, Mr. W. H. Leete (Borough Surveyor), Major Flower (Consulting Engineer of the Lea Conservancy Board), and other gentlemen.

Mr. W. H. Leete, Borough Surveyor of Luton, read a paper on "Luton Sewage, past and present." The population at the present time is about 30,500; rateable value, 104,316l.; municipal area, 2,600 acres; and there are thirty miles of roads and streets. Luton is situated at the head of the Lea watershed, and above the intake of the New River Company and the large lakes on Luton Hoo estate. It has been jealously watched by the riparian authorities, and precautions constantly enforced to prevent pollution of the Lea and lakes. Of recent years, during droughts the Lea has been almost dried up. About the year 1800 there were only five streets in Luton, and within three years of that date the first bridge was erected over the stream. The original industry was malting, no fewer than sixty kilns being at one time worked, also a few tanneries, and there were six water corn-mills on the stream. The straw-plait industry was introduced by Lorraine plaiters, who left Scotland, owing to troublesome times, in the reign of Mary Queen of Scots, and the trade has now an annual turnover of 1,750,000l. In 1821 the population was 2,980, and there were 595 houses. Up to 1850 the drainage was by open ditches and drains direct into the river. The Public Health Act of 1843 was adopted, and the first meeting of the Local Board was held on August 12, 1850. The owner of the Luton Hoo estate obtained an injunction to restrain the Authority from polluting the stream, and in 1856 a scheme was initiated, 14 acres of land between Park-road and Windmill-road being purchased, and outfall works arranged, with engine and boiler, receiving tanks, filter-beds, and lime-mixing apparatus, in connexion with which an intercepting sewer was constructed about a mile in extent, on the advice of Sir Joseph Bazalgette. Extensions were made from time to time. In 1868 the Authority was served with notice to conform to the Act (cap. 154, July 30, 1868) for the preservation and improvement of the Lea. By the efforts of the late Mr. E. O. Williams, Alderman Higgins, and Mr. G. Bailey, Clerk to the Board, a clause was inserted in the Act, allowing Luton to continue discharging sewage water into the river after purification by Higge's

process, or such other which from time to time might be in use as the best known practicable process, providing they did not increase the sectional area of the existing sewerage and drainage works. From time to time, to meet the wishes of the Conservators, several processes were applied, such as Whitbread's, the Native Guano Company's, and others, but all failed to improve on the simple lime process. In rainy seasons the sewage is very much diluted with subsoil and spring water, and is continuously deeply coloured by dyes used in the local trade. During the past six years plaiting has become almost obsolete, owing to the enormous importation of cheaper foreign plaits, and the industry consists of making up the foreign-made plaits. This has driven the villagers into the town, and created a great demand for cottage property. Finding that the sewage could not be satisfactorily clarified by the use of chemicals and precipitation, the Authority, recently changed from a Local Board to a Municipal Corporation, in 1878 obtained a loan of 10,000l. for further works, which included the removal of the last remaining water-mill on the stream, providing a new outfall, purchasing five acres and leasing 17½ acres of land, which was terraced and drained, &c., laying down new machinery with rising main. After using chemicals and precipitating the solids, the partially clarified sewage was pumped upon the land, but the effluent remained highly coloured; 800,000 gallons of sewage were pumped six days each week. Chemical treatment was again tried, viz., Hill's salts of magnesium and tar, with lime, the patentees having the works at his disposal for six months, only to fail more signally, leaving the works in a filthy condition. Mr. John Hanson's black ash was also tried, but was found to be quite ineffective, not in the least touching the colour. Between 1876 and 1885 the population increased one-third, and complaints again arose. After much inquiry, the Town Council acquired the present farm, which comprises 71 a. 12 r. 27 p., at an average price of 128l. per acre. It adjoins the borough boundary, and its extremity is fully a mile beyond the pumping-station. Its greatest height is 184 ft. The soil, for the most part, has a shallow staple on a chalk base, somewhat loose, and free from large fissures. The land is served by a 16-in. rising main, 1,541 yards long, prolonged by a 12-in. main, 220 yards in extent, with eleven valves serving eleven levels from 10 ft. to 184 ft. There are four earth-made tanks, two at 62 ft. height, one at 117 ft., and one at 125 ft., each having a small sludge bed. The tanks will hold 1,023,700 gallons, and may be filled twice in twenty-four hours. They cost 9s. per 1,000 gallons. The conduits from the various levels are simply earth cuts to a fall of 1 in. per chain, following the contour of the hill-sides. They extend slightly over three miles, and cost 8½d. per yard. About 9 acres at the foot and side of the hill are levelled and ridged to secure uniform distribution of sewage without any large accumulation at the foot of the hill. The cost was 16l. an acre. The chief crop is rye-grass, with about 16 acres arable, growing corn for the Corporation horses. As to crops, some years we have been able to show a profit, but last year's superabundant produce caused the crops to be almost given away, entailing a deficit. As the sewage enters the works it passes through a series of screens. Three tanks, holding about 700,000 gallons, are used to hold the night flow. They are connected with a well in the new engine-house, 9 ft. in diameter and 14 ft. deep, into which the 18-in. suction-pipe of the new pumps is carried. The boilers are equal to 130 horse power. The new engines are 100-horse power coupled horizontal rotating high-pressure condensing engines. The pumps are 19½ in. diameter, of the horizontal double-acting type. The new plant is capable of raising 1½ million gallons of sewage per day of twelve hours, 200 ft. high. As to coal consumption, twenty days' working at various levels showed a cost of 4d. per thousand gallons, taking coal at 11s. per ton on the works. Two days' consumption of coal working to the highest lift, showed a cost of 7-16ths of a penny per 1,000 gallons. The new machinery was designed and executed by Messrs. Hayward Tyler, Howard, & Co., of London and Luton, the contract sum being 2,760l., which, with a few extras, will possibly bring the amount in round figures to 3,000l. The results of the working from May 21 to the present time have been very satisfactory.



Pulpit, Huish Episcopi, Somerset.



...now disposes of its entire sewage with-  
an outlet to the river. The dry-weather  
of sewage in twenty-four hours is 820,521  
tons. In wet weather it is more than double.  
The old engines required will raise 800,000  
gallons in twelve hours. With them and the  
new plant we can lift 2½ million gallons in  
five hours. The town water supply equals  
1,000 gallons per day. A few months ago  
there were over 2,000 cubic yards of sludge  
at the pumping station. It has all been  
moved to the neighbouring farms, and the  
sludge is now daily pumped with the sewage to  
new farm a mile distant. At the request of  
Town Council, the whole of this work was  
signed and carried out by himself (Mr. Leete),  
excepting the machinery, the design for  
which was the result of a competition. The  
engine-house, boiler-house, shaft, &c., cost  
£31. We have been able to keep within the  
estimate (20,000), and so far the result has  
been quite satisfactory. The Association may  
be viewed more scientific work as regards  
construction of the tanks and conduits,  
larger outlay was avoided on account of  
distance of the farm from the town and the  
fact, particularly as we have a splendid chalk  
deposit of a possible depth (as has been stated by  
geologists) of 300 or more feet.

The President (Mr. J. Gordon, of Leicester)  
read remarks from the Mayor and Major  
Leete, whom he described as the High Police  
Commissioner of the River Lea.

The Mayor briefly referred to the favourable  
circumstances which had attended the carrying  
out of the scheme by Mr. Leete, and the experi-  
enced service rendered by Alderman Higgins  
and others.

Major Flower said that from much experi-  
ence he had come to the conclusion that land  
was the only absolute purifier of sewage matter  
as to render it fit to be discharged into a  
river from which people draw their drinking-  
water. He had great respect for many  
chemical processes, and they would meet the  
needs of some places, while being totally inade-  
quate in others. At Luton for a time chemical  
treatment supplemented by filtration on a small  
plot of land sufficed, but ultimately the sewage

became so loaded with chemicals and dyeing  
refuse as to render it exceedingly difficult of  
treatment; and chemical processes, which  
might be sufficient in other towns, had no effect  
whatever upon it. He felt that he should  
hardly be doing his duty as an official if he did  
not say how pleased those whom he had the  
honour to serve were with the honourable and  
thoroughly English way in which Luton had  
met the necessities of its position.

The party then drove in carriages to the  
sewage works, where they inspected the  
machinery and arrangements. They then pro-  
ceeded to the farm and inspected the irrigation  
scheme, which was highly commended for its  
simplicity and effectiveness. A visit was then  
paid to the waterworks, for the inspection of  
the engine and pumps, which were highly  
approved. On returning the visitors were  
shown over the factory of Messrs. Carruthers  
Brothers, and witnessed the various processes  
of manufacturing straw and felt bonnets and  
hats. It had been intended to inspect the dye  
works of Messrs. T. Lye & Son, but time did  
not allow of it.

On returning to the Council-chamber the  
visitors and members of the Corporation were  
entertained at luncheon by the Mayor.

**Roman Frescoes purchased by Germany.**  
The famous frescoes in the Casa Bartholdi in  
Rome, by Cornelius, Overbeck, Schadow, and  
Veit, representing the history of Joseph,  
which were purchased some time ago by the  
National Museum of Berlin, are now being  
taken out of the walls by Professor Bandini  
prior to their despatch to Berlin.

**Restoration of the Cathedral of Upsala.**  
The restoration of the Cathedral of Upsala,  
the oldest edifice of this kind in Sweden, which has  
been in progress for some years, is nearing  
completion. The work, which involves the re-  
building of the principal tower, destroyed by  
fire many years ago, is being carried out under  
the supervision of Herr F. Langlet, architect to  
the Swedish Government, and a sum of 10,000l.  
has already been expended thereon.

**PULPIT, HUISH EPISCOPI, SOMERSET.**

This is an interesting example of Decorative  
work of the early part of the seventeenth  
century. Some of the ornament is very good  
of its kind, and the general effect is rich; but  
the curiously entomological appearance of the  
reversed feature shown in the upper band of  
the detail drawings is certainly not to be  
commended; the lower portion looks more like  
the body and hind legs of a beetle than like  
any form derived from vegetation, and the  
curves of the different portions do not  
harmonise with each other. The other bands  
of ornamental design are much better in this  
respect.

**THE ARCHITECTURAL ASSOCIATION.**

The second meeting of this Association for  
the present Session was held on the 4th inst. in  
the meeting-room of the Royal Institute of  
British Architects, Mr. John Slater, B.A. (Presi-  
dent), in the chair.

The following seventy new members were  
elected, viz.:-

Messrs. G. S. Fleetwood, A. C. Williams, A. H. Knott,  
P. D. Smith, J. R. Cloniss, A. H. Moore, P. A. Grinstead,  
E. R. Sequeira, E. D. Webb, A. C. Walker, J. Peter,  
G. H. Fox, T. P. Simpson, J. Gehlin, F. A. Hundley,  
C. Cordery, W. H. Brooks, E. Carless, A. T. Pope, E.  
C. Bailey, E. Carter, C. E. Gray, A. P. Cocks, C. H.  
Strange, W. H. Winder, W. M. Paton, E. Archer, E.  
Scorff, P. L. Waterhouse, E. G. Angel, O. Costal, Ernest  
H. Selby, J. E. Jefferson, A. Gladding, H. G. Robins, F.  
J. Waller, A. C. Henderson, J. F. Parker, H. Rice, F. H.  
Greenaway, H. N. Smith, G. W. Johnson, E. W. Wonnacott,  
F. T. White, H. B. Young, J. T. Masters, J. G. Whyte,  
G. L. Orme, H. W. R. Sheffield, C. H. Cheston, A. Field,  
A. E. Jackson, F. T. Davis, C. W. Riches, T. P. Clarkson,  
A. T. Griffith, S. F. Bartlett, A. E. Halsebrook, H. A.  
Green, P. G. Esde, W. G. Ingram, O. A. B. Smith, W.  
J. Roome, A. M. Wakley, J. Angold, D. Gibson, F. E.  
Hollinworth, E. H. Hill, R. B. Lindsey, and A. T.  
Wainman.

Mr. P. J. Marvin was next elected to fill the  
vacancy on the Committee caused by the  
resignation of Mr. Dawber.

Mr. J. C. L. Sparkes next read a paper on  
"Architectural Modelling," which we printed  
last week (p. 665).

In the course of the discussion which fol-  
lowed,



Mr. Lawrence Harvey said that this year he had had a conversation with Professor Lasius, of Zurich, who considered modelling to be a very important subject for architects. The reason was that the sculpture on a building was part of the design, and could not be ignored. If, then, they did not understand modelling, another man brought in work which did not harmonise with the design of the architect. Another important thing, not only in the matter of modelling, but also with regard to carving, was that a totally different design had to be made, according to the material. Mr. Sparkes had mentioned the fact that marble could not be imitated in clay, nor could a marble design be carried out in Bath stone. The ornament must be different, and allowance must be made for thick instead of thin arrises. He might refer to a new invention of wood carving for doors. There was first the panel, on which woods of different colours were glued, the ornaments being carved out of the masses of wood. That got over one of the great difficulties in wood-carving, in working the background even. Mr. Sparkes had referred to colour, but what was colour in sculpture? They had to learn what colour in architecture was without paint being put on. Colour meant the difference of treatment of surface so as, by contrast, to bring up one surface above another. He would quote a case to show what Mr. Sparkes meant. He remembered seeing M. Guillaume carving a bust of the Archbishop of Paris, who was murdered by the Communists. M. Guillaume said he was carving the bust as a study of colour. On being asked what he meant, M. Guillaume explained that the Archbishop's face was of the most refined and intellectual character, and full of delicate lines. To bring out those he had treated the nose perfectly plain so as to have the polished surface contrasting with the delicate work of the face. That was what was meant by colour, and it was the same in every art,—the contrast between light and shade, between seriousness and liveliness; and as sculpture was one of the great means of getting that colour, it was perfectly indispensable for an artistic architect to study sculpture and carving.

Mr. Leonard Stokes said he agreed with Mr. Sparkes that modelling was very necessary to the architect, as he was expected to do a great many things other people could not do. For instance, he had to see round a corner, and unless he was able to model in his mind he could never realise what his building would be like. So long as architects could only grasp one elevation at a time their buildings would not be as satisfactory as if they were able to grasp the block or modelled mass in their minds. To be able to model detail was no doubt very useful, but more attention should be paid to form in masses, and perhaps less, although these, too, were very important in their proper place,—to small matters such as panels. He agreed as to the necessity of the architect being able to show a modeller how a thing should be done, although the modeller might not always like it. Mr. Stokes concluded by proposing a vote of thanks to Mr. Sparkes.

Mr. H. D. Appleton inquired whether Mr. Sparkes had had any architectural students in his schools, and, if so, what amount of success they had achieved? It seemed to him that if architects were to be artists, and be capable of doing all the work they had to superintend, the life of an architect would not be worth living. He seconded the vote of thanks.

Mr. Frank Jones asked Mr. Sparkes whether he preferred modelling to seeing the building in perspective? He did not quite understand, too, whether Mr. Sparkes wished a model to be made of the whole building, or merely of some of the ornamental detail, of which they might get an idea if it were drawn out full size.

Mr. E. Swinfen Harris remarked that if architects wished to make sure that their buildings would be effective in appearance of outline, there was nothing so excellent as modelling them as a whole. In support of that, he might mention the buildings of Mr. George Devey, which were the results of models made to scale in wood. If the detail was to be beautiful, so should be the building as a whole. Nothing, therefore, was so important to the members of the architectural profession as to understand the modelling of their buildings to a relative scale, so that they might form an idea of the effect produced before all attempts to improve it were too late.

Mr. W. H. Atkin Berry, as an old pupil of Mr. Sparkes, supported the vote of thanks.

Mr. H. W. Pratt said that the subject of modelling was a very interesting one, and no doubt architects did not see their details carried out in plaster and modelled before being executed as much as they might do. The old question of expense had a great deal to do with that. If modelling were taught in secondary or technical schools they might be tempted to go in for a little too much ornament. No doubt the extent to which modelling might be carried would be an inducement to apply plaster ornament to wood backgrounds, and so on,—a species of ornament requiring to be used with the utmost care. Much of that kind of thing was to be seen now-a-days in chimneypieces of wood with considerable ornamentation by the application of plaster, which, he considered, was a wrong application of the principle of modelling. With regard to carving in marble, stone, or wood, how did Mr. Sparkes propose that the modeller should go to work in order to produce what was required in those different materials? Modelling in plaster would not give the effects of marble or stone. He could understand in large work or in moulded work, where they had not an opportunity of judging the effect at great heights, or certain positions, proper models made beforehand might be of use. But in the case of small work, well within the range of the eye, he did not see how plaster would give the effect of the particular material intended to be employed. As to sculpture, he supposed no one would place a piece of sculpture on a building without first having a cast made of it. With regard to ornament, the same man who made the model would not be the person who would carry out the work, and it would put the carver on a lower scale than if he produced it from his own brain, and carved it by his own hand.

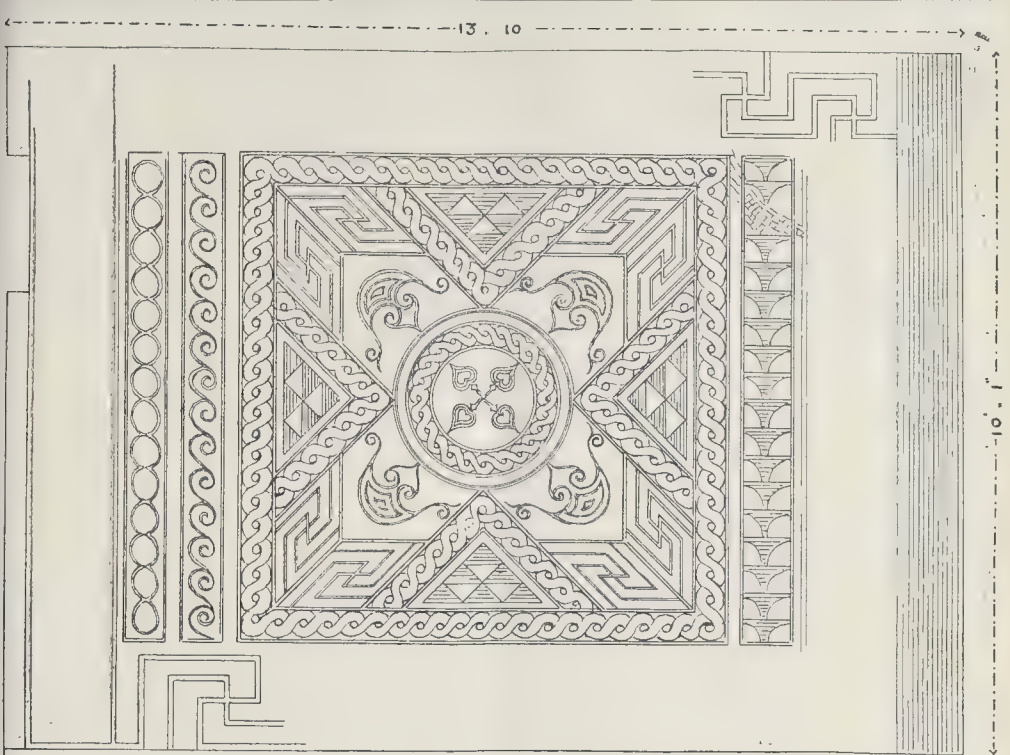
The Chairman said that Mr. Sparkes had referred very modestly to the Lambeth School of Art, but it was pretty well known that he had as much to do in raising the tone of artistic labour in Lambeth and Kennington as any man in London. It was curious how little attention was given in this country to matters connected with architectural education, which were considered of importance abroad. He believed that in the Ecole des Beaux Arts in Paris, as well as in almost every Continental and American Architectural School, modelling was one of the subjects young architects were compelled to study. And not only was modelling useful from an artistic point of view, in the arrangement of details, but it was also of extreme use constructionally. It was a matter of difficulty to tell if the roofs were all right from the drawings, and nothing could be more educational than for the student or office assistant to model his roofs in a piece of soap, or some similar substance. Every one, he supposed, would agree with what Mr. Sparkes had said about material. It had struck him, when listening to Mr. Harvey's remarks about wood, that he was advocating the use of that material in much the same way as plaster was used in sgraffito decoration, which was not a proper treatment for wood. Mr. Pratt supposed that no one would put sculpture upon a building unless he had casts made first, to show the effect; but they had only to walk through some of the London streets to see that such was not the case. Anything more incongruous than some of the huge pieces of masonry or plaster on London buildings could hardly be imagined. Something had been said as to Mr. Devey's success being due to the fact that his buildings were modelled in wood, but it must be remembered that he was very fortunate in his clients, and never at a loss for any money to be expended. A great many of their clients, on the contrary, would look askance if asked to pay for models of buildings they were having designed. Mr. Sparkes had made a remark about the City and Guilds of London Technical Institute, and the members of the Architectural Association felt strongly that they also owed a debt of gratitude for the way in which one of the rooms of that body had been placed at the disposal of the Class of Masonry. He believed he was not saying anything which was not known when he added that the same Institute was considering how in various other ways architectural education in London could be fostered and helped.

The vote of thanks was then put, and was very cordially received.

Mr. Sparkes, in replying, said his meaning

was not that the architect ought to make full models, so to speak, of his buildings. That, he took it, belonged to another work; nor did he think that the architect, with all the things he had to learn pressing on his time, would arrive at a great pitch of success as an original modeller. What he meant was that by the practice of modelling that higher sense should be stimulated which one perceived was moving the greater architects. He could not express that by any other means than that of colour. He well remembered his first impression on seeing the façade of the Cancelleria at Rome—it was a new vision, for the old well-known parts had been so arranged that they produced quite a new effect. One might take the archaeological view of ornament, and demonstrate what the Egyptians, Greeks, Romans, and every other nation had used, but that was not quite the thing he wanted to bring out. After all, the use of the several parts was a matter of detail, but the effect they produced was what he should like young architects to study. To demonstrate the use of a modelled elevation, Mr. Sparkes referred to Mr. Herkomer's new house at Bushey which, he said, was one of amateur plan, and a building for which an American architect had given an elevation. The plan was extraordinary, but one of his (the speaker's) students made a model of it; it was a very difficult thing to realise without a model, as the house was one which would make an architect's hair stand on end. At the same time, it was an artistic building, with an enormous amount of light and shade about it. Mr. Herkomer was really erecting his house from the inside outwards,—building first the furniture, and then a shell which eventually would be encased in the external apartments. With this in view a number of wood-carving machines were employed, driven by a gas engine, and these machines working a number of drills, were used by workmen in sinking the ground of the ornament, leaving the pattern a mere silhouette which was then carved. That was, no doubt, saving of labour, but it took away the character of a hand-worked ground. On the same principle he also objected to Mr. Harvey's advocacy of glazing layers of wood together, and then carving panels out of such layers as to secure uniformity of background. Why the very irregularity of the ground in hand work gave life, which a merely mechanical treatment took away. He had been asked to say how many architects he had had in his modelling classes. He did not know that he had any, and possibly that was the reason why he was addressing the Architectural Association (a laugh). The union of stone-carving and modelling had been a great success. The stone carver had a very limited outlook before him, and it was not likely he would trouble himself much about colour or the refinements of art, so he fell into the condition of unintelligent drudgery which was so common in this age of divided labour. But they had taken their men, and put before them a totally different ideal, by making them model from the finest forms. Such men, after a thorough technical knowledge of the treatment of stones of various textures, made most excellent designs. Mr. Harvey's remarks about M. Guillaume were to the point. The greatest sculptors worked for colour, and the balance of colour, and what was now done by the sculptor might be done by the skilful architect in his buildings if he knew the enormous capabilities of the material in proper distribution.

**The Sanitary Registration Bill.**—At the ordinary meeting of the Council of the Sanitary Assurance Association, 5, Argyll-place, Regent-street, on Monday last, Sir Joseph Fayrer, K.C.S.I., F.R.S., in the chair, the following resolution was unanimously passed, on the motion of Mr. H. Rutherford, seconded by Mr. Andrew Stirling:—"That the principle of the Sanitary Registration of Buildings Bill, viz., that the law should forbid any building being used for public or semi-public purposes unless and until the arrangements for water-supply, drainage, and ventilation of such building shall have been certified as satisfactory by some qualified person,—having been very widely approved, a determined effort ought to be made to pass the Bill into law during the next session, and in order to facilitate its progress in Parliament it will be desirable to introduce the measure in the House of Lords."



Pavement of North-East Room.

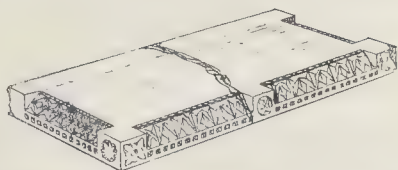
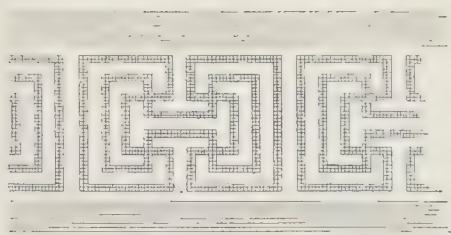


Table Stone.

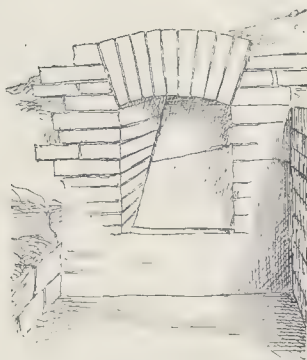
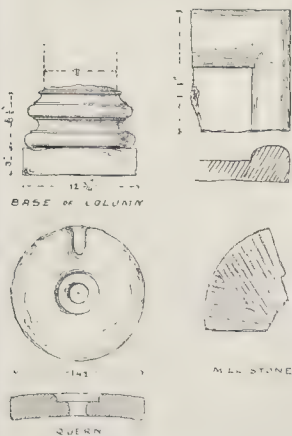


Mosaic Border from North-West Room.

# ROMAN REMAINS, TOCKINGTON, BRISTOL.

We give a few sketches taken from the remains of the Roman villa at Tockington Farm, near Bristol, for which we have not been able to find space hitherto. In the *Builder* for Oct. 22 last, our first article was devoted to a detailed description of the villa.

The illustrations here given include, as will be seen, the entire design of the pavement of one room, a mosaic border from another room, the arch of the hypocaust, and a few miscellaneous remains, illustrating a class of relics frequently found on the site of similar remains. The arch of the hypocaust is formed of the local lias stone, which splits readily into the apparently evenly-cut forms indicated.



ARCH OF HYPOCAUST



## Illustrations.

DESIGNS BY THE LATE W. BURGESS.

**T**HE designs for a pastoral staff, and for lanterns, by the late W. Burgess, are reproduced from the portfolio of photographs of his work brought out by Mr. Pullan, some remarks on which will be found in another column.

## RESTORATION OF ALL SAINTS CHURCH, ASHDON, ESSEX.

THE proposed work in connexion with the above consists not only of the rebuilding of walls, buttresses, windows, &c., as shown by hatched lines upon the plan given with our illustrations, but also of removing the lead from the roofs, thoroughly repairing and renewing the same, and re-covering the nave and chancel with tiles and the aisles with lead; taking up the present floors and removing the galleries, seating, &c., and laying wood-block flooring on concrete; removing old plaster; repairing the flint-work externally, and plaster internally, and also the stonework to windows, doors, &c., which is, unfortunately, of local "clunch," or chalk; removing the earth outside to below the floor-level, and furnishing a gutter round the building; a new oak pulpit; reseating in oak, with oak screens to form vestries and to the tower archway, &c.

Want of funds has prevented the promoters doing more than a small portion of this work. An oak pulpit, executed from the designs of the architect, Mr. John W. Alexander, of Middlesbrough, by Messrs. Rattée & Kett, of Cambridge, has been placed in the church in memory of the late rector, and the re-roofing and reseating of the church has been partially carried out by Messrs. W. Bell & Sons, of Saffron Walden.

The fabric is of historic interest, as it is considered to be upon the site of a minster erected A.D. 1016 to commemorate the battle fought upon or near its site, between Edmund Ironsides and Cnut.

The Rector, the Rev. H. B. Swete, D.D., writes thus to the architect:—

"I have not had time to work out the history of our church and parish, my own studies lying another way. But I will put down what I have collected.

1. In *Domesday* (Essex D., p. cxli) the place is called *Assenduna*, and described as a domain held by Raif Baidard.

2. The Cotton MS., *Vesp. F. xv.*, which contains a number of documents connected with the Clunian Priory of St. Pancras, Lewes, has repeated references to the church and rectory of Ashdon (*Essenduna, Assenduna, Asshendun*). From these it appears that 'G. de Essenduna Miles' presented the benefice to the rector and monks of St. Pancras somewhere about the year 1200. Subsequent deeds seem clearly to identify the 'Knights of Essendun' with the Baginard family.

3. The chroniclers describe the battle fought A.D. 1016 between Edmund Ironsides and Cnut at a place in Essex called *Assandun*. They add that on the site of the battle Cnut raised a minster, and that he endowed priests to sing for the souls of the slain. This minster was dedicated in 1020 by Archbishop Wulston of York, in the presence of Cnut and a great company of earls and bishops. But within a century it had given place to a small church under the charge of a parish priest.

4. Although Professor Freeman asserts the contrary, the weight of the evidence is in favour of identifying *Assenduna* or Ashdon with Cnut's *Assandun*. I have taken the trouble to go to Ashdon, the other claimant for this honour, and have sifted Professor Freeman's note on the spot. Both ancient spellings and topographical considerations point to Ashdon, Bartlow Hills, of course, had nothing to do with the battle. But the field below the church is full of apparent earthworks; graves of Scandinavian origin have been found in it, and a great mound at the foot of the field consists of cartloads of organic remains mixed with lime, among the remains being large quantities of river shell-fish, presumably brought by the Danes from the Essex coast, and bones of oxen, the relics, I take it, of their last feast before the battle."

## ST. JOSEPH'S CATHOLIC CHURCH, SWANSEA.

THIS church, which is nearly completed, has been designed by Messrs. Pugin & Pugin. It consists of nave, aisles, chancel, two chapels at the chancel end, and one by the entrance to the church.

The nave is divided into seven bays, and is separated from the aisles by an arcading supporting the clerestory, which is pierced by three-light windows with tracery leads in each bay.

The west end is lighted by a four-light window with richly-tracery head. At the west end are two entrance-doors with tracery tympanums. There is a gallery supported by stone arches, and approached by a turret staircase, which forms one of the buttresses of the tower. The chapel at the west end is approached from the vestibule under the gallery. The baptistery is also approached from the vestibule, and is in the lower stage of the tower.

The tower and spire, which is not yet built, will rise to a height of 165 ft.

The aisles are lighted by triplet windows, with cusped heads in each bay. The respond of the nave arcading at the east end has been made sufficiently wide to admit of a small arch through which the priest can pass to enable him to administer the Holy Communion, the Communion-rail extending the whole width of the church.

The chancel is divided from the nave by a stone arch, 45 ft. in height. The mouldings of the arch die on a cap and shaft, supported by a canopied niche on each side, in which are placed figures of Our Lady and St. Joseph. The haunches of the arch are weighted by pinnacles, which rise to a height of 16 ft.

The roof of the nave is constructed with cross-braced principals supported on caps and shafts, the bases of which are corbelled out; in each principal is a carved rib; the roof itself is boarded, and divided into panels by moulded ribs.

The chancel is apsidal in form, having angle buttresses. It is lighted at the east end by a three-light window with tracery head. Over this window is a gable corbelled out and surmounted by a stone cross. The other bays of the chancel are lighted by two-light windows with tracery and cusped heads. The roof is similar in design to that of the nave, but richer in detail. The walls between the side chapels and the chancel are pierced with arches. There are rose-windows in the side chapels.

The total length of the church is 142 ft. inside, the width 56 ft., and the height 62 ft.

The sacristy, which adjoins the presbytery, is connected to the church by a cloister. The materials used are local stone for facing, with dressings of Bath stone, the latter being used throughout for the interior work, with the exception of the columns to the nave arcading, which are octagonal in form, and are of Dumfries stone built in courses.

The building is being carried out under the direction of Mr. Cruikshank, the clerk of works.

## CRICKET PAVILION, CHARTERHOUSE, GODALMING.

THE pavilion, which measures about 100 ft. by 20 ft., has been erected on the playground, and contains, on the ground-floor, shop, bakery, and brewery, dressing and club-rooms, umpire's room, and roller-shed.

In the centre, on the first floor, is a large room for cricket dinners and the use of visitors at athletic sports, &c. A platform with stepped seats is placed in the middle.

The building is of framed timber, burnetised, and filled with concrete of selenitic lime, and fastened to dwarf walls of selenitic concrete. The tiles are laid in concrete in the manner introduced by the architect, Mr. Ralph Nevill, F.S.A. Messrs. Tompsett & Kingham, of Farnham, were the builders.

The drawing was in the Royal Academy exhibition of this year.

## BINDON, DEVONSHIRE.

BINDON, near Axmouth, in Devonshire, must not be confused with Bindon in Dorsetshire. The Dorsetshire Bindon, which is near Wool, is celebrated for the ruins of its Cistercian abbey. The Devonshire Bindon consists of an old farmhouse, or grange, of which we give illustrations. It is very interesting as an example of one of the smaller manor-houses of the Middle Ages. The building itself is erected in the shape of the letter L, the perpendicular having two roofs, with a valley between, and the horizontal a gabled roof and a "lean-to." There is a forecourt, enclosed by stone walls, and entered by a semicircular arched gateway just at the angle of the two lines of the L, and facing into this court is the principal entrance of the house, consisting of a gabled porch, which appears to have been a subsequent addition, probably of Elizabeth's time. Entering by the porch, to the left is the hall, now used as a kitchen, and

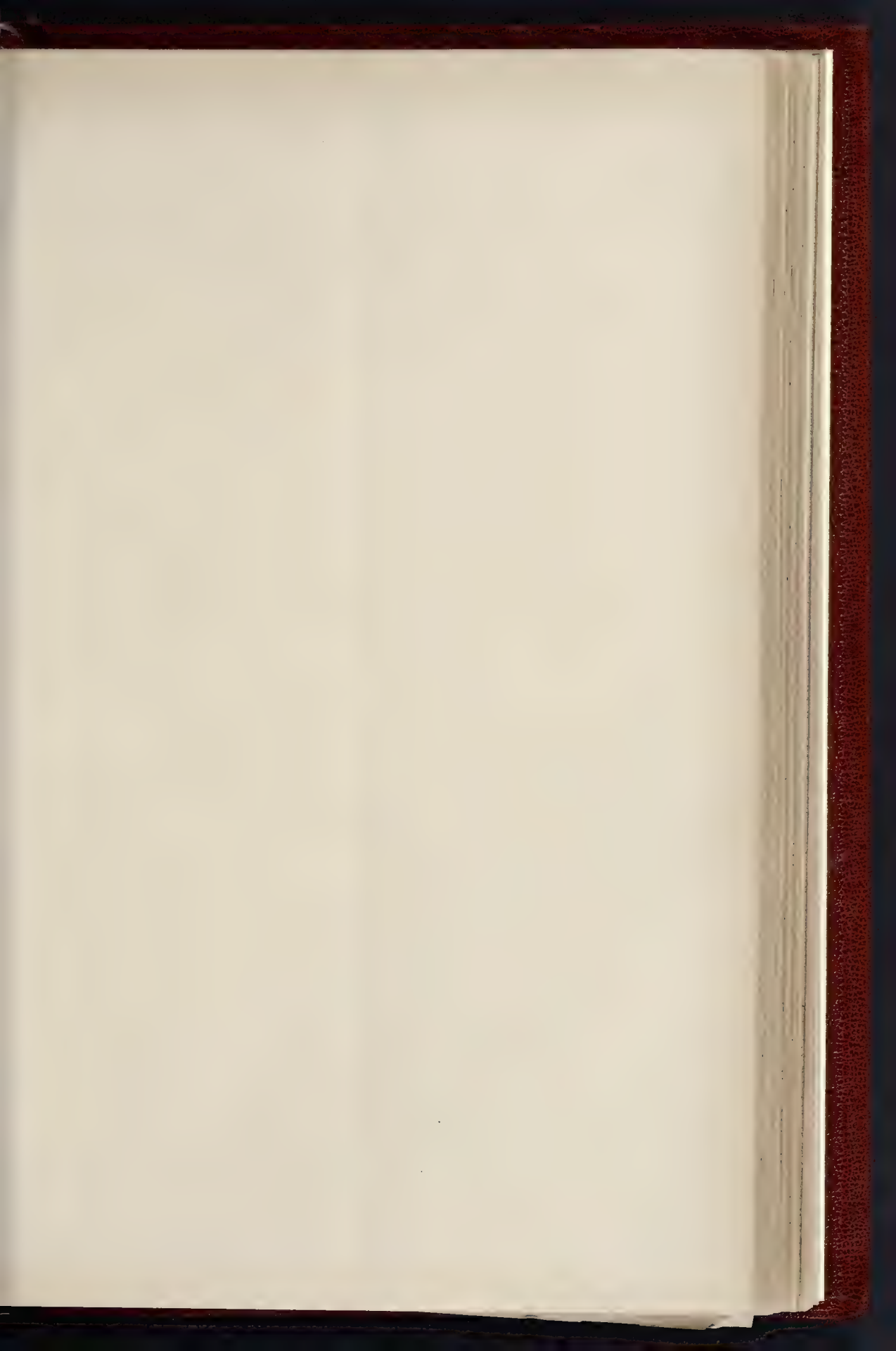
very much modernised. It is, however, separated from the entrance-passage by a very pretty Early Perpendicular screen, similar in design to that of the chapel, shown in our illustration. Turning to the right, one enters the principal parlour, which, unfortunately, has been papered, but still retains its old carved stone chimney-piece, and is lighted by two three-light Perpendicular windows, which are shown externally in our view from the garden. The staircase has been altered at the same time that the porch was built, but the principal landing is in its old condition, and is extremely interesting. It has a finely-moulded ceiling, and a screen separating it from a very curious little domestic chapel; the great peculiarity is that this screen, instead of running north and south, runs east and west, and has a doorway with a finely-pannelled oak door close to its western end. The screen was formerly open, but has been boarded up internally, and the chapel is now converted into a bedroom; it receives light from a large three-light Perpendicular window (now partly blocked up) on the south side. The exterior of this window is shown in our view from the garden, and the interior of it in our sketch of the landing and chapel. A very rich and beautiful niche, with the remains of a piscina under it, is to be seen in the easternmost jamb of the window. The exact date of this chapel can be fortunately ascertained, as there exists at Exeter a licence granted by Bishop Lacy to Roger Wyke in 1425, permitting him to have Mass said in this chapel. Several of the rooms, and especially the offices in the south wing, are in their original condition. They are plain almost to rudeness, but very picturesque. We were told that about thirty years ago there existed a kind of tower or heavy stone building attached to this house, which went by the name of the jail, which was pulled down; and it is not improbable that this may have been the remains of a still earlier house, especially as some proportion of the walling and a little square-headed trefoil window near the porch also look like portions of some earlier structure. Bindon is, or was, at any rate, a short time back, for sale, and it is much to be desired that it may fall into the hands of some one who will see to its preservation, as fifteenth-century manor-houses containing chapels are by no means common in England, and it is a remarkably interesting specimen.

## PRIORY OF ST. LEONARD, STAMFORD.

THE illustration represents the west front of this highly-interesting priory, which was built in the eleventh century, by William the Conqueror and Carleph, Bishop of Durham, upon the site of a monastery founded in the middle of the seventh century by Wilfred, tutor of Prince Alfrid. Here, we are told, lie the remains of Henry of Stamford, prior of Finchale, who was buried in 1320, and "after his interment a light like a sunbeam was seen shining upon his grave." The building, as now seen, was carefully restored by the late Marquis of Exeter, and consists of the west end of the nave, with five bays of the north arcade, and part of the clearstory. Only the two easternmost bays of the arcade can be said to be of the time of Carleph, as the details of the succeeding style gradually show themselves in the remaining bays, and are fully developed in the west front, which is a fine example of Transitional work. A. D. W.

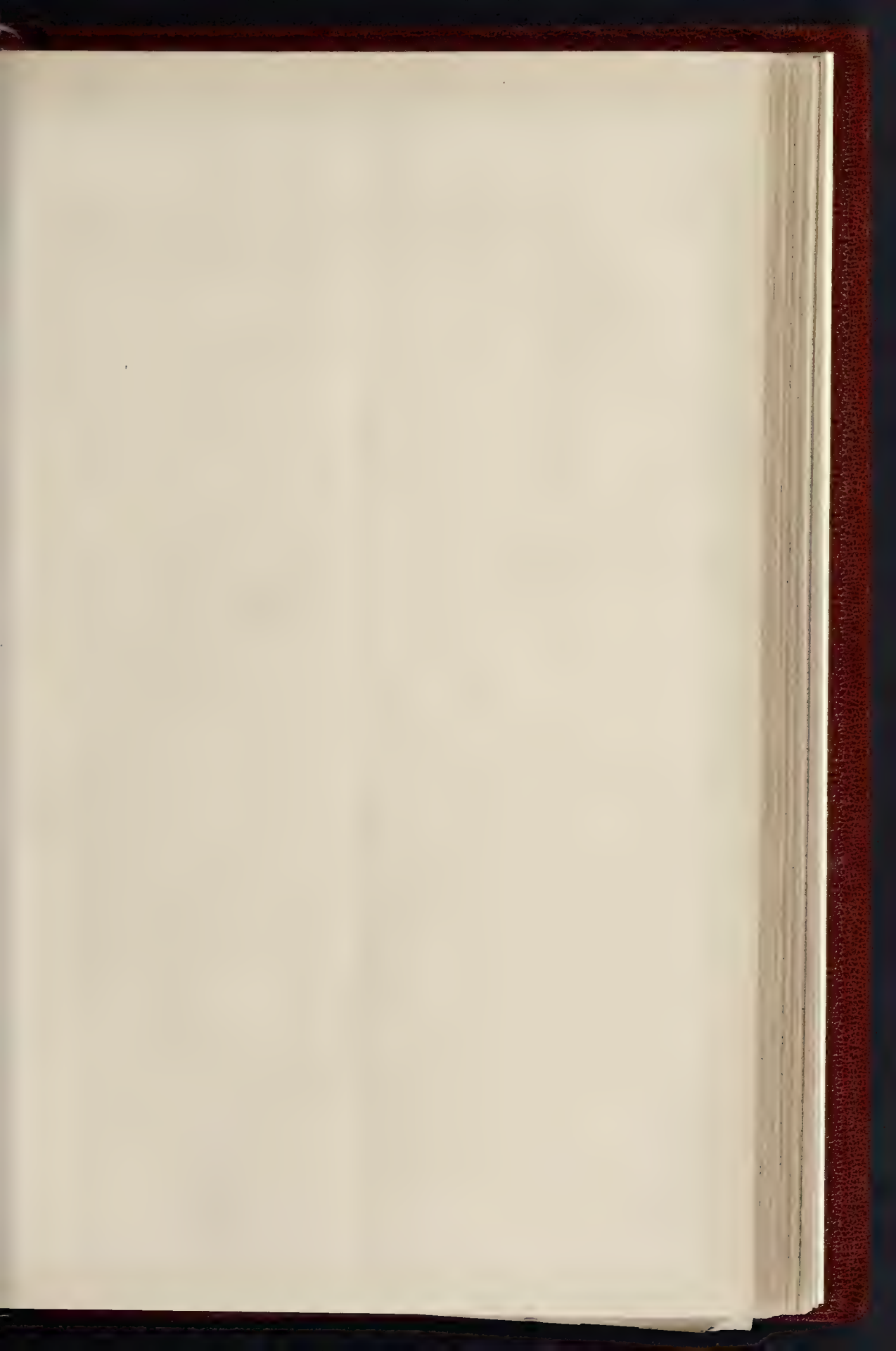
**The Lenham Chimes.**—The old chimes in the tower of the parish church were started last week, after remaining silent for eight or ten years. The machinery, which had fallen into bad repair, has been restored and repaired, and nine tunes added as a Jubilee memorial, contributed by the inhabitants of Lenham. The whole of the work has been carried out by the well-known firm of Lund & Bockley, clock and carillon manufacturers, of Pall Mall, London. The same firm, we believe, has just erected a full quarter turret clock in the parish church of Birchington, Kent, as a Jubilee memorial.

**The Oder-Spree Canal.**—The canal now in course of construction between the rivers Oder and Spree, in Germany, will be 85 kilometres in length, and cost, it is estimated, about 630,000. The work on it, which was begun in October, 1886, will, it is expected, be finished in 1889. The canal will probably become an important agent in the commerce of Northern Germany.



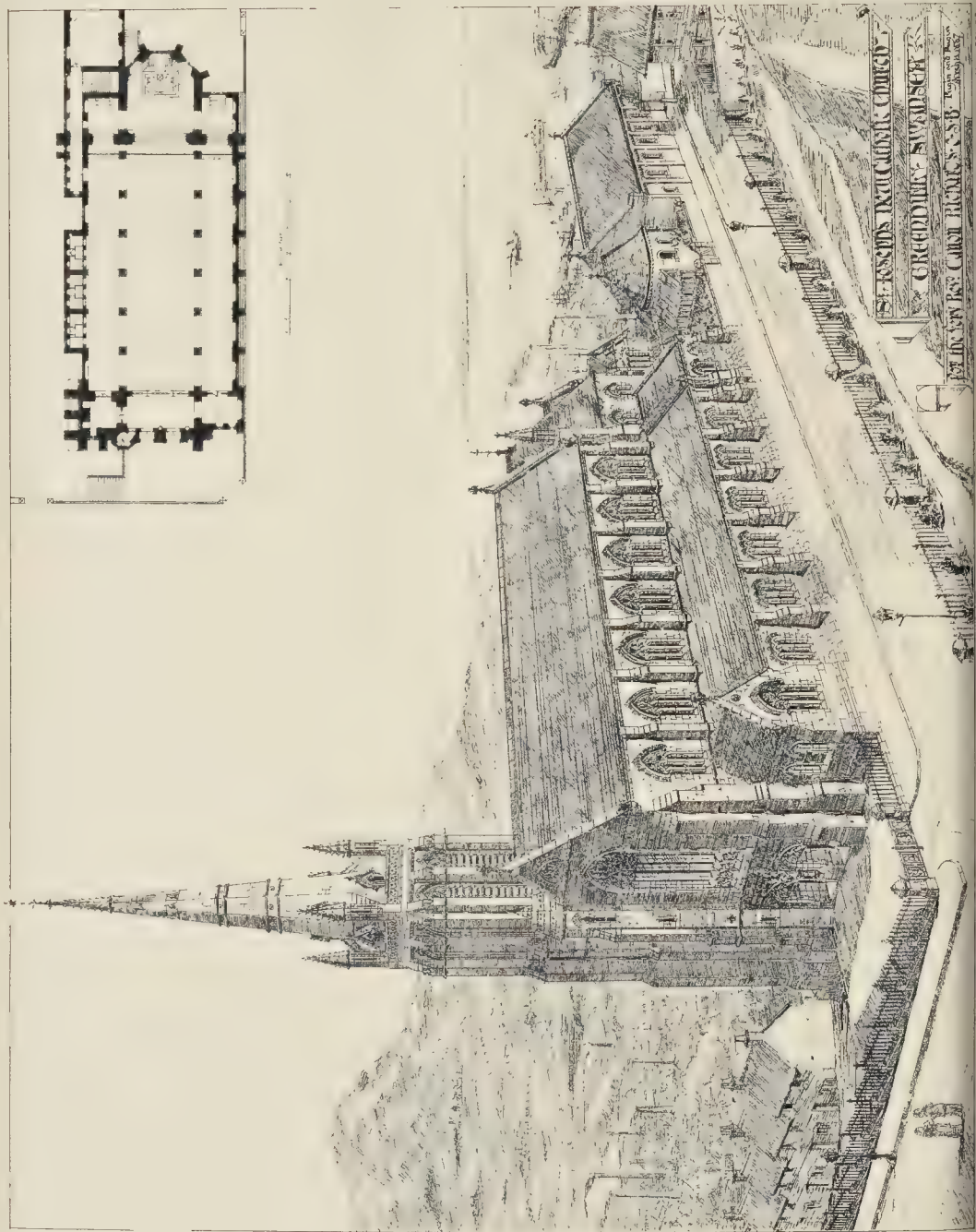


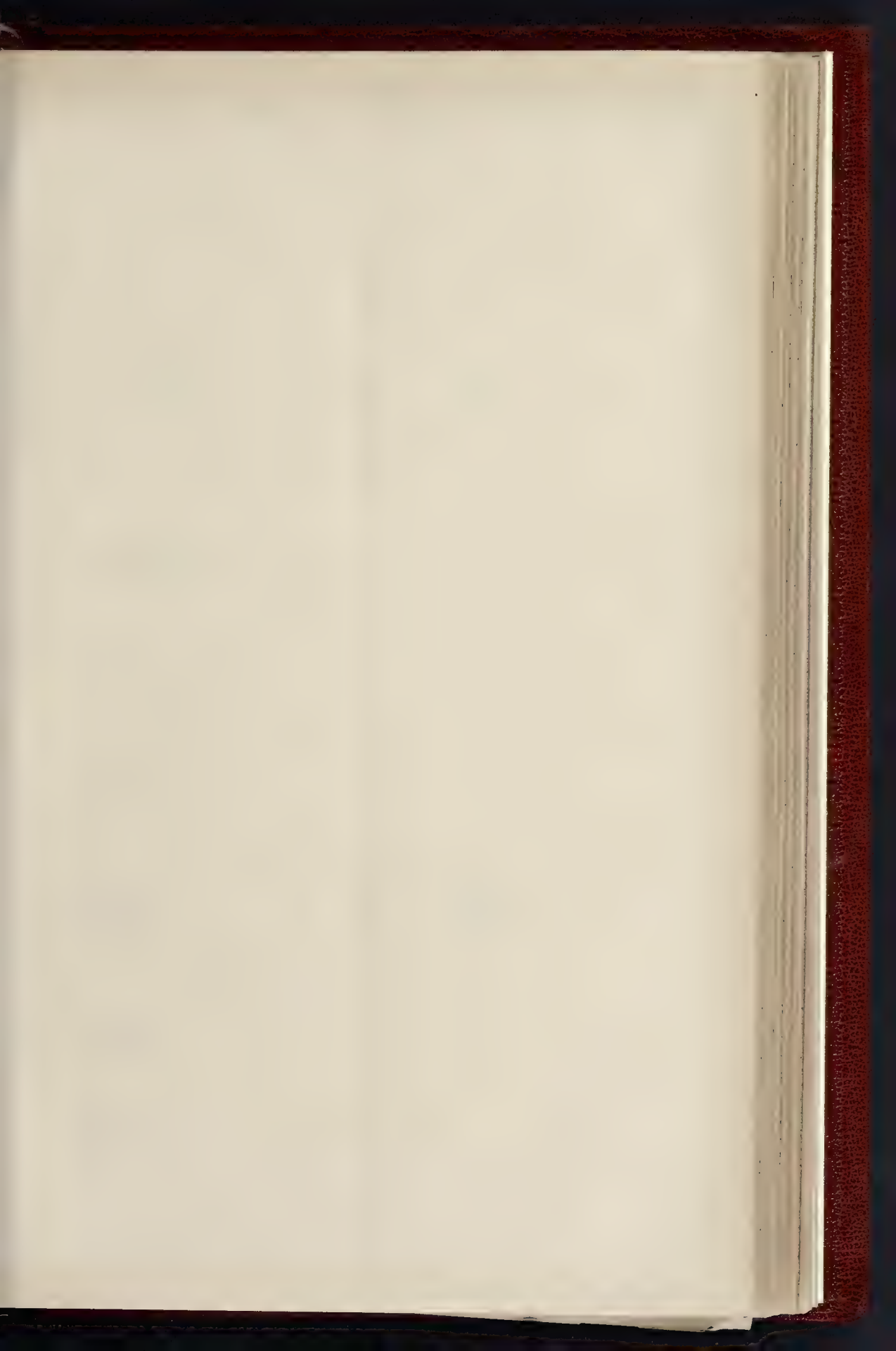






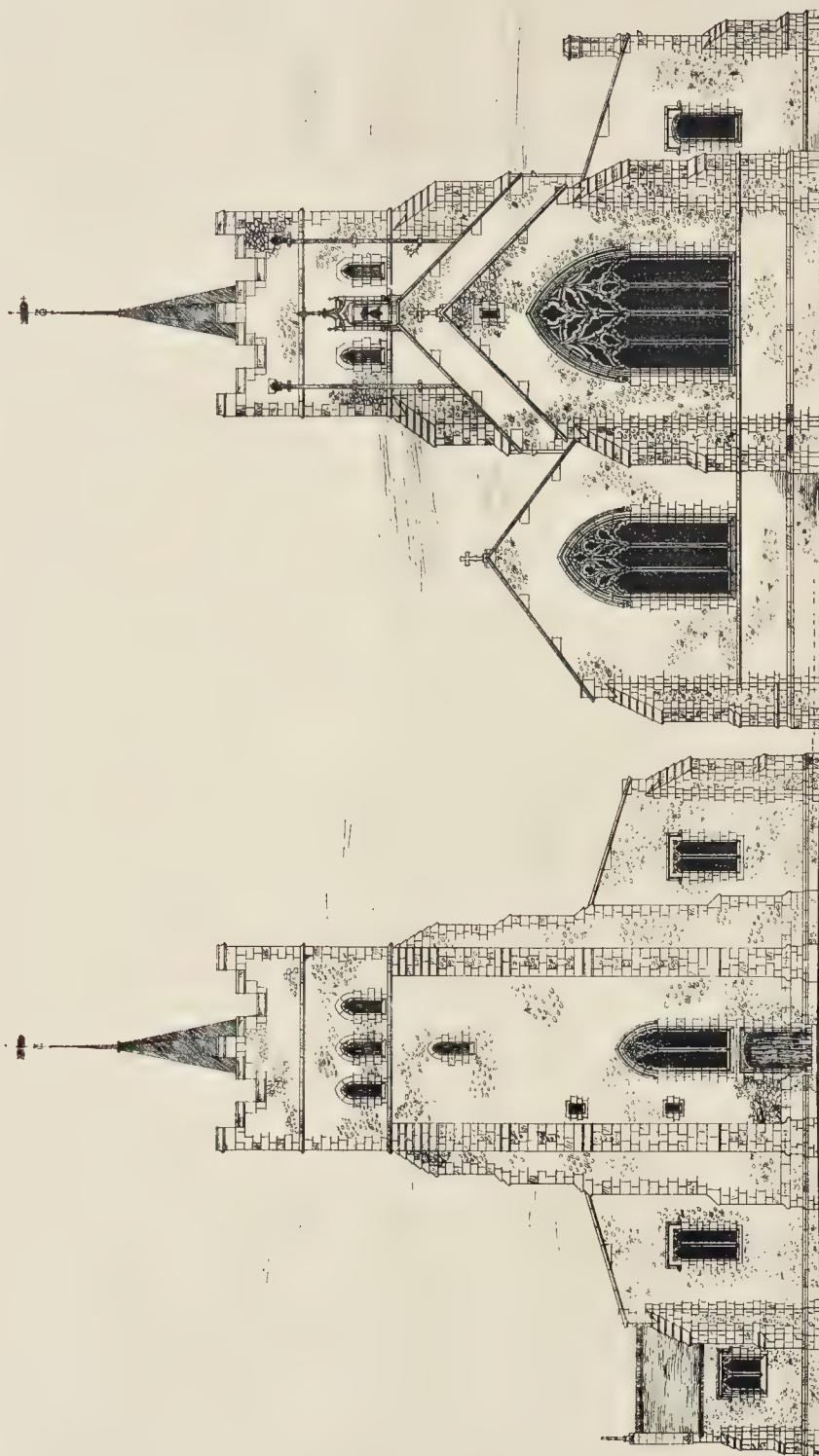
THE BUILDER, NOVEMBER, 19, 1887.







THE BUILDER, NOVEMBER 19, 1897.



EAST ELEVATION

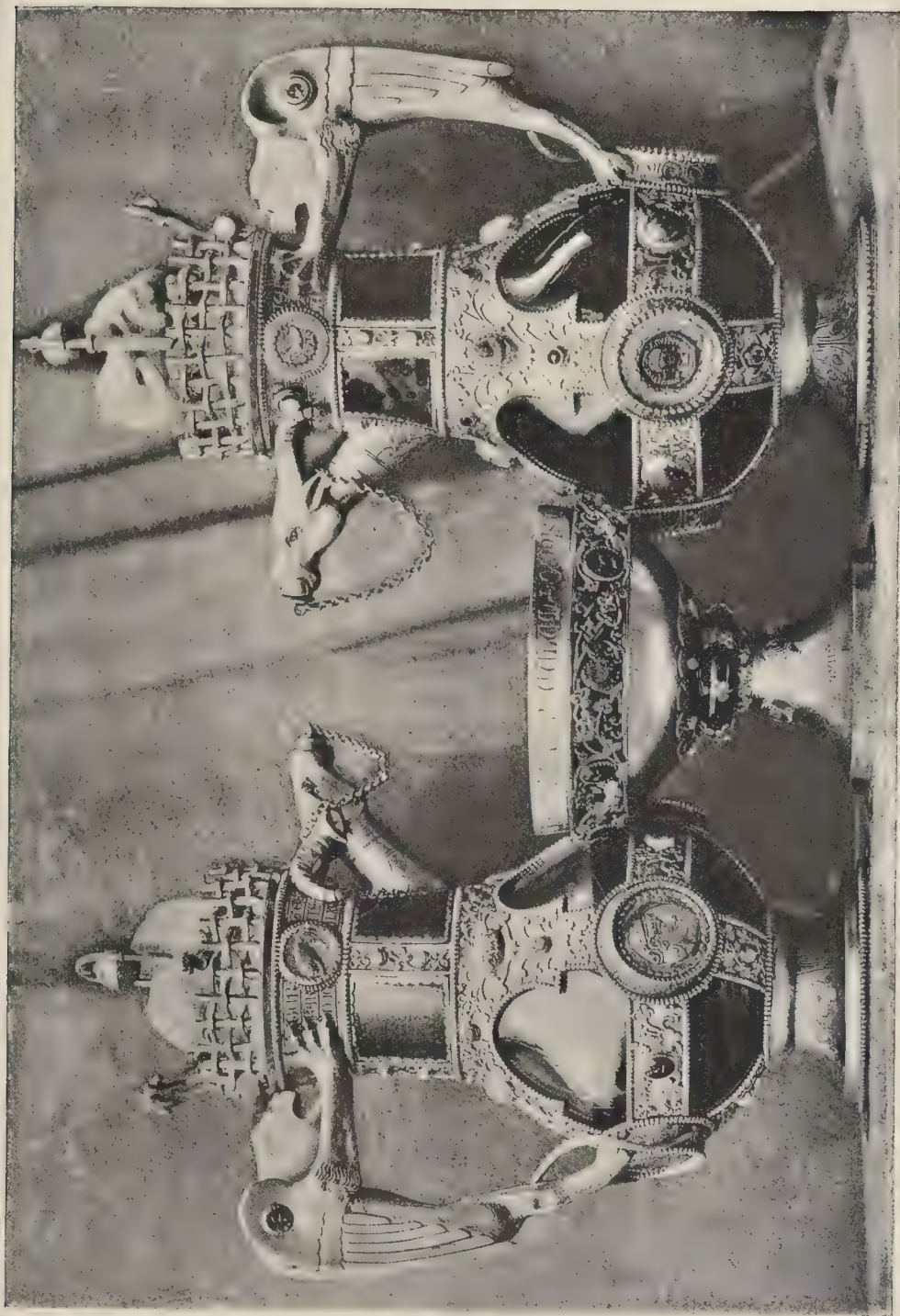
WEST ELEVATION







PASTORAL STAFF. DESIGNED BY THE LATE W. BURGESS.



DECANTERS AND DRINKING CUP. DESIGNED BY THE LATE W. BURGESS

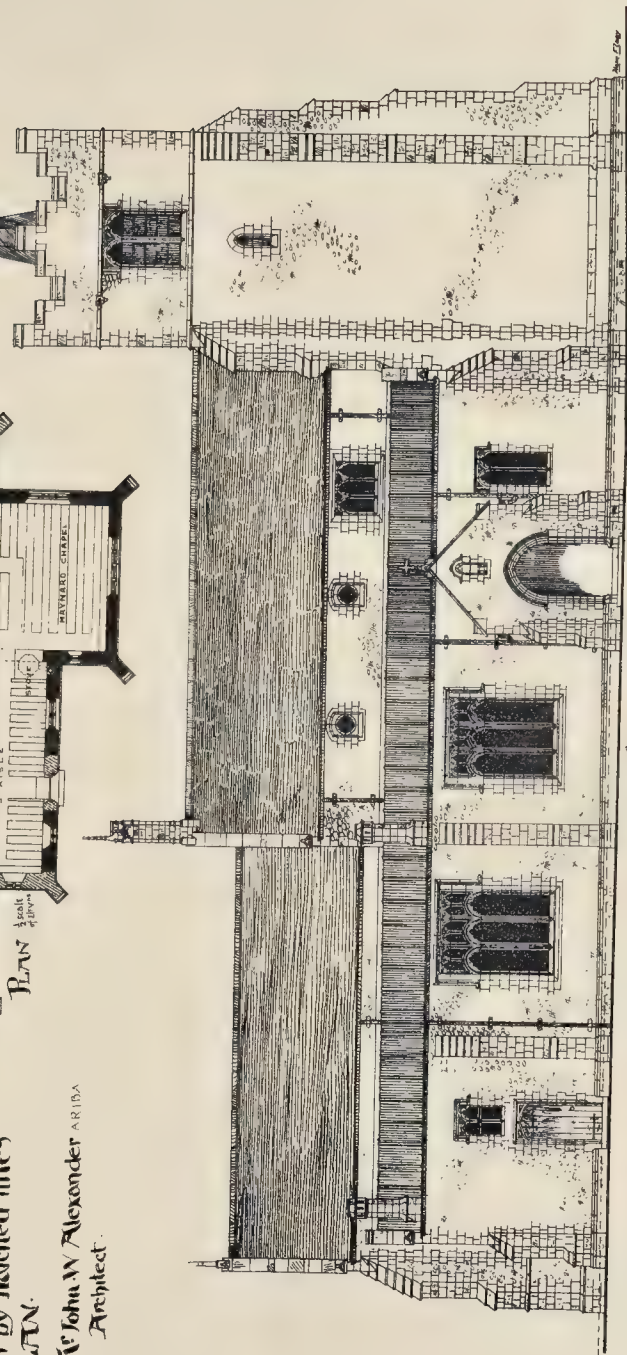
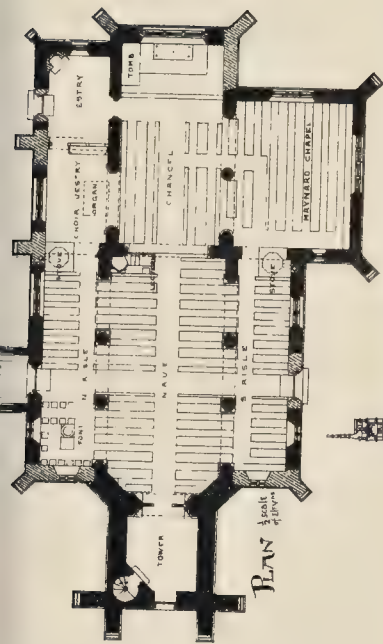




# ALL SAINTS CHURCH -ASHDON-ESSEX-

Proposed Restorations  
shown by hatched lines  
on PLAN.

Mr John W Alexander ARCHA  
Architect.



NORTH ELEVATION



F. Kell Photo. Ltd. & Print.

8 Castle St. Holborn London, E.C.





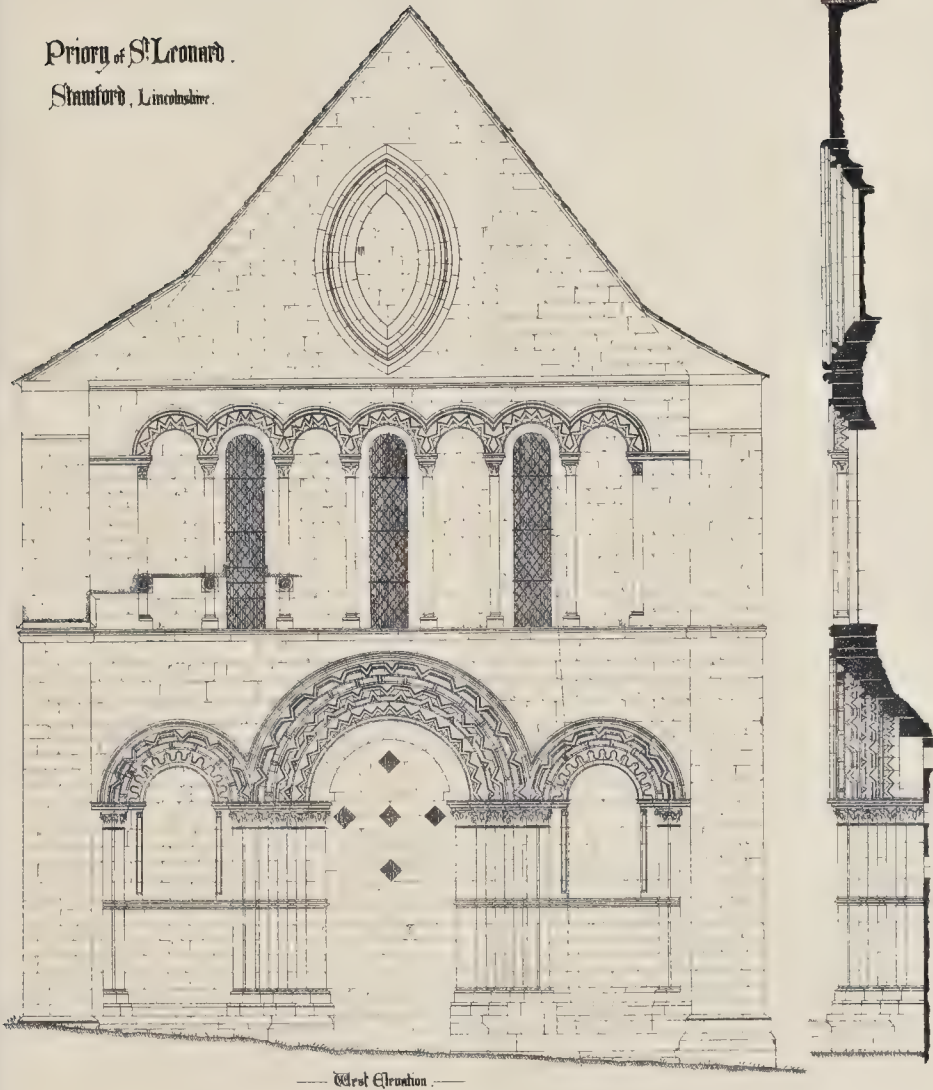


CHARTERHOUSE CRICKET PAVILION, GODALMING.—MR R. NAVILL, F.R.I.B.A., ARCHITECT





Priory of St Leonard.  
Stamford, Lincolnshire.

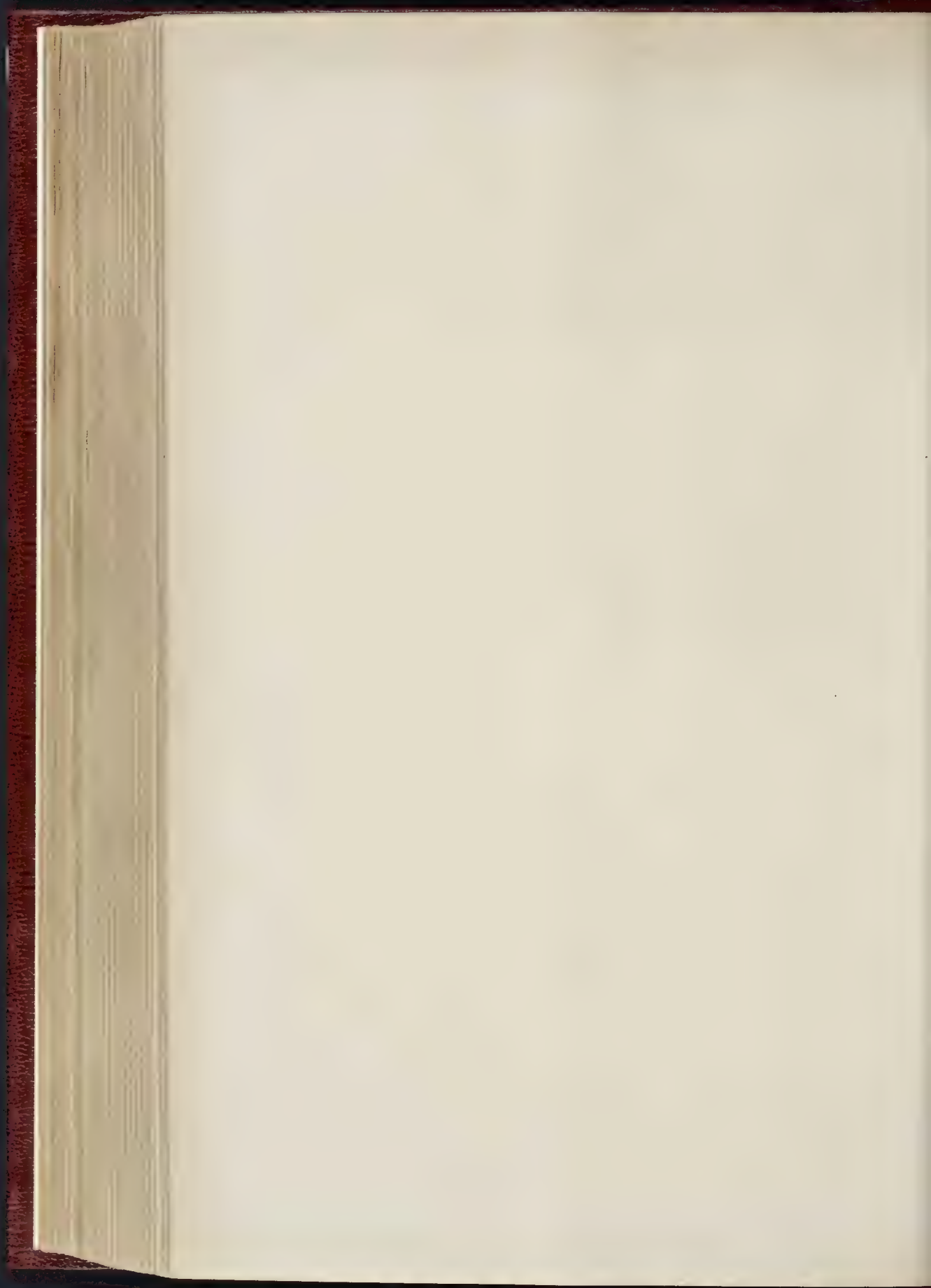


West Elevation.



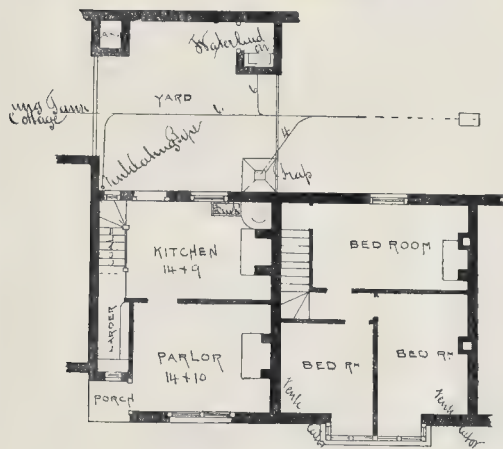
Measured Draw by H. B. Smith  
Nov. 1887







New Cottages, Red Lion Row, Windsor.



Plan of Cottages, Red Lion Row, Windsor.

IMPROVEMENTS AT WINDSOR.

We publish an illustration of some new cottages for the poorer class of inhabitants, which have recently been erected in the Bier-lane district of Windsor. They have been built by Mr. Richardson-Gardner, M.P., on the old site of Red Lion-row, from the design of Mr. Stephen Wyborn, architect, Windsor. From a sanitary and structural point of view these cottages are said to be satisfactory; and they are, moreover, let at a rental which brings them well within the reach of all. The *Builder* so long ago as 1871 condemned the Bier-lane district of Windsor; since which the whole of the old streets and alleys which disfigure and demoralise the Royal borough have been pronounced by

the Inspectors of the Local Government Board in their report of last January to be "still pitifully bad." The Rev. Arthur Robins, the Rector of the parish in which Bier-lane is situated, has long struggled, unsupported by those in Windsor who should have been the first to give him their moral and material support, to get human homes for the Windsor poor and to aid him in continuing the work of rescue originated in the town by the late Prince Consort. He has, however, never ceased until at last the reconstruction of the homes of the Windsor poor has begun; and, though the buildings are not of architectural interest in one sense, we are glad to publish an illustration of them as a memorial of the com-

mencement of an improvement long called for, and to which we have given whatever support was in our power.

SEWER VENTILATION.

At a recent meeting of the Wimbledon Local Board the following important report on sewer ventilation was presented to them by their Engineer, Mr. W. Santo Crimp, Assoc.-Mem. Inst. C.E., a memorial having been presented to the Board on the subject:—

The persons signing the memorial reside in all parts of the district, south of the railway; the complaints are, therefore, of a general rather than of a particular nature.

By far the larger proportion of the sewers in the entire district fulfil the conditions of perfect sewers, i.e., they have gradients sufficiently steep to render them self-cleansing, are thoroughly ventilated, and are frequently flushed. As it is proved by the memorialists that the emission of foul smells is of constant and general occurrence, the obvious conclusion is that the system of ventilation at the street level is an obnoxious one. In my opinion some other method should be adopted.

In experimenting on the Thornton Hill sewer, during the past summer, some unexpected and striking results were obtained. The sewer was trapped off the Worple-road outfall into which it discharges, and the syphon was provided with an air-pipe brought to the surface; the termination of the sewer, near the Ridgway, was furnished with a 6-in. pipe, to which a powerful fan was attached. All the known openings were closed, with the exception of the air-pipe at the foot of the hill, out of which the sewer air poured in a continuous stream. The fan was worked for some time and extracted large volumes of air, but all the time the air poured out at the foot of the hill in undiminished quantity. On trying the openings nearer the fan the air poured out of these as soon as the covers were removed, and at the nearest man-hole to the fan, distant about 400 ft., the air was not affected. The experiments prove how uncontrollable the gases are, and how useless shafts with furnaces would be. All through the summer the gases poured down the hills into the Worple-road outfall; in cold weather the gases travel up the hills: thus the difficulties of ventilation are increased.

It cannot be shown that the excessive ventilation of sewers,—which are too small for men to work in,—is necessary or of the smallest advantage if the gases can be disposed of elsewhere than at the street level; all that is required is that sufficient vent should be provided to render the admission of sewer air into our dwellings impossible. If houses are themselves properly drained, this is accomplished, even where sewers are unventilated, since if the gases were forced through the disconnecting trap, they would pass up the vent-pipe of the house-drain. If vent-pipes be provided for each of the sewers, and if these pipes are placed in carefully-selected positions, the necessity for the street openings would cease, and they might be closed. I suggest that this course be adopted; it is the best method of dealing with the question, in my opinion. Ventilating lamp-posts are, as a rule, the cheapest, and may be used in a great many cases; in others, pipes should be carried up trees and houses. All the sewers in the district can be treated



in the manner suggested at a cost of about 500l. As I have successfully dealt with upwards of fifty offensively-smelling manholes during the past five years, by the means suggested, success may be said to be assured."

#### NEW BOARD SCHOOLS IN LONDON.

THE deposit of plans customary at the closing of the year is already made by the School Board for London. At their offices on the Victoria Embankment may be seen those which relate to the next forthcoming school supply for the metropolis. Neglecting, for the present, two alternative sites, we find that the Board's plans concern thirty-two sites either for new or the enlargement of existing schools, being for thirteen on the northern side and nineteen on the southern side of the Thames. The southern district includes the two large divisions of East Lambeth and West Lambeth. In West Lambeth ten new sites are scheduled, their area extending over an estimate of 215,195 ft. superficial. Other sites are distributed throughout certain divisions, as follows:—East Lambeth Division: St. Mary, Newington, and St. Giles, Camberwell, parishes, three. South-west Division: St. George-the-Martyr, St. Saviour, and Christchurch parishes, three. Greenwich Division: St. Giles, Camberwell, and Plumstead parishes, three. The West Lambeth sites lie in the parishes of Wandsworth, Tooting, Clapham, St. Mary Lambeth, St. George-the-Martyr, and Battersea. Chelsea Division: Fulham and Chelsea parishes, three; and Hammersmith, one, at Ellerslie-road, by Old Oak Farm, being about 72,780 square feet. Tower Hamlets Division: St. George-in-the-East and Mile End Old Town parishes, two. Hackney Division: Shoreditch, Hackney and Tottenham, and St. Matthew Bethnal Green, parishes, three. Finsbury Division: St. Mary Islington, and St. Luke's parishes, four. These areas, some of them being vacant spaces, make a grand total of nearly 755,000 feet superficial, or, say, 12½ acres, with a possible addition of rather more than 18,000 ft. having regard to the two alternative sites at Earlsfield, Wandsworth and Fulham. The figures show an increase over the estimates for last year, when a minimum of sixteen sites, equivalent to between 10 and 11 acres, were scheduled for appropriation by the Board.

#### INFRINGEMENT OF COPYRIGHT OF THE BUILDER.

COX AND ANOTHER v. PARDON AND OTHERS.

THIS action came on for trial before Mr. Justice Kekewich on the 11th inst. The plaintiffs, as the registered proprietors of the *Builder*, sought to restrain the defendants, Pardon & Sons, the printers, and the General Publishing Company, as publishers, of the *Brick, Tile, and Builders' Gazette*, from publishing and selling any number of that periodical containing any article, essay, note, or other matter copied or colourably altered from any article, essay, note, or other matter contained in the *Builder*.

Mr. W. Barber, Q.C., and Mr. Hadley appeared for the plaintiffs, and Mr. Henderson for the defendant Company. The defendants Pardon & Sons did not appear.

An interim injunction was, on the 16th of December, 1886, granted by Mr. Justice Stirling. It was alleged and admitted that the defendants copied *verbatim* several articles, essays, and notes from the *Builder* in infringement of the plaintiffs' copyright.

Mr. Justice Kekewich now made an order for a perpetual injunction, and ordered the defendants Pardon & Sons to pay 50l. damages and costs.

#### PICCADILLY CIRCUS.

SIR,—Would it not be well that this matter should be looked at in a broad way, without letting the existing lines of the buildings have undue influence? If a fine scheme were prepared, it could be carried out in parts,—perhaps realised in its completeness fifty years hence,—unless some public benefactors or unexpected windfall should hasten the process. Most of us are agreed that if a grand open space can be kept, it may be a success. It will, however, need to be shaped ruthlessly; the thoroughfares coming in at odd places and at varying angles would afford a splendid problem to any one, left free to settle for himself which are the essen-

tial, and which are the accidental, temporary features. The idea of a circus would probably disappear at an early stage, and most of the surrounding buildings would have new frontages before the place assumed a definite, monumental shape.

Are we, however, prepared to think of the matter otherwise than within very narrow limits? To leave things very much as they are,—to let the vacant bit of land against Shaftesbury Avenue to a speculator, and accept his view of the right design for a building which will pay,—to hoard round the two spaces in the centre of the place, and trust to something turning up to indicate a use to which they might be put,—would be following the accepted precedents,—not a very noble course, but a fairly safe one. Perhaps, however, middle courses may be worth considering still. These would, as I take it, involve the retention of the circus, and its completion in some sufficiently emphatic way. A building of less height than the existing buildings on the west side would fail to emphasise the circus form; the space would, with low buildings, be only a little less shapeless than at present. The vacant ground beyond the circumference of the circle might be liberally dealt with, not utilised to the last inch, but it would be necessary to use the larger portion of it in order to obtain a mass of building sufficiently powerful. Is the idea of continuing the street by archways under buildings,—an idea which some members of the Metropolitan Board of Works seem to have thought worth consideration,—to be put aside if the points to be aimed at are the retention and completion of the circus, and the penetration of the circumference of the new portion by the roadway? Such archways would, of course, be of very large size, both wide and lofty. A large area, lighted from above, might be arranged so as to make the middle of the space under the archways brilliantly lighted, and be a novel feature, rising from the vaults of the archways, something like a lantern tower as seen from below, serving also for the lighting of corridors, &c., in the buildings, which should be of a public or semi-public character. The great gateway to Burlington House and the entrance to Somerset House are prominent London examples of the idea, and, if treated in a becoming way, something notable in the way of architectural character might result.

This, however, is only thrown out by the way,—a catholic spirit with reference to the unshaped future being reckoned praiseworthy. The idea of a completed circus being abandoned, archways and buildings over them and all similar schemes would vanish. But what should we then aim at in the near and in the ultimate future? Is any one ready to propose that a fine architectural place shall be created, and to point out what that would necessarily involve, who is persuaded and persuasive enough to make other people hold strongly the same opinion? I fear very much that the business will drift, and another opportunity will be lost for a long day. Perhaps some general discussion might help to clear the air, and enable people to see things in their right relative importance. Few could fail to vote for the fine architectural place, at once and with both hands, if some very rich person or the National Exchequer provided the funds. Very many people seem to think, however, that too much may be attempted in one generation, and that it may be better to advance a little gently in this place, as a good deal has been done already, and as London is large and ratepayers are human. AN ARCHITECT.

#### "THE SIZE OF HOUSE DRAINS, AND THE USE AND MISUSE OF TRAPS."

SIR,—Mr. W. P. Buchan must be content with my reply to his strictures published in another journal, before his letter to you, p. 650 (which I have just seen), appeared. There is one misstatement in that letter, however, which perhaps I should notice. Mr. Buchan says that though thirty years ago I advocated the ventilation and flushing of sewers, it was not till ten years after that that the great truth was revealed to the world, by Mr. W. P. Buchan, that the best safeguard against the admission of foul air into houses was the use of disconnecting-traps between the house and the sewer! This is too ridiculous. There was no novelty in this idea in 1857, and in a paper which I read in 1858 to the Glasgow Architectural Society,—in the hearing of Mr. Buchan, I think,—which was

published, and noticed in the *Builder* of the period, I used these words:—"It requires by a moment's reflection to perceive that the proper and common-sense course to adopt is to prevent the foul air from getting into the house at all. It must not, and need not, be tolerated within our doors." At the same meeting exhibited a trap which I had designed to facilitate this complete disconnection,—a trap which, for the purpose, has not been materially improved upon since by Mr. Buchan or any one else. I am tempted to refer to this subject chiefly because there seems to be a growing disposition among certain specialists,—and even architects, who should speak for themselves and claim as much ignorance as they please,—to discredit architects as sanitary engineers. I must be quite clear, I think, that thirty years ago I did not require to be taught by Mr. W. P. Buchan; neither can I now tolerate the idea that architects are to be instructed and dictated to by sanitary plumbers or sanitary doctors, however eminent, in one of the simple branches of their ordinary professional work. JOHN HONEYMAN.

SIR,—In a letter on the subject of house drains published in your issue of November 5th, Mr. Buchan remarks that my statement, that the ventilator in a system of house drainage should be twice the area of the outlet ventilator, is absurd. This may or may not be true; I, of course, think that it is not true, and one of my principal reasons for this opinion is that I find from my own experience that the ventilation arranged as I proposed in my paper on house drainage works before the Sanitary Congress at Bolton is always satisfactory, and I have never had a complaint of back-draw.

I think that Mr. Buchan proves too much; states that with a 4-in. outlet and a 6-in. inlet the rate of admission of air was 80 ft. per minute, while with a 2½-in. inlet the rate of admission was increased to 400 ft. per minute; that with the same outlet of 4 in. in diameter, a quantity of air in cubic feet passing through inlet was in the first case 15.7 and in the second 16.5 per minute; but this is contrary to the nature of things, and it is not possible that with the exertion of force the larger quantity of air should pass through the smaller opening; therefore the conditions were not the same in the two cases, and the figures given are not mathematically correct.

If no more air be passed through the drain, the contracted opening than with the larger one, fail to see the force of Mr. Buchan's argument, what advantage he gains by increasing the speed of current of air from 80 ft. to 400 ft. per minute. This increase of speed must be purely local, for, were continued any distance the quantity of air passed through the drain would be materially decreased, owing to the increased friction; I do the other hand, see disadvantages which may result from the increased speed of admission. If the corners or angles be met with while the air is flying in at this speed eddies will be set up which will have the effect of producing increased friction, thus reducing the efficiency of the ventilation, any such eddies must tend to produce back-draw, which is what it is desired to avoid.

REGINALD E. MIDDLETON.

#### Birmingham Architectural Association.

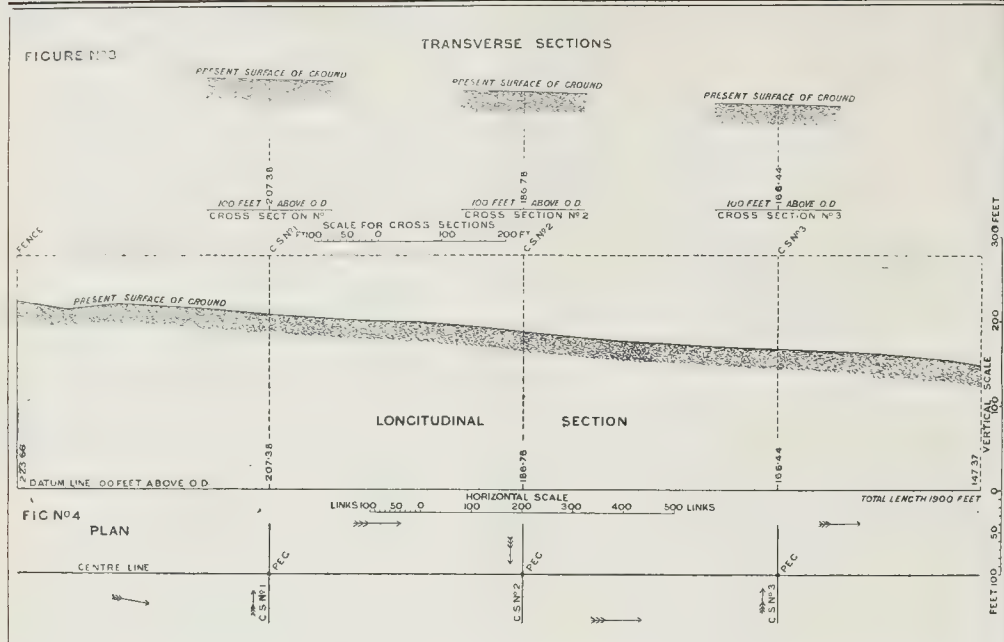
THE first ordinary meeting of this Association the current session was held in the Library, Queen's College on Tuesday evening, Nov. 11th. Eleven gentlemen were nominated for membership. Mr. W. Doubleday (Vice-President) was the chair. A paper was read by Mr. J. Bradley, B.A. (Lond.), entitled "A Gossip of Old MSS." The lecture was illustrated by many fine examples from illuminated manuscripts. A vote of thanks, proposed by Doubleday, and supported by Mr. W. H. Lake and Mr. Victor Scruton (Hon. Sec.), was unanimously accorded to Mr. Bradley for very erudite analysis of this once famous work. After a response from Mr. Bradley the meeting terminated.

**Rochdale New Station.**—We are informed that the directors of the Lancashire and Yorkshire Railway Company have accepted the estimate of Mr. T. W. Helliwell, Brighton, to execute the whole of the zinc roofing, glazing on their intended new station at Rochdale. The work is to be done on Helliwell's patent systems of glazing without putty, zinc roofing without external fastenings, solder. The total area is about 81,000 square feet of glass and 28,800 super. feet of zinc.

**New University in Washington.**—The Catholic community of Washington has decided upon building a new Catholic university for the city. It is to cost about \$60,000 dollars, of which has already been collected, and work of erection is to begin at once.







fixed in terms of the reduced levels in the Level Book so as to suit the section to be plotted. The level of the datum line having been thus determined, as so much above or below some known bench mark or datum point outside the section, the horizontal measurements are then marked in pencil for the purposes of plotting the section, along the datum line. In the case before us these distances are to be scaled 0, 200, 375, 400, &c., links to 600 at the end of one page of the Level Book. The section is plotted page by page, as follows:—Vertical lines are first ruled in pencil through the marks at 0, 200, 375, &c., upon the datum line (see fig. 1) with the aid of a set-square sliding against a straight edge, set parallel to the datum line. The set-square employed should be long enough to draw these vertical lines of sufficient length so as to need no further prolongation when scaling the heights. These heights are obtained from the column of reduced levels in the Level Book and are scaled from the datum line, the heights being, for the sake of accuracy, carefully marked thereon with a fine needle pointer (*Builder*, Sept. 3, fig. 14, p. 348). A fine-pointed pencil is not accurate enough when the comparatively small scale of the section is considered. The points so pricked off are joined by a fine black line ruled in ink, and this is best done if the surface line is inked in before plotting another page of the Level Book.

The position of the datum points or bench marks are indicated upon the plan in fig. 2 near each end of the longitudinal section. Where the section is taken upon a curve, the radius of the curve (in this case 20 chains) is figured upon the longitudinal section. The tangent lines to this curve intersect at the peg A upon the plan (see fig. 2) off the line of the section. A horizontal line, as shown in fig. 2, is usually drawn above the section, parallel to the datum line. Dotted lines are drawn vertically from the line indicating the surface of the ground to this horizontal line at all points requiring description, and the description is generally written in at an angle of about 45° to this line, as shown. Where a peg is left in the ground upon the section at this point the vertical dotted line is carried down to the datum line, so as accurately to mark its position in a horizontal direction.

Transverse sections (as shown in fig. 3) have their position marked upon the longitudinal section as well as upon the plan. They are taken for a distance of either one or two chains, as required upon each side of the centre line, and in order to continue the levelling between the bench marks, they are levelled alternately thus:—C. S. No. 1 is taken from right to left,

C. S. No. 2 from left to right, C. S. No. 3 from right to left, as indicated by the arrows upon the plan. This continuous method is found in practice to be the most satisfactory way of connecting transverse sections with a longitudinal section.

#### CHURCH-BUILDING NEWS.

**Acton.**—The memorial stone of the new Church of St. Alban the Martyr, Acton Green, was laid on the 18th ult. by Mrs. Nelson on behalf of Mr. C. Montague Nelson, J.P., of Hanger Hill, Ealing, who was prevented from attending by an accident. The parish is to be formed out of All Saints, South Acton. The church will be 135 ft. 3 in. from east to west, and 53 ft. 3 in. from north to south, internal dimensions; and will seat 750 adults, giving each the space required by the Incorporated Church Building Society. It will consist of nave and chancel, with north and south aisles, vestry, and organ-chamber, with heating-vents under morning chapel, 12 ft. by 29 ft., semi-octagonal baptistery, 20 ft. by 10 ft., two porches at the west end, and an entrance at the north-east corner of the nave; there will also be a lofty clearstory on an arched of five brick arches springing from quatrefoil columns, and the height from floor to ridge of nave will be 55 ft. The building is to be in the Early English style, and is being carried out from a design and under the personal superintendence of Mr. Edward Monson, jun., A.R.I.B.A., of Acton. The walls are to be built of bricks faced externally and internally with best red local bricks, which are of a very bright colour, and will be relieved with dressings of Bath stone and blue Staffordshire brick bands; the roofs are to be of yellow deal of the hammer-beam form, double boarded, and covered with felt and North Welsh slating, an air space being left between the two lots of boarding to secure ventilation; the flooring of the aisles is to be of solid wood blocks on concrete, the other part will be laid with floor boards and joists. The building is to be warmed with hot air, upon Messrs. Haden's principle, and ventilation is to be provided for by means of vertical shafts carried up in the thickness of the external walls under each of the side windows, covered on the top with polished brass lit-and-miss gratings as inlets, and large openings in each gable and clearstory for outlets,—all thoroughly under control. The cost of the building (including seating, lighting, and warming arrangements) is estimated at 5,000l., but it is only intended at present to erect the nave, aisles,

and baptistery, and to enclose the site with a substantial brick wall, and the contract for this has been taken for the sum of 3,500l. by Mr. Joseph Dorey, of Old Brentford.

**Birmingham.**—St. James's Church, Ashted, which has been closed for about two months for partial restoration, was re-opened on the 5th, by the Lord Bishop of Worcester. The interior of the church has been thoroughly repaired, the hot-water apparatus increased, and the timbers of the roof and ceiling that were decayed have been renewed. The south and east walls of the church, which were badly cracked, have been underbuilt. The organ has been moved to the east end of the church, and a baptistery formed at the west end. The work has been carried out by Messrs. Jeffrey & Sons, under the superintendence and instructions of Messrs. Osborn & Reading, architects, of Birmingham.

**Coombe-in-Teignhead.**—The renovation of the Church of Coombe-in-Teignhead has just been commenced under the direction of Mr. R. Medley Fulford, F.R.I.B.A., of Exeter. The general work has been entrusted to Mr. Hugh Mills, builder, of Newton Abbot, and the restoration of the old rood-screen has been entrusted to Mr. Harry Hems, of Exeter.

**Dodbrooke.**—Dodbrooke parish church has just been restored, and will shortly be reopened. The church is in the Perpendicular style, and the restoration has been in hand since September, 1886. A new north aisle has been added, thus providing about ninety additional sittings. The chancel has been entirely rebuilt, the flooring being of Hopton Wood stone and slate set in diamond pattern, the steps leading to the altar are formed of slabs of the same stone. The Communion-table is of oak and the choir-seats are of wainscot oak with linen-pannelled fronts. The east window is traciced and filled with cathedral glass. The north aisle is divided from the chancel and nave by three new Dartmoor granite arches and three old ones. The new chancel aisle contains two stained-glass windows, and the west window of the north aisle is also filled with stained-glass. The south aisle is, with the exception of the tower, the only part of the church which has been left intact, but the removal of the ceiling has exposed an oak roof with carving and bosses. A new roof covering the nave and north aisle is of the same pattern as that of the south aisle, but the material is deal instead of oak. The pulpit is the old one, of oak, and a new lectern, also of oak, has been added. The font has been re-erected on a stone base of Dartmoor granite. The west end gallery has been taken away. The new seats are of pitch-pine, with



linen-pannelled backs and fronts. All the windows not stained are filled with cathedral glass, supplied by Mr. Horsman, of Plymouth. The total cost of the restoration is about 2,000l. The architect was Mr. J. D. Sedding, of London, and the contractors were Messrs. S. Farr & Sons, of West Alvington.

**Gullane (N.B.).**—A new church is to be erected at Gullane, N.B., from the designs of Mr. Honeyman, of Glasgow. The old church, an interesting building of the twelfth century, has been for many years ruinous. It will not be interfered with, but its most important remaining feature, the chancel arch, will be reproduced in the new building. The chancel will have an apsidal end, and all the walls inside will be faced with the local freestone. The contractor is Mr. George Easton, North Berwick.

**Lillingston.**—The centre portion of the reredos for Lillingston Church, near Leamington, has now been placed in position. It is a representation of the "Lord's Supper" in high relief, the figures being carved out of a solid block of Caen stone, about 18 in. thick. The panel is surrounded by a battlemented cornice, with a string of Early English carving beneath. This is supported by columns of Devonshire marble of rich colouring. The structure is not yet completed, inasmuch as side wings (which are designed to rise to a much greater altitude than the centre portion) have yet to be added. The whole of the work has been entrusted to Messrs. Jones & Willis, of Birmingham.

**Wainfleet (Lincolnshire).**—There has recently been erected a new chancel and vestry to All Saints Church, Wainfleet. It is built of bricks with stone dressings, the internal walls plastered with rough stucco. The roof is of pitch pine, having moulded principals and ribs, and covered with blue slates. The new chancel and side arches are moulded, of Bath stone. Granite specular paving is used. The stalls are of pitch pine. The hot-water heating apparatus is by King & Co., of Hull. The work done has cost about 850l., and has been carried out under the superintendence of Mr. J. B. Corby, architect, of Stamford, by Mr. John Holmes, builder, of Wainfleet.

**Woking.**—The foundation-stone of Christ Church, Woking (Station), was laid on the 10th, by the Duchess of Albany. The church will be built of red brick and stone, with wide and lofty nave, and no aisles. When completed will seat about 800. The character of the work is thirteenth century, from the designs of Mr. W. F. Unsworth, of London. The contractors for the first section of the work are Messrs. James Harris & Son, of Woking.

## Books.

**The Metal Turner's Handybook: A Practical Manual for Workers at the Foot-Lathe.** By PAUL N. HASLUCK. London: Crosby Lockwood & Co.

MR. HASLUCK is a practical man, who writes in a practical manner on a very practical subject. Still, this book is not without its faults. It consists of about 150 pages of small octavo of not very closely printed matter, and there are numerous illustrations incorporated in the text. The work is evidently intended for novices in the art of turning, otherwise it has no *raison d'être*, and it is from the novice's point of view that we shall criticise it. The author, after a few introductory sentences, commences at once with the simplest form of lathe used for metal work. On page 3 is a small illustration giving a general view of a plain lathe, and on succeeding pages are five other illustrations of similar types. It is here that we find the chief imperfection of the work. The tyro in turnery would naturally expect a description of the machine tool on which the art depends, and Mr. Hasluck gives no general explanation before proceeding to deal with the different patterns of tools made by the various makers he has selected for illustration. Thus the student is confused at first start with a number of terms of which he has no knowledge. We will suppose his natural intelligence will tell him which is the bed, gap, headstock, and so to what parts some other of the simpler or more obvious terms refer; yet he can hardly be expected to know, without previous explanation, which is the "mandrel," "tail-pin," "cone-centres," "back-gear," "bridge piece,"

"poppet," "tail-end," &c., all of which terms are used in the few pages which comprise the first chapter.

Mr. Hasluck courageously gives the names of makers and their list quotations for the various tools he illustrates. It is a practice to be commended, for cost is generally a prime consideration with purchasers of small machine tools. To go to makers' catalogues, however, is always dangerous, and the author has fallen into the usual error of such a course. The main part of his first chapter reads like nothing so much as a paste-and-scissors compilation of trade catalogues: a source from which the illustrations also appear to have been mainly taken. These are the only faults we have to find with the book, and to some extent they are apparent throughout its course. For the rest, there is a great deal of useful information and many sound ideas set forth in the limited space the author has allotted to himself in which to treat so large a subject. There are separate chapters treating of geared lathes, screw-cutting lathes, overhead gearing, slide-rests, chucks, cutter-spindles, outer-frames, milling and planing attachments, circular cutters, slide-rest tools and cutter-bars, tool grinding, &c.

There is yet plenty of room for a good and not costly book on the lathe, of a thoroughly elementary and explanatory nature. The work under notice, as we have intimated, can hardly come under this definition; for a pretty wide knowledge of the lathe's mechanism is presupposed by the author. Mr. Hasluck, however, appears so well qualified for the task that we hope some day he may undertake it, although, to succeed, he must make up his mind to depend less on catalogue blocks, and have special sectional and other drawings prepared, with reference letters, to illustrate the text.

**The Wood Turner's Handybook: A Practical Manual for Workers at the Lathe.** By PAUL N. HASLUCK. London: Crosby Lockwood & Co. 1887.

This is a companion book to that just noticed, and is, on the whole, a more satisfactory work. There is an absence of that catalogue element to which we have already referred, and the illustrations are generally better calculated to help the text. The author commences with illustrations and descriptions of lathes, and then goes on to treat of the important subject of the hand tools used for turning wood. In this section there are some excellent remarks on cutting angles. Rounding tools and various lathe appliances are next dealt with, and descriptions with illustrations of simple and automatic-feed rounding machines are also given; although it may be doubted whether these come strictly within the scope of a work on turning, an operation generally supposed only to be performed by means of the lathe. There is a good chapter on chucks and another on fitting up a lathe. The latter has several good illustrations, one, an outline drawing giving two views of a lathe, being furnished with reference letters. After this examples of work are given: "lady's companion, pin-cushion, chessmen," &c.; and then come instructions for turning billiard-balls, the *Pons asinorum* of amateur turners. The work concludes with a short chapter on copying lathes. On the whole, the book is to be recommended as fulfilling a definite purpose, and contains as much information as could be reasonably expected within its compass.

**Days and Hours in a Garden.** By E. V. B. 6th edition. London: Elliot Stock. 1887.

THE dress of this little book is so pretty and graceful that, had it treated of the drier and most uninteresting subjects, there would have been found some few curious enough to turn its pages; but as it is, "the Garden Story" is as seductive as many of the three-volume novels that are drifting about, and when once the reader begins it he feels he must follow the footsteps of the months, and see the completion of the year's life. There are some quaint little illustrations and head-pieces, and though the language is somewhat flowery throughout, the wise may find many useful and practical suggestions for the making and keeping of a garden. The author is evidently a close observer of nature, animate and inanimate, and speaks of the flowers, and birds, and bees as if they and he were dear friends.

Each month is treated separately, and we hardly know which chapter is the pleasantest,

unless it be that on the "merry month of May." We cannot agree with the author, though, when he asks if it is not time the artists should cease trying to paint the May blossoms. Why should we be denied apple blossoms in our paintings whilst we have such artists as Mrs. Allingham (and others we could name) to paint them? Neither do we sympathise with the sorrow the author seems to feel on seeing the carts laden with daffodils going up to London. There are many dwellers in our smoky city who love the country sights and accents, and to whom a bunch of shining daffodils gives real pleasure. On the whole, the "Days and Hours in a Garden" are full of pleasant thoughts and musings, and when we have gone through the course of the year and closed the book, we learn (if we knew it not before) that "to the attentive eye each moment of the year has its own beauty."

## RECENT PATENTS.

### ABSTRACTS OF SPECIFICATIONS.

14,126, Chimney Tops. D. Wilkins.

The chimney-top which is the subject of this invention consists of an inner and outer case, the inner case reaching about half way up the outer case. The space left between these forms the air-chamber for the purpose of receiving the smoke and down-draught, which is directed into the chamber by means of the conical-shaped cover over the inner case and then conveyed to the outer air through an opening left around the base of the outer case. The inner case is surmounted by a conical-shaped cover which is connected by rods slipping in rings, so that when, in sweeping the chimney, the cover is raised by the sweep's brush, it falls back into its place when the brush is withdrawn.

16,213, Window-sashes. W. Murray.

According to this invention, the sliding sashes balance one another, although weights, moving in a groove in the lower sash, are fitted for balancing the upper sash when required. The beading which keeps the sashes moving closely together is fixed with a spring, allowing the sashes to be easily removed when required. A part of one side of the frame is made to fold back upon hinges so that the sashes can be taken out. The window in that case slides into the recess, and is thus removed from the groove on the opposite side. If desired the sashes can then be attached to hinges and swing horizontally.

16,293, Securing and Ornamenting Parquetry. J. Ickringill.

This invention relates to certain improvements in parquetry flooring, especially with a view to obviate the defect of the tendency for one strip to rise above another, and to conceal the means used for securing the parquetry strips; and for ornament. The pattern is laid in a geometrical manner, and the edges of the strips are grooved for the reception of tongues. Or, countersunk holes are sunk in the ground work, which, after the screws are inserted to fasten the work more securely, are plugged tight with hard woods in patterns.

16,390, Wood-block Flooring. L. Oppenheimer.

By this invention holes are made in the blocks, and they are fastened by nails or screws to each other. The foundation is the same as in general use.

366, Ventilating Rooms, &c. T. Sterné (Paris).

The claim in this invention describes the arrangement as "Means or apparatus for ventilating rooms or buildings by the combination of a fresh-air inlet apparatus composed of valves or flaps, which can only open inwards, with a foul or vitiated air discharge apparatus which can only open outwards, the inlet and discharge being identical with each other in construction, except that one is the reverse of the other."

11,109, Improved Chimney-top. J. H. Carrett.

According to this invention, a square earthenware pot having four openings is employed. Two of these are on one side, and two on the opposite side. Connected with the openings is an inclined plane or web running upwards, and also attached to each side. The top lip of each of these planes or webs projects beyond the centre of the pot, thus preventing a straight down-draught; for if the down-draught should miss the first plane and opening, it has still three others to pass; the four upward draughts are, however, sufficient to prevent this. The whole chimney-top is in one piece.

### NEW APPLICATIONS FOR PATENTS.

Nov. 4.—15,023, J. Lander, Artificial Stone for Flooring, Decorating, &c.—15,065, F. Ransome, Manufacture of Cement.

Nov. 5.—15,071, J. Wright, Chimney-top and Ventilator.—15,083, R. Payne, Wind-proof Cowl.—15,096, S. and A. Fenn, Fireplaces of Kilns or



Ovens for Burning Bricks, &c.—15,114, G. Sonnenthal, Pile-drivers.

Nov. 7.—15,145, G. Denys, Unfastening the Doors of Theatres, &c.—15,159, J. Lee, Groove and Tongue Cutting Machine.

Nov. 8.—15,173, J. Bean and W. Gaines, Apparatus for Closing Doors and Preventing Slamming of same.—15,188, G. Wicks, Raising, Lowering, and Reversing Window-sashes.—15,197, D. Alport, Lessening the Slamming of Doors, &c.—15,203, J. West, Water-waste Flushing Cisterns.—15,211, A. South, Wire-lath.

Nov. 9.—15,269, J. Dunning and B. Priestley, Opening, Closing, or Adjusting Fanlights, Tippler Windows, Skylights, &c.—15,306, J. Pauwels, Water-meters.—15,327, M. Ede and A. Buchanan, Iron and Steel Flooring for Bridges.

Nov. 10.—15,355, A. Patrick, Brick-making Machinery.—15,356, A. Patrick, Brick-making Machines.—15,372, J. Morris, Ventilator and Chimney-cowl.—15,395, R. McGregor, Bricks, Blocks, Tiles, &c.

#### PROVISIONAL SPECIFICATIONS ACCEPTED.

13,467, W. Smith, Manufacture of Cements.—13,508, W. Ballantine and R. Blackie, Flushing Cisterns for Water-closets, &c.—13,884, R. and W. Locking, Water-closets, &c.—16,890, J. Fagan, Flushing Cisterns, &c.—18,240, W. Scott, Heating and Ventilating.—13,258, W. Dutton, Revolving Door-posts for Public Buildings.—13,528, J. Thrush, Traps for Drains, Sewers, &c.—13,713, M. Morgan and J. White, Raising and Lowering Window-sashes, Skylights, &c.—14,113, E. Tarrow, Construction of Theatres.—14,167, J. Greenlake, Window-Frames and Sashes.—14,220, H. Lake, Wood-paving.—14,393 and 14,394, G. Snelus and others, Manufacture of Cements.—14,456, G. Maltster, Ventilators.—14,630, W. Shine, Ladders.

#### COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

176, T. Wilson and H. Johnson, Ventilating Apartments.—302, J. Garvie, jun., Pile-driving Apparatus.—743, E. Dive, Ventilating Apparatus.—6,307, E. Zahn, Water-trap.—9,888, A. Savage, Safety Bolt for Windows, Doors, and Casements.—10,963, P. Aitiz, Portable Cranes.—12,473, A. Harrison, Wood-block Flooring.—12,768, W. Lake, Sash Lock and Fastener.—17,130, A. Mack, Artificial Boards, Slabs, Mouldings, &c.—437, J. Thompson, Ventilators and Chimney-cowls.—10,636, T. Baker, Draught Regulators for the Fronts of Fireplaces.

#### RECENT SALES OF PROPERTY.

##### ESTATE EXCHANGE REPORT.

##### NOVEMBER 3.

By GLASIER & SONS.

(At Brighton.)

Steyning, near-New Horton Farm, 13a. Gr. 25p., freehold ..... £7,500

##### NOVEMBER 7.

By G. A. WILKINSON.

Whitecross-street—1 to 6, Cherry Tree-court, freehold ..... 1,550  
Regent-street—37 and 39, Maddox-street, &c.—111, street, freehold ..... 5,000  
35, Maddox-street, freehold ..... 4,080

##### NOVEMBER 8.

By FRISHER, PRICE, & FURBER.

Hackney—94, 96, and 98, Well-street, and 1 to 7 odd, Balcony-street, freehold ..... 2,530  
Addiscombe—13, Alexandra-road, freehold ..... 425

By ROGERS, CHAPMAN, & THOMAS.

Hammersmith—25 and 27, York-road, 70 years, ground-rent 61. 6s. .... 400  
Notting Hill—34, Friar-church-road, 71 years, ground-rent 71. 5s. .... 355  
Clarendon-road, a plot of land, 60 years, no ground-rent ..... 115  
1, Railway Mews, 70 years, no ground-rent ..... 305  
83, Cornwall-road, 77 years, ground-rent 101. .... 1,295  
41, Archer-street, 56 years, ground-rent 71. 7s. .... 700  
Shepherd's Bush-road—Ground-rent of 1000, reversion in 83 years ..... 2,450  
West Ham, Stephenson-street—Ground-rent of 161, reversion in 77 years ..... 305

By A. RICHARDS.

Green-lanes An enclosure of freehold land, 1a. 1r. 31p. .... 2,000  
Edmonton—Three freehold enclosures of land, 27a. 3r. 34p. .... 5,425  
Windmill-road—The Huxley Flour Mills, freehold ..... 500  
Fins-lane—Freehold cottages and land, 6a. 1r. 31p. .... 750

##### NOVEMBER 10.

By J. JACOBS & SONS.

Paddington—18 and 17, Market-street, 34 years, ground-rent 81. .... 305

By COLEMAN & CO.

Clapton—80, Blunton-road, 84 years, ground-rent 61. 6s. .... 300

By E. STIMPSON.

Camberwell—1 to 11 odd, Sultan-street, 78 years, ground-rent 271. .... 450  
Peckham—233 to 239 odd, St. George's-road, freehold ..... 1,100  
Lambeth—26, 27, and 28, Wood-street, 22 years, ground-rent 181. .... 600  
Clapham—29, Sandmore-road, 94 years, ground-rent 71. 10s. .... 300  
57, Solon-road, 92 years, ground-rent 81. 17s. 6d. .... 320

#### By F. J. BISLEY.

Bermundsey—1 and 3, Reverdy-road, 55 years, ground-rent 91. .... £755  
112 and 114, Lucy-road, 57 years, ground-rent 81. .... 530

By RYMOND & EASEY.

Kilburn—14, Victoria-villas, 74 years, ground-rent 107. .... 360

By C. C. & T. MOON.

Dalston—56 and 58, Marlborough-road, 58 years, ground-rent 71. .... 605

St. George's-in-the-East—10, Umlerston-street, freehold ..... 215  
Rotherhithe—43 and 45, Clarence-street; 6 and 7, Dodd's-place; 2 and 4, Foreyth-street; and a plot of land, freehold ..... 775

By FULMER & FULMER.

Tottenham—8 and 9, Tavistock-villas, freehold ..... 500

St. Luke's—126 and 127, Upper Whitecross-street, freehold ..... 3,000  
43 to 45, Banner-street, freehold ..... 1,100  
Bethnal Green—62, 64, and 66, Sale-street, 9 years, ground-rent 71. .... 470

#### NOVEMBER 11.

By BAKER & SONS.

Finchley-road—An enclosure of freehold land, 5a. 3r. 3p. .... 1,500  
Harlesden—4 and 6, Fortune Gate-terrace, freehold, Blinfold, Sussex—Four enclosures of land, 15a. 0r. 16p., freehold ..... 500

Upper Norwood, Mowbray-road—Two houses, 80 years, ground-rent 51. .... 1,100

Islington—137, 135, and 181, Caledonian-road, 53 years, ground-rent 791. .... 1,790

By GAVIN & SONS.

171 and 181, Caledonian-road, 53 years, ground-rent 501. .... 1,270

155 and 159, Copenhagen-street, 53 years, ground-rent 481. 10s. .... 460

173, 181, and 183, Copenhagen-street, 53 years, ground-rent 81. 10s. .... 1,050

Improved ground-rent of 681, term 53 years, and the reversion to 841, a year, life aged 73 years, term 51 years ..... 1,400

By W. W. JENKINSON.

Camden Town, Rochester-square—Ground-rent of 251, term 53 years ..... 540

Camden Town, Wilnot-place—Ground-rent of 171. 10s., term 56 years ..... 370

Brixton—59, Barrington-road, 35 years, ground-rent 81. 2s. .... 330

64, Barrington-road, 35 years, ground-rent 71. 10s. .... 280

#### MEETINGS.

MONDAY, NOVEMBER 21.

Royal Institute of British Architects.—Mr. W. Brindley, F.R.M.S., on "Building and Decorative Stones of Egypt," 8 p.m.

TUESDAY, NOVEMBER 22.

Institution of Civil Engineers.—Further discussion on Sir F. A. Abel's paper on "Accidents in Mines," 8 p.m.

WEDNESDAY, NOVEMBER 23.

Society of Arts.—Professor Silvanus P. Thompson on "The Mercuial Air-Pump," 8 p.m.

THURSDAY, NOVEMBER 24.

Society of Telegraph Engineers and Electricians.—(1) Dr. J. A. Fleming M.A., and Mr. C. H. Gimmingham on "Some Instruments for the Measurement of Electromotive Force and Electrical Power." (2) Professor W. E. Ayrton, F.R.S., and Mr. J. Perry, F.R.S., on "Portable Voltmeters for Measuring Alternating Potential Differences," 8 p.m.

FRIDAY, NOVEMBER 25.

Glasgow Architectural Association.—Mr. J. J. Barnett, F.S.A., on "The Architect's Assistant."

#### Miscellaneous.

**New Baths at Hyde.**—The Mayor of Hyde, Mr. J. Cheetham, recently laid the foundation-stone of some new baths, the cost of which will be £3,000. The building is situated in Union-street, and is set back 16 ft. from the street. Leading from the two main entrances are a set of slipper baths, 7 ft. by 7 ft., fitted with porcelain. There is also a plunge-bath, with a water area of 75 ft. by 25 ft., the ground area being 89 ft. by 40 ft., and this is supplemented by thirty-eight dressing-boxes, two shower and foot baths, and other conveniences. The room will be spanned by a light iron roof, the underside of the spars being boarded. The light is obtained from a ridge skylight running the full length of the building, and raised above the roof, with Louvre ventilators. The water will be 6 ft. deep at one end, and 3 ft. 6 in. at the other, and the sides and bottom will be lined with white enamelled bricks. The walls will be faced to a height of 5 ft. with brown salt-glazed bricks, and above this with grey bricks. The women's plunge-bath will be carried out in the same manner, the size of the water area being 33 ft. by 17 ft., and the ground area 42 ft. 6 in. by 25 ft. 6 in. At the back of the large plunge-bath will be the laundry, and raised above it about 6 ft., the space below being used as the boiler-house. The laundry will be fitted with machinery, by Messrs. Bradford & Co., of Salford, who have also undertaken the engineers' work. Mr. S. Warburton, of Miles Platting, is carrying out the contract for the boilers. The architect is Mr. J. W. Beaumont, of Manchester, the clerk of works being Mr. Hill.

**Roman Discoveries in Trieste.**—Recently some interesting archaeological discoveries have been made in Trieste. During the pulling down and excavating of certain parts of the old city, in order to provide more light and space, a number of Roman graves and sarcophagi have been encountered, and some days ago the workmen engaged in some canal work at Barcola, in that city, came upon the remains of a Roman building, the mosaic floors of which were in excellent state of preservation. By continued excavations, three of these floors were laid bare. They consist of the usual tesserae, having a border of black or white marble. In a fourth room, not yet completely excavated, the mosaic reveals the feature of a dolphin. It is believed that the remains are those of the villa of a Roman patrician. An aqueduct has also been discovered, leading from a neighbouring hill to the villa, the calcined clay pipes of which are almost uninjured. The excavations, which are expected to bring further interesting archaeological discoveries to light, are conducted by Prof. Paschi for the Archaeological Museum at Trieste.

#### Stone Bridges v. Iron Bridges.

According to the *Railroad Gazette*, the Pennsylvania Railroad Company is gradually replacing the existing iron bridges of short span on its lines by bridges of quarry-stone or brickwork. The experience has been that the iron bridges were not only a constant source of anxiety, but constituted a continual drain upon the income of the Company. It was necessary to inspect them regularly and carefully, and to repair or strengthen and in some cases even renew them. The fact, too, that the weights to be carried by railway bridges are steadily increasing, and that it is impossible to foresee what those weights may be, say in five or ten years' time, has also been taken into consideration in resolving upon the change. It is likewise urged in favour of masonry bridges that, although their first cost may be greater than that of iron bridges, they involve little expense afterwards for inspection and maintenance; that they sustain heavy weights much more efficiently, and are less liable to injury or destruction by accident than lattice bridges of iron or wood.

#### Metropolitan Building Act, 1885:

**District Surveyors' Fees.**—A question of some interest to builders and others was decided at the Woolwich Police-court, on the 2nd inst., when Mr. Davis, builder, of New Eltham, was summoned by the District Surveyor, for payment of 31. 2s. 6d., the fee due upon the erection of a house at Southwood-road, Eltham. The defendant disputed the amount charged, upon the ground that the cellar should not be regarded as a story in calculating the fee. Mr. Marsham decided that the cellar constituted a story, and made an order for payment of the fee claimed, together with costs.

**Dolfor.**—Two two-light stained-glass windows have recently been erected in Dolfor Church, Newtown, Montgomeryshire. One is in commemoration of her Majesty's jubilee, and illustrates the figures of King David and Esther, a medallion of Queen Victoria appearing in the top part of the tracery; the other represents the figures of St. John and Paul. The execution of the work was entrusted to Messrs. Jones & Willis, of Birmingham.

#### British School at Athens.

Mr. Penrose has now retired from the post of Director of this Institution, which he accepted temporarily when it was started under the auspices of the Hellenic Society, and has been succeeded by Mr. Ernest Gardner.

#### Rushton.

A three-light painted window has just been fixed at Rushton parish church, to the memory of Mrs. Fanny Isabella Wilson, daughter of the late Rev. Francis Smith. The window is from the studio of Messrs. Charles Evans & Co., and is the gift of Mr. Edmund Smith.

#### PRICES CURRENT OF MATERIALS.

TIMBER.				£.	s.	d.	£.	s.	d.
Greenheart, B.G. ....	ton	7	5	0	13	0	0	0	0
Teak, E.I. ....	load	8	0	0	12	0	0	0	0
Sequoia, U.S. ....	foot cube	0	2	8	0	0	0	0	0
Am. Canada ....	load	3	0	0	4	0	0	0	0
Birch " ....		2	0	0	3	0	0	0	0
Elm " ....		3	0	0	4	0	0	0	0
Fir, Danstic, &c. ....		1	0	0	1	0	0	0	0
Oak " ....		2	0	0	4	0	0	0	0
Canada " ....		3	0	0	6	0	0	0	0
Pine, Canada red ....		2	0	0	3	0	0	0	0
" yellow " ....		2	0	0	4	0	0	0	0
Lath, Danstic " ....		3	0	0	5	0	0	0	0
St. Petersburg " ....		4	0	0	5	0	0	0	0



Gibbs .....	£370	0	0
Carter .....	330	6	0
Reed .....	247	0	0
Potter .....	189	10	0
J. J. Robson, Snarebrook (accepted)	181	13	0



BROMLEY (Kent).—For sewerage, levelling, kerbing, &c., the following private streets, for the Bromley Local Board. Mr. Hugh S. Creegan, surveyor:—

	Addison Road.	Bromfield Road.	Cowper Road.	Chatterton Road, A to B.	Chatterton Road, B to C.	Walpole Road.	Pope Road.	Johnson Road.	Havelock Road.	Great Kings Road.	Malboro Road.	Wellington Road.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Wm. Gibson	946 7 10	838 18 0	650 13 11	443 19 5	712 2 6	1144 5 4	1043 5 4	607 18 3	735 7 3	539 19 3	498 4 3	527 10 1
Wm. Harris	780 19 3	870 7 1	529 8 1	363 19 0	578 11 4	836 19 10	867 6 11	502 6 6	691 13 6	443 5 7	388 18 11	422 16 8
Abraham Kellet	697 5 3	618 17 8	488 16 6	335 1 2	622 0 3	853 1 11	787 6 5	449 19 8	666 18 6	470 10 6	373 15 4	385 9 2
Hindle & Morrish (Limited)	668 3 7	603 1 4	490 8 6	314 17 4	636 17 7	887 4 0	814 4 4	468 15 6	543 5 3	411 15 5	360 6 7	382 11 10
J. L. Cattell	865 2 8	679 15 8	464 2 11	308 11 9	498 11 6	821 8 8	753 15 5	428 11 10	528 17 4	399 10 6	344 16 5	368 6 6
J. Mowlem & Co.	610 11 3	572 9 1	451 13 10	392 12 1	494 13 4	815 2 10	760 19 8	483 16 7	542 16 11	389 15 8	357 12 5	379 15 6
E. & W. Lee	612 8 0	551 15 8	441 6 6	287 8 4	471 11 3	773 18 9	713 1 8	498 14 0	673 5 2	356 18 0	331 16 10	329 14 3
Woodham & Fry	630 13 8	652 9 6	433 12 9	284 12 7	478 18 7	779 12 10	725 9 10	417 19 11	524 6 6	363 4 10	321 6 5	332 0 4
T. Hall	603 13 6	633 14 2	423 5 1	287 0 9	481 10 10	774 17 8	709 6 8	404 3 0	497 9 0	360 8 8	330 10 10	350 2 3
T. Adams	695 16 0	534 19 3	419 14 10	280 1 7	485 2 7	794 8 6	710 10 6	427 5 3	617 11 4	390 7 6	341 14 7	360 11 1
J. G. B. Marshall	580 2 5	519 2 1	410 19 0	277 11 1	479 17 7	747 14 8	693 13 6	398 1 7	484 19 6	343 12 6	320 8 1	343 0 10
Ely Perkins	557 19 3	489 2 5	385 11 5	259 9 3	573 9 11	826 16 7	770 6 6	441 5 10	542 19 1	359 10 2	337 19 3	380 3 3
Wm. Porter	583 19 0	502 5 9	398 11 6	298 14 5	445 10 6	739 2 3	677 10 0	389 9 5	475 4 4	343 10 2	311 19 11	334 2 6
T. Lashbury	527 7 1	464 0 1	396 7 3	286 9 1	432 11 4	677 5 7	628 19 7	357 6 0	431 19 4	304 16 8	287 5 5	307 5 6
E. Peill & Sons	498 3 3	434 3 7	344 11 0	230 9 9	393 15 8	644 4 4	609 11 5	341 12 9	443 0 11	317 3 6	292 8 3	311 19 8
A. Palmer	499 11 3	438 11 5	345 15 3	234 11 0	393 19 8	643 18 3	564 2 1	333 2 1	420 15 0	295 4 7	271 11 4	291 14 4

\* Accepted.

	Newbury Road.	Aylesbury Road.	Westminster Road.	Ravensbourne Road.	Ringers Road.	Eltham Road.	Reigate Road.	Martin's Road.	Newman Road.	Waller's Yard.	Park End.	Park Grove.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Wm. Gibson	831 1 8	1111 19 10	358 8 2	930 18 2	464 18 9	539 18 3	506 19 0	812 14 10	169 8 4	230 0 10	1470 11 0	231 5 0
Wm. Harris	657 18 2	884 13 4	296 7 10	812 14 1	441 4 8	468 4 10	497 5 1	651 18 7	128 17 8	209 10 6	1222 9 9	186 8 9
Abraham Kellet	674 1 4	513 19 6	380 2 8	686 0 3	365 15 9	388 3 10	453 19 4	594 15 2	112 18 0	415 16 6	1161 9 1	163 1 1
Hindle & Morrish (Limited)	591 10 10	799 19 1	247 15 3	734 9 6	379 19 5	408 10 6	463 16 11	662 2 0	105 3 0	183 19 3	1186 0 5	163 10 0
J. L. Cattell	564 2 1	764 19 2	233 12 0	639 14 0	360 14 10	390 3 5	440 3 8	543 13 10	103 1 8	327 4 3	1090 11 0	152 9 0
J. Mowlem & Co.	587 19 6	785 13 1	245 9 1	694 11 9	345 6 2	399 5 10	449 8 6	678 9 6	105 1 7	158 4 0	1108 0 9	153 18 0
E. & W. Lee	681 19 10	540 4 5	245 2 6	669 0 3	359 1 1	371 7 7	400 13 2	543 10 11	102 8 8	389 10 10	1018 11 4	167 1 10
Woodham & Fry	638 1 4	744 14 11	243 7 11	648 6 2	349 5 1	385 3 6	417 7 10	541 12 10	146 10 4	169 16 6	1090 5 6	146 17 0
T. Hall	540 12 3	719 3 6	229 5 0	663 12 11	352 18 8	389 4 10	405 1 1	528 4 3	97 14 4	225 13 3	995 15 0	142 6 6
T. Adams	580 10 11	744 18 8	248 4 10	671 14 4	355 14 2	399 19 4	415 17 0	650 6 5	113 15 10	151 16 8	1670 11 3	156 4 8
J. G. B. Marshall	583 4 4	720 14 0	232 13 4	633 3 10	343 8 4	371 7 7	400 13 2	519 6 8	88 18 11	146 17 7	1074 14 8	143 15 1
Ely Perkins	585 12 6	787 7 10	257 10 0	702 16 3	375 19 9	447 4 4	444 12 3	600 15 0	120 12 2	170 9 10	1102 8 5	147 4 4
Wm. Porter	510 5 8	682 6 7	223 8 7	624 15 8	331 19 4	391 5 1	390 7 0	531 5 0	95 13 9	170 1 0	1057 15 1	137 13 1
T. Lashbury	489 16 6	624 3 9	242 11 7	609 0 3	312 10 1	348 13 8	363 10 6	543 10 10	92 13 2	170 2 11	1074 14 8	137 13 1
E. Peill & Sons	454 7 9	659 2 2	209 17 0	584 19 6	302 7 11	333 17 8	363 5 7	479 16 0	91 18 0	160 12 8	926 15 5	181 7 1
A. Palmer	455 2 6	605 16 8	195 3 9	606 11 8	270 8 5	298 8 7	336 5 3	447 19 8	85 18 8	130 4 2	813 0 0	121 19 0

\* Accepted.

WEST HADDON.—For the first section of the restoration of St. Saviour's Church, West Haddon, Northamptonshire. Mr. W. Millican, architect, Leicester:—

C. Clidge, Banbury, Oxon	2544 0 0
Law & King, Lutterworth	525 0 0
E. Jarvis, Banbury	608 0 0
Jno. Gee, Daventry	440 0 0
W. & J. H. Martin, Market Harborough	388 0 0
Roberts & Son, Weedon (accepted)	378 0 0
G. W. Mitchell, Northampton	310 0 0

\* Net amount of tender, after deducting allowance for old materials.

\* SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than 12 Noon on THURSDAYS.

#### TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

A. M. P.—B. & Sons.—E. S. E.—A. G. G. (we have already expressed our opinion in the precisely opposite direction. The view advanced by the Society appears to us simply absurd, and not worth taking into consideration).—M. P.—Carpenter.—(consult a solicitor). It is not our province to give legal advice).—C. H.—A. C.—M. A. E.—H. E. P.

All statements of facts, lists of tenders, &c., must be accompanied by the names and addresses of the sender, not necessarily for publication. We are compelled to decline publishing on books and giving addresses.

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# The Builder.

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SATURDAY, NOVEMBER 26, 1887.

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### The Old Châteaux of the Low Countries, and their Surroundings.



VERY few of the old Flemish châteaux retain their gardens and surroundings unaltered. The region in which the greater number of Flemish châteaux were situated was for a century the battle-ground of Europe, and before things had time to recover, most of the noble families to whom these estates belonged were ruined by revolution, their houses pillaged and burnt, gardens cut down, water-courses choked up, so that it is only here and there that we find a little nook of the pretty garden which has escaped; a broken moss-covered fountain, in which the Triton has been in vain blowing through the empty shell, from which the water has ceased to run for nearly a century; a terrace overgrown with weeds; or a picturesque summer-house forlorn and roofless. Fortunately, however, the engravings of Wenceslaus Hollar, Erlinger, Harrewyn, Vanweerden, Peeters, Vorstermans, Bruyn, Vanheil, and others have, in their illustrations of such works as "Brabantia Sacra et Profana," "Castella et Prætoria Nobilium Brabantie," "Les Délices de Brabant," "Les Délices de Holland," and the illustrations of a still earlier work, Ait-singer's "De Leone Belgico," left us carefully-executed bird's-eye views of so many of these buildings and their surroundings, that we are able, with a little study and care, to restore, mentally at least, the aspect of these beautiful homes of the old Dutch and Flemish nobles and country gentlemen; and when the difficulties of the situation are taken into consideration; when it is remembered how very little nature had done in the way of making this vast flat level country picturesque or pretty, we must admit that the art of rendering the surroundings of a house attractive and pleasant has seldom been so well understood or carried to so high a perfection as by the architects and gardeners of the Low Countries during the sixteenth and seventeenth centuries, and it is a remarkable fact that with such unpromising circumstances and conditions the Dutch set the example of gardening to the whole of the rest of Europe. We find imitations of Dutch gardening not only in England (in spite of the demolition of many of them wrought by "Capability Brown" and his school) and France, but even in Spain, Italy, and the south of Germany; in fact, one of the most perfect examples of a Dutch garden that we ever remember to have seen is that surrounding the little country château of the Prince-Bishops of Würzburg at

Veitshöchheim, in Bavaria. So far had the Dutch, in the opinion of the people of the time, overcome all the difficulties that surrounded them, that even countries which possessed all the natural advantages of hill and dale, and of varied and distant landscape, absolutely sacrificed it all for the purpose of obtaining a perfectly flat, level garden, after the manner of the Dutch.

It is not our purpose here to enter at any length into the question of the architecture of Dutch and Flemish houses, except so far as it affects the arrangements of their gardens and other surroundings. As a rule, they were generally somewhat square and formal in design and plan, for, the site being perfectly level, both convenience and appropriateness suggested a somewhat symmetrical treatment, and the general squareness of design was best suited for buildings which were to contain square apartments, with flat ceilings, lit by square-headed windows, entered by square-headed doorways, with walls usually constructed of brick with stone bands, all of which were dictated by necessity and convenience. These old Low Country châteaux were thoroughly suited to the wants of those who inhabited them, and were not only comfortable but cheerful and dignified dwellings; they had none of the ostentatious and pompous discomfort of the English "Classical" mansions: they had no useless Corinthian porticos darkening the windows, no sham pediments concealing the garrets, no imitation parapets to hide the gutters and make them leak into the bedrooms, no nymphs holding urns to serve as chimneys, no impracticable doors to keep some practicable one in countenance. Any symmetry or regularity which is to be found in them was the result either of convenience or necessity.

It is much to be regretted that so few of these interesting old mansions now remain entire. We come across them, however, in the districts surrounding Arnheim, Zutphen, Brabant, and Limburg, their stately avenues and extinguisher-crowned or bulb-capped towers adding a pleasant feature to the somewhat monotonous landscape. These spires or steeples crowning the towers are the only features that were purely ornamental, and did not result from necessity or convenience.

The principal buildings of a Dutch château were usually arranged round a square court with towers at the angles; examples, however, do occur in which the courtyard is polygonal or octagonal, as at Gœsbeke, Reves, Terelst, &c. This, which may be called the main building, was surrounded by a moat, which came right up to the walls, as is still the case at the great palace of "La Hague," and is shown in nearly all the illustrations in the works to which we

have referred. It was approached by one or more bridges, one arch of which was replaced by a drawbridge and defended by a strong gate or tower, which served not only for the purpose of defence, but the upper story of which very frequently formed a clock-tower and dove-cot.

One of the bridges led to the Bas Court, where were situated the stables, farm buildings, granaries, &c. These were, again, generally surrounded by a moat, and approached from the road by a drawbridge and gate; not unfrequently the clock-tower itself was situated in the Bas Court. Another bridge usually gave access to the great garden, or pleasureance, which was generally on the opposite side to the Bas Court, though there are examples of it being on the same side. The great orchard and the kitchen garden were close to the Bas Court, though sometimes divided from it by a moat. The whole of the gardens and surroundings were, again, enclosed by a large moat. Thus it will be seen that the space enclosed within the outer moat usually consisted of four islands, one of which was occupied by the principal buildings of the château, a second by the Bas Court, a third by the garden or pleasureance, and a fourth by the orchards and kitchen gardens. Occasionally, though very rarely, the pleasureance was on the same island as the main buildings of the château,—this appears to have been the case at Eversberg. Amongst the principal buildings of the castle was always a large hall; it was, however, generally, not an independent structure like the halls of our English mansions, but was arranged in the lower story of the building with rooms over it. One example, however, the castle at Tergeuren, had a magnificent hall, just like our English Mediæval mansions. The chapel seems usually to have opened out from the hall, and in some instances the apse projects out over the moat, and is supported either upon a corbel or, as at Laer, upon columns and arches which rise out of the moat itself. At Herlier the chapel appears to have been in the Bas Court, but judging from Erlinger's view it appears to be of a very much earlier date than the buildings of the castle, and it is probable that they may have had scruples about removing it, though convenience may have dictated a different situation for the main buildings of the castle, as it is not to be supposed that, in the Middle Ages, they would have deliberately set down a chapel among the pig-styes and stables of the Bas Court.

The great garden, or pleasureance, which forms such a beautiful feature in these Dutch châteaux, was nearly always placed in such a position as to be overlooked by the windows of the principal apartments of the castle. It was generally subdivided into square com-



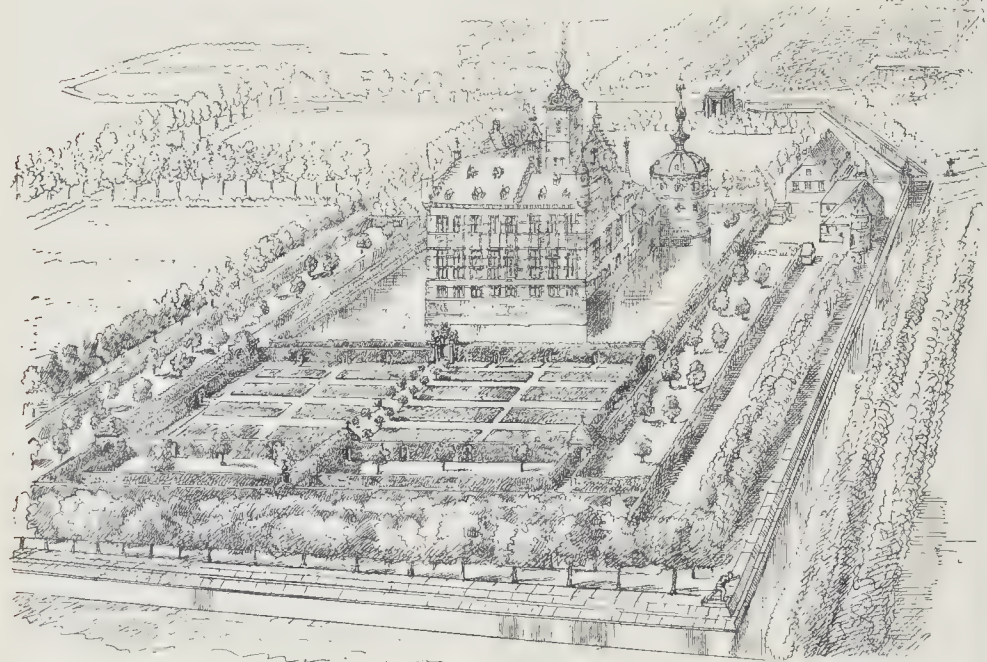
partments by lofty clipped hedges, and sometimes by little canals and water-courses; the viviers or fish-ponds, which were such very important accessories to these houses, were generally placed in an isolated position, outside the pleasure-gardens, as at Haldenberge. This was not always the case, because the great moat round the house itself not unfrequently served the purpose, and at La Hague the moat is still called *Le Vivier*. This also appears to have been the case at Brochem,\* near Lierre, which, judging of it from the four drawings given in Someres and Ravenstein's "*Castella et Prætoria Brabantia*," must have been, as far as its surroundings are concerned, one of the finest châteaux in the Low Countries. At Bouchaut, however, where there is another very fine castle, with buildings more Gothic in character than those at Brochem, although the moat round the castle is a regular lake as to size, we find three large fish-ponds as well; here, too, the moat is oval in form, and not

large vivier with a narrow causeway separating it from the river. A large square garden of a very elaborate description stands in the midst of the vivier, approachable only by the causeway. Dams, water-wheels, and sluices are hinted at, or represented in these old engravings; these were erected for the purpose of preventing the stagnation of the water. The great moat round the house appears always to have been upon a slightly higher level than the water-courses and canals surrounding the gardens, and waste leats appear to have been provided in every case, so that the surface water from the great moat could be drained off and its depth regulated by any surplus being carried off into the canals, and through them to a general "escape stream." The edges of all the canals, viviers, and water-courses are cut rigidly straight, and are not unfrequently furnished with a stone or marble lip. This was not done for the sake of appearance alone, but as a sanitary precaution,

only from 1757. Many of the illustrations are poor copies of those in Someres and Ravenstein. Several interesting facts, however, are brought to light by it; for we find that many of the châteaux had been rebuilt between the publication of the two works, notably the château at Breda, which had been re-erected by William III. of England.

The earlier engravings show very carefully the commencement of mischief in the buildings that are out of repair. Weeds are indicated in the moats, dams broken down, the edges of the ponds and canals are ragged and uneven, and the water stagnant; but where the mansions are in good repair we find everything neat and clean, and in good order,—swans in the moat, ornamental pleasure-boats on the canals filled with gaily-dressed people, and men fishing with nets and rods in the viviers.

We have alluded to the great garden, or "pleasure," which forms such a striking feature in the old Flemish country-houses.



The Château and Grounds of Brochem.

square or rectangular, as is usually the case. A curious feature also is the canal, which forms a second or outer moat, leaving a narrow causeway or strip of land between it and the great moat. The pleasure-garden and Bas Court have each the separate moat, and the avenues and water-walks are remarkably extensive.

At Diepesteyn the fish-ponds are shown very large indeed; in fact, they cover a greater area than the castle and grounds together.† At Leew the fish-ponds are also very large, and this castle possesses the rather unusual feature of a garden attached to the house and enclosed within the same moat. It is true that in addition to this little garden we have the pleasure as usual on the opposite side of the moat; another peculiarity is the fact that the Bas Court is between the house and the pleasure. All the best apartments of the house, however, looked on to the little garden within the moat, of course, not into the Bas Court; a small kind of jetty bearing a wooden structure, probably a bathing or fishing house, runs out of the pleasure into the great vivier.

The château of Loupouge has an unusually

\* See view of this château subjoined.

† See plate of lithograph sketches in this number.

as it prevented the accumulation of weeds, scum, and vermin at the edges. With care and attention paid to regulating the levels of the water, and constant cleaning, these extensive waterworks were probably not so deleterious to health as is usually supposed; but of course, directly these precautions were neglected, and the sluices and dams allowed to fall into ruin, the effect was disastrous, and it is not surprising that the elaborate waterworks of these old châteaux became plague spots when the country was overrun by an invading army, the beautiful castle reduced to ruin, the gardens laid waste, the water-courses choked up, and the viviers overgrown with rank vegetation. Even when Harrewyn, Hollar, &c., made the drawings and engravings for the works which we have mentioned, several of the castles in Brabant had evidently fallen into bad repair, and some of them were completely in ruin. These views are not dated, as a rule, but we find upon Hollar's engraving of Antwerp Cathedral, in "Someres and Ravenstein," the date 1649, and there is every probability that the other views in this work were made about the same time. The work itself is dated 1694. "Les Délices de Brabant" is a very inferior book, and dates

This usually was nearly square in plan, surrounded by a moat, and subdivided either by clipped hedges or small water-courses. In nearly every case there is a centre object,—generally a fountain. These fountains sometimes consisted of a small pond, with a *jet d'eau*, but more frequently they were elaborately and beautifully designed structures, with basins, statues, and architectural details, and would appear to have been constructed either of marble or metal work (probably bronze). A remarkably elegant one is shown at Percke, in the centre of a "pleasure," with very elaborately-arranged beds, clipped hedges, &c. (see plate). At Wemmel, a curious summer-house of clipped greenery forms the centre object (see plate); and in the "Château of the Lords of Daysbourg," a tall clipped tree occupies this position. The paths sometimes radiate from this centre object, thus subdividing the garden into triangular compartments; but more generally the subdivisions are square, the four squares nearest to the centre having their inner edges cut away in the form of four segments of a circle, so as to leave space for a circular path round the fountain or other central object. At Ter-Weuren, a very large and magnificent château, the great garden is



subdivided into four equal squares. There is no object in the centre, which is simply formed by the intersection of four paths, but each of the four squares has its own centre object, which in each case consists of a statue upon a rather lofty pedestal, with a low-clipped circle of box round its base. Sometimes when the "pleasance" is large it is divided into two distinct parts by a little canal or a tall-clipped hedge, the communication between one part and the other being either by a bridge or by a little ornamental archway of clipped greenery. When this is the case the two portions of the garden are treated in a totally dissimilar manner, one generally having paths and hedges radiating from the centre, and the other laid out in squares. The great garden was nearly always inclosed by a tall clipped hedge, considerably higher than those forming the subdivision, leaving a pathway between itself and the canal or water-course, which formed the extreme boundary of the garden; sometimes this path had a tall hedge on either side. The hedges appear generally to have been 8 ft. or 10 ft. high, but those which formed the subdivisions of the great garden seem to have been about 4 ft. high. The spaces enclosed between the low hedges are either planted out as flower beds or planted with foliage of various colours clipped and arranged in elaborate patterns, not unlike those upon a Persian shawl. There are no indications of coloured earths being used; in fact, that kind of ornamentation was rather Italian than Dutch. Possibly the Italians, finding their climate too dry to get the plants which were clipped into these elaborate patterns in the Low Countries to grow with them, introduced the ornamentation by means of coloured earths as a kind of imitation.

There were always one or more summer-houses in the great garden or pleasance, frequently as many as four, one in each corner. They were most frequently composed of cut greenery, but were also occasionally of brick or stone. A good deal of elaboration appears to have been expended upon them. At Wemmel, Gaesbeck, and Perke there are good examples. Sometimes they were enclosed and had doorways and glazed windows, and were covered with domical roofs, but occasionally they were open all round.

A "Green Vault," composed of trees with their branches trained so as to meet overhead and thus shade the pathway, forming a delightful promenade in very hot or in wet weather, is another frequent feature. One is shown in our view of Brochem. Niches or archways cut in the tall hedges are also occasionally to be met with. These niches and archways are sometimes open, but not unfrequently they are filled with urns, statues, &c., as is also shown in the sketch of Brochem. Nothing could well be more beautiful than the effect of a white marble statue in such a position, and there is, perhaps, no more charming way of introducing statuary into a garden; the contrast between the white marble and the dark green of a clipped yew hedge is very beautiful.

The kitchen-gardens and orchards, which are often shown as being very extensive, do not call for any special description, as they were pretty much what those features of a country-house still are.

A belt of trees generally surrounded the whole domain, and a long avenue led up to the principal entrance or bridge leading to the château; if it was a large and important estate, there were several of these avenues, all radiating from the mansion. Ham House, near Richmond, in this particular strongly resembles the treatment of an old Flemish château, the kind of unenclosed park which surrounds it, and the long, straight avenues of trees, quite recall the surroundings of a château of the Low Countries. A labyrinth or a maze is sometimes to be seen, and what would appear to be ornamental vineyards seem to be indicated.

The little château of the Prince-bishops of Würzburg at Veitshöchheim, to which we have previously alluded, possesses a most charming feature, though one which we should hardly have expected to find in the surroundings of an episcopal palace; it is no less than a complete open-air theatre, the auditorium

composed of various tiers of seats all covered with green turf, and the scenes of the stage are entirely of clipped greenery.

We do not find, however, any indications of the great isolated conservatory or ball-room which is to be found in some English houses, notably Kensington Palace. Possibly this was a more modern introduction, and may have been an imitation of the garden-hall, or belvedere, of the Italian Palazzo. These structures certainly found their way into Germany. We find two very remarkable examples in Prague, in the belvedere of the king's garden, and the so-called hall of Wallenstein's palace. Amongst the buildings of the Bas Court of these Flemish châteaux, it is true, we occasionally find buildings represented with great open arcades in front, but these must have been carriage or cart sheds, the fact of their being always in the Bas Court must exclude any idea of their having been intended as pleasure-houses or ball-rooms. Terraces with urns and statues on their balustrades, which form such a striking feature in some of our old English gardens, would not appear to have been very popular in the Low Countries, as in all the views we have examined we only find three châteaux which exhibit them to any extent; the most important is that in the castle of the Baron de Steil and Overhem, and here the terrace seems to have been rendered necessary by the fall of the ground, a circumstance somewhat uncommon in the Low Countries.

Some portion of our description of these Low Country mansions, and their surroundings, may recall to the minds of our readers the gardens at Hampton Court Palace, and no doubt as originally laid out they were completely Dutch in character. The water-works, canals, &c., are still pretty perfect, but the gardens themselves have been nearly spoiled through the English landscape-gardeners; great bald lawns, and huge, wide gravel paths, beloved by English gardeners and hated by every man who has the slightest feeling for picturesqueness, now occupy the site of the trim clipped gardens of former times. The old yew trees, it is true, are allowed to remain, but they are absolutely out of place amidst their modern surroundings. Not content with ruining the gardens at Hampton Court, a few years ago the forecourt, with its beautiful wrought-iron gates and enclosures, which gave such a scale and dignity to the east front of the building, were removed, portions of them being stowed away in the South Kensington Museum. Surely there is sufficient artistic taste in the country to see the propriety of replacing these, and to admit that Sir Christopher Wren understood how to treat the surroundings of his buildings in a more appropriate manner than the modern landscape-gardener does it. The present huge gravel path, or rather gravel desert, out of which the building rises, is destructive of all scale, and gives it an isolated and forlorn appearance. Now, it is just this kind of dull, dreary, isolation which the Flemish builders, and, for the matter of that, the old English builders as well, did everything in their power to avoid. There can be little doubt that the gardens and surroundings of old houses were designed and arranged by the architect of the house himself, and it is for this reason that they always seem right in scale and appropriate to the building; whereas the modern landscape-gardener, knowing nothing whatever about architecture, looks upon a garden simply as a garden, without any reference whatever to its surrounding objects. He has an idea handed down to him from the "Capability Brown" school that a great, unbroken lawn "gives breadth," that a wide gravel path "gives a noble approach," and, consequently, he will give you these features whether your garden is 30 ft. or three miles square. Now, the old designers of gardens, before they planted a tree or laid out a path, considered how it was to affect the buildings and other objects which were in its proximity.

In addition to the reasons that we have given for a very careful and exhaustive study of the scale of surrounding objects, the Flemings and Dutch had a still further reason for studying this point in the laying out of their gardens.

With them, distant views and even glimpses of a distant landscape were things to be thoroughly avoided. Even in England the Medieval, Elizabethan, and Queen Anne house-builders never went out of their way to obtain extended views from their houses; it was left for the dreary Classical architects, at the close of the last and the commencement of the present century, to stick their mansions on the top of some bleak, desolate hill, pleasantly exposed to the east wind, and unsheltered from the sun's rays during the dog days. But the Dutch and Flemings had every possible reason for excluding distant views. A vast level tract of unbroken country, with a sluggish canal flowing through it, was not calculated to form an enlivening prospect from a drawing-room window, and they consequently took great care that there should be no outlet beyond the pleasant gardens, high-clipped hedges, and avenues surrounding the domain.

The conservatories, orchid houses, forcing houses, palmieries, ferneries, and other glass-covered buildings, which usually form such ugly adjuncts to our country houses, are, of course, not to be found in the ancient châteaux of the Low Countries; nor in the châteaux of the Low Countries do we find other hideous surroundings of the modern country house; they had no gas-works, engine-house, or steam-laundries to deal with. Whether they would have found some picturesque treatment for these hideous adjuncts of a modern country house we are unable to say, though from the pretty way in which they treated the various buildings of the Bas Court, from the beauty of all old barns, granaries, farm buildings, wind-mills, and water-mills, they might have hit upon some means of rendering these buildings at any rate less disfiguring to their surroundings than they are at the present day.

#### NOTES.



DE LESSEPS has made a new application to the French Government to sanction the emission of a lottery loan for the Panama Canal. The sum for which he now asks is 565 million francs, with a further and undefined sum for the conversion of some of the actual debt. If this new Loan is sanctioned, M. de Lesseps states that, "on the day of the opening, in 1890, the Canal will have cost one thousand and five hundred million of francs." This figure, however, large as it is, by no means represents the total cost at that date, according to the official statements made from time to time in the *Bulletin du Canal Interocéanique*. These comprise (1) the constituted capital of 300,000,000 francs; (2) the Loans of 1882, '83, '84, and '85, amounting to 629,833,500 francs; (3) the Loans of 1886 and 1887 (issued at 55 and 56 per cent. discount), which amount to 717,689,000 francs; (4) the Loans now in question, amounting to 565,000,000 francs, making a total of 2,212,522,500 francs, or 712,522,500 francs more than the sum now stated. It is not for us, but for the directors of the Canal, to explain this unparalleled discrepancy in their own statements. It is, however, the fact that the rebate or discount on items 2 and 3 amount, according to the annual balance-sheets published in the *Bulletin*, to 615,657,000 francs. This sum, though not received in cash, forms as integral a portion of the responsibilities of the Panama Company as any item of their capital; and the Company are under obligations to repay the whole of the larger sums, which we have calculated from their own numbers of obligations issued, at the date specified in the several conditions of Loan. We wait to see what explanation will be given of a misstatement which could hardly fail to mislead any public writer who had not access to the records published by the Canal Company. The *actif disponible ou réalisable* on the 30th of June, 1886, was 132,388,966 francs. The cash received for the loans of 1886 and 1887 (less any commission or banker's discount not published) was 320,371,180 francs. M. de Lesseps says that on January 1, 1888, the Company will have on hand about 110,000,000 francs, making the expenditure for eighteen months amount to



342,760,146 francs, which is equal to 13,710,400*l.*, or nearly 762,000*l.* per month. The excavation during the last six months of 1886 amounted to 5,044,000 cubic metres, that during the first six months of 1887 amounted to 6,900,000 cubic metres. In July and August of the present year 1,963,000 cubic metres were returned; the cube of September not having been published in the *Bulletin* of the 2nd inst., which admits a considerable falling off in the monthly total, owing to rain, floods, and want of workmen. For the fourteen months, therefore, the monthly excavation amounted to nearly a million cubic metres per month, instead of the three millions anticipated by M. Charles de Lesseps in March, 1886; and the cost, on the rough rule of dividing expenditure by cube of earth-work, was 15-24 shillings per cubic metre. Thus if the excavation yet unfinished be reduced, as proposed, to forty million cubic metres, and if it be executed at the actual rate of one million per month, three years and four months' work is requisite for this alone, bringing us to March, 1891. This, however, takes no note of the cost and time required for constructing 12,000 ft. run of locks, in a country where skilled labourers are now receiving 26*s.* per day. And if it be proposed, as appears to be the case, to run the canal level from either end until it reaches the 14 kilometres of mountain, up which it is now proposed to raise the waterway, it is evident that the problem is not one of easy solution. As to the provision for the floods of the Chagres, the *Bulletin* of September 2nd last speaks of the commencement of the dam between Obispo and Santa Cruz, of which the last annual report of M. de Lesseps announced the abandonment.

**THE** judgment which Mr. Justice Kekewich delivered in the case of the Birmingham, Dudley, and District Banking Company *v.* Ross, on Saturday last, will, if it is upheld by the Court of Appeal, have a material effect on the administration of the existing law of light. There is a well-known principle of law that a man cannot derogate from his own grant: so that if A grant a building to B, and later on an adjoining piece of land to C, the latter cannot build so as to interfere with the light of B's house. In the case to which we have just referred, the Corporation of Birmingham demised to the plaintiffs' predecessor in title a house near a thoroughfare where new and important buildings were likely to be erected. They were erected on adjoining land, demised by the Corporation after that owned by the plaintiffs, and so obscured the plaintiffs' lights. Mr. Justice Kekewich held that primarily the above principle applied, and that the plaintiffs would, under ordinary circumstances, have been entitled to an injunction, but that the predecessor of the plaintiff in title "must be taken to have known what class of buildings were likely to be erected in a broad street in a commercial town." Knowing this, the plaintiffs were held not to be entitled to the relief which they would otherwise have received. This decision is in reality entirely a new one in point of law. It appears to raise many difficulties. For example: A man buys a house near a thoroughfare which is afterwards, and at a considerable distance of time, made an important street. Is the owner of this house bound to anticipate this change? We mention this as a possible difficulty, and showing the way in which the case in question may give rise to trouble. So long as the law of light in its present state exists we doubt both the practical wisdom and the legal soundness of this decision. There is also this to be observed, that the Corporation could have at the time of selling the house in question have made an agreement that a perpetual easement of light did not go with it. They not having done so, it seems to us the purchaser was entitled to believe that the usual easements went with the building he purchased.

**A**MONGST the various Bills for which application will be made by the Board of Works in the course of next session there are

none that relate to any metropolitan improvement on an extensive scale; such as, for instance, to another Shaftesbury-avenue or Charing Cross-road. As touching their yet incomplete project of a direct thoroughfare from Gray's Inn-road, by the Holborn Town Hall, through Clerkenwell to Islington, the Board mean to ask for a two years' prolongation of the period, which is at present limited by their Various Powers Act of 1885. It seems that, whereas the Home Secretary has approved of the provision made by the Board for rehousing the working classes dispossessed in the region to the south-west of Farringdon-road, the Board still await Government sanction for their scheme as in continuation of the route. They are thus, in effect, hindered from purchasing more of the property along Exmouth-street and about Sadler's Wells. By the end of this current month the Board will have deposited with the various local offices concerned, all statutory plans, sections, proposals, and the like thereto, in connexion with their schemes, as follows. It is proposed to transfer and vest in the Board two plots of land in St. Giles's, Camberwell, parish, whereby approaches may be made to Dulwich Park from Court-lane and Dulwich Common-road, and to add the same to the Park which is already under the Board's control. Similarly, an extension of Kennington Park is contemplated, by including therein the piece of land that now lies between the Park northwards, and South-place. A recreation-ground for Lewisham will be provided by the enclosure and preservation as an open space of certain lands by the river Ravensbourne, and situated between Catford Hill and Ladywell. A foot-bridge will be thrown over the Mid-Kent railway, which passes through the ground marked out. At Fulham it is designed to improve the Middlesex approach to new Putney Bridge by a widening of Church-street. This involves the demolition of the houses along the southern side, and from School House-buildings along the northern side, of Church-street to where it meets the junction of the Hurlingham and King's roads. The Board of Works for the Poplar District will be called upon to contribute to the cost and maintenance of a bridge across the Limehouse Cut, with approach roads in Bromley (St. Leonard's parish), at a spot close by the North-Western and Dock Junction Railway. A new site, it appears, is chosen for the Thames Tunnel from Blackwall to Greenwich, somewhat to the west of that whose construction is sanctioned by an Act which was obtained in the session of this year. The Board again intend to apply for extended provisions under their Fire Brigade Act of 1865, with their Loans Act of 1869; and for power to inspect and license houses and other places of public resort used for stage plays, dances, music, or other entertainments.

**IT** cannot be said that the Metropolitan Board of Works has rehabilitated itself in public opinion by its recent proceedings. What is called the "Robertson Scandal" has been the main theme of debate. It will be remembered that in July last the Board, after investigating the serious charges made against Mr. T. J. Robertson, principal clerk in the Estates office of the Superintending Architect's Department, came to the conclusion that he was deserving of censure. Incidentally arising out of these charges against Mr. Robertson, imputations, more or less vague, were made against the Board itself,—or a section of the Board, at any rate; and the Board, in answer to these imputations, took the very singular course of appointing itself as its own committee to inquire into its own conduct. This inquiry, as might have been expected, led to nothing,—partly, as is alleged by the critics of the Board, because the Board could not compel witnesses to come forward, and because the evidence given by such witnesses would not be privileged, as evidence given before a Parliamentary Committee or a Royal Commission would be. The Board adjourned for the recess, and the matter slept for a time; but one of the first acts of the Works and General Purposes Committee, after the recess, was to

bring up a report recommending that "no further action be taken in relation to the vote of censure passed by the Board upon Mr. Robertson in July last." This was met by an amendment that "Mr. Robertson's engagement with the Board be terminated at the earliest period practicable." The amendment was lost, but only by three votes, and a further amendment, confirming the censure, was carried by a large majority. At the last meeting of the Board, a resolution was carried recommending that Mr. Robertson be removed from the Superintending Architect's department, and referring it to the Works and General Purposes Committee to consider to what position he should be transferred. At the same meeting a resolution was passed to the effect that if the Home Secretary or the Government cared to call for an independent public inquiry into the proceedings of the Board, the Board would give every facility for the holding of such inquiry. We hope that such an inquiry will be held, and that it will be thorough and exhaustive, for the Board and its officers ought to be placed above suspicion.

**IT** appears from a report by Mr. Wm. Crookes, Professor Odling, and Dr. C. Meymott Tidy, that the water supply of London during the month ending October 31st was of exceptional purity, as it had been during the three preceding months. During the months of July, August, and September the mean proportion of organic carbon in the water obtained from the Thames was 0.136 part in 100,000 parts of water, or less than one quarter of a grain per gallon. The supply during the past month was found to be practically identical with that of the preceding months; all the samples examined, whether derived from the Thames or the river Lea, were free from turbidity, and unexceptionable as regards colour. The public are warned that they must not expect this high standard to be maintained during the coming rainy season. The average degree of hardness was 13.19 degrees.

**SIR GILBERT SCOTT'S** design of the University Buildings in Glasgow, his largest secular work in Scotland, has now been completely carried out by the addition of the spire to the great central tower. Sir Gilbert's largest ecclesiastical work, the Cathedral Church of St. Mary, in Edinburgh, is imperfect as regards the two western spires and the chapter-house, which remain unbuilt. Dean Montgomery is exerting himself with a view to raising a fund to meet the cost of erecting the spires. This work, if carried out, will give to the church a marked individuality not only in the city, but as regards the whole of Scotland, there being no ecclesiastical edifice north of the Tweed having three towers or spires. Glasgow Cathedral did, of old, possess three such features, but the central spire only now remains.

**THE** value of sea-water as a sanitary agent is well known; for the flushing of drains and watering streets it is invaluable; and its use in the form of hot baths is of great benefit in many complaints. Such being the case, it is a somewhat remarkable circumstance that greater use has not been made of the inexhaustible supply where it is available. North Shields is one of the very few places which have been quoted as using salt-water for flushing purposes, and, we understand, with the most satisfactory results from a sanitary point of view. The matter has been taken up by certain members of the Edinburgh Town Council with a view to the introduction of a plentiful supply of sea-water into the city, and we have no doubt that if the object is attained a great boon will be conferred upon the citizens.

**WE** are desirous to give increased publicity to the following memorandum in the *Journal of Proceedings* of the Institute of Architects:—

"A prize of ten guineas for the encouragement of the study of stereotomy,—offered by the President of the Institute and three other members of the Council,—will be given next year to the candidate



who submits the best working drawings and model of 'Vaulting at an Angle of a Cloister.' The models will have to be constructed, probably, in the rooms of the Institute, and in the presence of moderators appointed by the Council. The competition is an open one, but, obviously, only those who have had previous instruction in the science of masonry will stand any chance of obtaining the prize. Mr. Harvey has therefore arranged to open a special class this December, which, he states, is to be limited to sixteen pupils. Thanks, however, to him, there are now other young architects in this country competent to give instruction in the science of masonry, and other classes of instruction may be held, if the applications to attend Mr. Harvey's special class exceed, as will probably be the case, the limit of sixteen which he has fixed. Moreover, all students of masonry will do well to read the paper by the late Professor Willis, F.R.S., on 'The Construction of the Vaults of the Middle Ages,' in the *Transactions*, 1842."

Mr. Lawrence Harvey's attainments in regard to the class of subject referred to, and his success in teaching it, have been frequently referred to in our columns. We are glad also to see that the solid learning and merit of Professor Willis's brilliant essay are not forgotten by the present generation.

**A**n appeal is made for funds for the repair of Fairford Church, Gloucestershire, for which the large sum of 3,000*l.* (large in relation to the size of the church) is required, of which sum about 700*l.* have been obtained from the parishioners of Fairford and their friends. It is expressly declared that no attempt will be made to "restore" the damage and decay from which the stained glass has suffered, whether from the action of the atmosphere or at the hands of iconoclasts. It is stated that the windows require re-leading and the roof immediate repair for the safety and preservation of the church. The re-leading of the windows will be done upon the spot, and only one light will be undertaken at a time. When fragments of glass are obviously misplaced they will be replaced in their original position by the aid of the late Rev. J. G. Joyce's monograph, read before the Bristol and Gloucester Archaeological Society in 1878. No portion of a face or landscape which is missing will be replaced otherwise than by white glass; the fold of a robe, however, it is suggested, may be supplied by an unmistakable wash of colour on the white glass. The committee will have the assistance of Mr. T. Gambier Parry in dealing with the windows, and every effort will, it is stated, be made to preserve the glass *in situ*. The estimated cost of the repairs to the windows alone (with the necessary contingencies) amounts to 1,000*l.* Mr. F. S. Waller, of Gloucester, is the architect for the proposed works.

**CAPTAIN MONRO**, her Majesty's Inspector of Constabulary, has intimated to the Edinburgh City Authorities his intention to report that he considers the central police establishment defective in its arrangements and accommodation. There are certainly good grounds for Captain Monro adopting such a course, although it is hard upon the Corporation that they should be called upon to overhaul a building the execution of which was placed in the hands of the architect of the Board of Works (the late Mr. Nixon) so as to avoid the probability of what has now taken place. The building was erected about thirty years ago, and is most defective as regards planning. The police-court room, and the accommodation provided for witnesses, are such as to entail great hardship upon persons of respectability who, from no fault of their own, are compelled to enter the premises. The building is neither admirable without nor within, and it would, in the long run, prove the truest economy to make a clean sweep of it and erect entirely new premises either on the present or another site.

**MR. AMBROSE M. POYNTER**, son of Mr. E. J. Poynter, R.A., has recently translated for private circulation Dr. Pietro Saccardo's report on the principal works executed to the basilica of St. Mark at Venice during the year 1886, and proposals for additional works to be carried out in the year 1886, to which we referred at length a year

ago (*Builder*, Dec. 4, 1886, p. 796). The report was reprinted in the publication called the *Archivio Veneto*, Series II., vol. xxxii., pt. ii., 1886. With regard to the works for the year 1886, the report concludes,—"We have before all to complete the repair of the principal façade in the last arches to the right, with which is connected the substitution of the antique slabs of marble on the south front as a work embraced by the same project and the same ministerial sanction. In the interior of this part the Capella Zeno has, of course, to be completed with the restoration of the semi-circular part, very much decayed through the saltness of the air, and with the re-application of the slabs wanting to the rest of the walls. Besides these there still remain to be applied, as has been said, a few pieces of the antique mosaics of the vault; and that of the semi-dome ought to be taken down and replaced, preserving the two angels and remaking the figures of the Virgin with the Child, as they are now reduced to a mere blot of very bad restoration. For the model, not being able to count on the existing figure for an approximate reproduction, we shall have recourse to one similarly designed that exists in the semi-dome of the cathedral at Torcello, taking advantage of the scaffolding that is now there to make a tracing. . . . Turning to the exterior, we find that the lead covering of a part of the roof and of the cupola is in want of renovation. In this last it will be advisable to make use of old sheets of lead in the parts which are visible from below in order to preserve their antique and picturesque aspect. The walls of the three lunettes above the façade have still to be restored, and the gables that belong to them, with their decorations in marble, as well as the two pinnacles placed between them." It may be assumed that the whole of these works have by this time been carried out, and, as will be seen, a part consists of a restoration of a restoration.

**BY** an order of the Ministry of Public Instruction of Fine Arts, published in the *Journal Officiel* of November 20th, the "Service des Monuments Historiques," which has since 1879 had possession of the east wing of the Trocadéro Palace for the establishment of a Museum of comparative Sculpture, is authorised to take possession of the west wing also, to give a further development to the museum, which will be indispensable in order to complete the series of works by French sculptors.

**I**n the Edinburgh Dean of Guild Court, held on the 17th inst., plans for the rebuilding of Newsome's Circus, recently destroyed by fire, were approved of. The new building will accommodate about 3,000 persons, and will cost about 5,000*l.* Noncombustible materials are to be used in every instance where practicable, and the seating is to be coated with asbestos paint. The general feature inside is an amphitheatre where no part of the audience will be over another except at the main entrance, where a small gallery is to be placed. In the event of a panic no less than eight separate exits will be available. An endeavour is to be made to push forward the construction of the building so that it may be ready for the Christmas holidays. This hasty mode of construction often leads to imperfectly-executed work, and is the cause of many of the mishaps which occur.

**WE** are very glad to find that between the liberality of the British School at Athens and that of the President of the Institute of Architects, who have each contributed 50*l.*, there is a travelling studentship in Greek archaeology worth 100*l.* to be competed for. It is not very clear whether the studentship is to be regarded as in connexion with the Institute or with the School at Athens; the latter proposed, the Institute is the authority to be applied to for particulars, so we presume it is a joint matter between the two Institutions; but the position is not very clearly defined in the note in the *Journal of Proceedings*, except that the terms and conditions are to be obtained "only at the office

of the Institute." The selected student will probably have to start for Athens early in January, and there hold himself at the disposal of Mr. Ernest Gardner, the Director of the British School.

**THE** manager of the Donegal Industrial Fund, established to encourage Irish Industries, having invited us to look at some specimens of the work lately produced by distressed Irish ladies and by Irish peasants, we have visited the dépôt of the Fund at 43, Wigmore-street, and examined a small collection of *portières*, curtains, and other embroidered and lace fabrics, which exhibit excellent taste and skill, and look as if they ought to be exceedingly durable. The materials used are, almost without exception, of vegetable origin, and chiefly flax dyed with vegetable dyes to a variety of pleasant, soft, or sober colours. The designs are well drawn, and exhibit a very judicious restraint, and considerable knowledge and skill in the combination and distribution of forms and colours. The material has, unavoidably, a somewhat hard and coarse look when closely examined; and the majority of the ornamental patterns, founded on Celtic originals, appear a little coarse and barbarous beside the more delicate ones imitated from Italian work; but if the two are not seen together this objection is not apparent, and the simple vigour and conventional forms of the earlier style are in themselves very pleasing.

**THE** cities of the Lombard plain, between Brescia on the east and Verelli on the west, possess supremely fine examples of two schools of architecture, the brick and terra-cotta of the thirteenth, fourteenth, and fifteenth centuries, and the Early Renaissance or Bramante school. The Tower of Chiaravalle, the little façade of the Church of St. Maria in Istrada at Mouza, and the Certosa of Pavia, are three notable examples of the former. The sacristy of St. Siro at Milan, the Churches of S. M. Incoronata at Lodi and Pavia, and the parish churches of Saronno and Busto Arsizio are the finest examples of the latter. Lovers of architecture and the allied arts travelling in Italy often miss seeing these and other important but comparatively out-of-the-way works of art, for want of having their importance duly insisted upon in the usual guide-books. "Como and Italian Lake-Land,"\* by the Rev. T. W. M. Lund, though not a guide-book in form, is such in fact, with this further advantage, that it is evidently written by a man of taste and learning. It covers all the artistically important part of Lombardy, as well as the district named in the title. Intending travellers will do well to bear its existence in mind.

**THE** article on "Architecture" in the "British Almanac and Companion for 1888," is a forcible and well-written sketch of the architectural work of the year, accompanied by some sensible and outspoken criticism on various points, concerning most of which we have already expressed ourselves to pretty much the same effect. The writer is an advocate of progress and an opponent of copyism, in which also we are with him.

**WE** have received from Messrs. Josiah Wedgwood & Sons a very elaborate illustrated catalogue of their tile designs for floors and walls. The reputation of this firm is, of course, historical, and we have no doubt the tiles are of excellent quality; but as they invite our criticism we cannot help expressing our surprise that manufacturers whose name has been connected with so much artistic work in the past should not have made more effort than appears here towards the production of what could be truly called artistic designs, instead of mere patterns on the old well-worn lines of squares and cross checkers and diamonds. Of course, it is necessary to have a certain number of easily-executed designs which will not be too costly for ordinary work; and the makers may say, no doubt, that the real object of a pattern-book is to show how every-day demands may be supplied. We find, however, little or nothing beyond this every-

\* London: W. H. Allen & Co. 1887.



day quality. We have no positive objection to make against the designs, unless with regard to the colour of some of them (No. 169A, for instance, one of the largest illustrations, is a very crude and harsh combination of predominating greens and reds); our complaint is that they are entirely uninteresting, and show no thought, invention, or feeling for artistic effect in the higher sense. To arrange bands and squares crossing each other, with different arrangements of squares and lozenges for filling in the centre, is a kind of thing that a child can do if you give him the pieces to put together; and among all the floor patterns we cannot see a single one of which we can feel that we would desire to lay our floor with for the pleasure of seeing it. All that can be said is that they are neat and more or less effective, and will "do" very well for their purpose. But surely something more may be done even with machine-made tiles than this. The designers came rather near evolving something in Nos. 171A and 173A; but they cannot escape from the mere juxtaposition of alternating arrangements of squares, &c. A study of such designs as those of the Arabic school might have suggested the step further in invention and contrivance which would have removed these from the category of "patterns" to that of "designs."

#### ROYAL INSTITUTE OF BRITISH ARCHITECTS.

The second ordinary meeting of this Institute for the present session was held on Monday evening last, Mr. Edward P'Anson, F.G.S. (President) in the chair.

##### *Gifts to the Library.*

Mr. J. Macvicar Anderson (Hon. Sec.) said it was not customary at the ordinary meetings to put forward presentations, but two gifts which had just come into their possession were of such special interest that he wished at once to acknowledge them. The first was a chromolithographic view of the Tower Bridge, sent by direction of Mr. George Shaw, Chairman of the Bridge House Estates Committee of the Corporation of London. Considering that this was one of the last works of the late Sir Horace Jones, Past-President, it possessed exceptional interest for the members of the Institute. The other presentation was "Architectural Drawing," by Mr. R. Phéné Spiers, any work emanating from whom on such a subject must be of considerable value and interest.

Mr. Charles Fowler drew attention to a donation to the library which would be made in the course of a day or two. It had occurred to him that the Regulations of the Metropolitan Board of Works, on the various matters concerning buildings, did not exist in the library in a collected form. He had, therefore, asked the Superintending Architect to kindly furnish him, for the library, with a copy of the Regulations, and had obtained them in duplicate. These, he believed, would be more particularly useful to the younger members who were thinking of passing the District Surveyor's Examination.

Mr. C. J. Phipps, F.S.A., remarked that the Regulations were very illusory. When they had followed every line of them it would be found that the Building Act Committee of the Board wished a great many things more. In fact, they were not of the slightest value (laughter).

##### *The School of Athens.*

The President drew attention to the fact that the School of Athens had invited students to come there and study for four months, the only condition being that they should be prepared to assist in the excavations. The School was prepared to contribute 50*l.* towards the expenses of any student who desired to avail himself of the invitation, and the Institute was prepared to add another 50*l.* Application should be made before the 10th proximo to the Hon. Secs. of the Institute. There was only one studentship at present.

Mr. Macvicar Anderson said he must correct the President in one particular. The Institute was unable to contribute the 50*l.*, but Mr. P'Anson himself had liberally offered to find the additional 50*l.* out of his own pocket (applause).

#### *Building and Decorative Stones of Egypt.*

Mr. W. Brindley, F.R.M.S., read a paper on "Building and Decorative Stones of Egypt," of which the following is an abstract:—

**Limestones.**—The Egyptian quarries, which played an important part in the architectural history not only of Egypt but of the ancient Roman Empire, were nearly all on the east side of the Nile. The Pyramids being the most ancient and impressive remains, the author commenced by considering the material used in their construction. There had originally been seventy, of which twenty still existed. Much of the stone used was a nummulitic limestone, quarried on the spot in cubical blocks and built in steps. The triangular casing was a fine cream-coloured magnesian limestone, quarried at Toora and Masarah, and all cut out of the solid rock to the size required. Except in a few lower ones recently unearthed, these stones had all been used to build modern Cairo. A fragment shown by Mr. Brindley, which had the vertical and horizontal joints (giving the angle correctly), showed the surface wear of 4,000 years, with the original tooling of the joints. No stone could have worn better. The quarries immediately behind Thebes were of fine limestone, to which the Egyptians were very partial for sarcophagi and small sculptures, owing to the extreme fineness of the grain. It was like close chalk, only much harder and of warmer colour, and occasionally contained brown flints.

**Sandstones.**—Next in importance sandstone had been mostly used for the building of temples. It was of a warm grey colour with fine texture. The quarries, which were at Silsileh, consisted of extensive grottoes and open spaces, where the workmen had followed the best beds, cutting out the blocks with the greatest care and tooling them on the spot. They were then floated down the Nile on rafts. These stones were usually set dry, the finished faces afterwards being coated with stucco, in some cases hardened with albumen or gum, to receive colour decoration.

**Granites.**—The famous granite rocks of Syene formed part of the igneous range running parallel with the Red Sea. The ancient quarries were in the Eastern Desert, about two miles from Assouan (the ancient Syene) and very extensive, but the deepest not exceeding 80 ft. In the first was the so-called unfinished obelisk, which was a dressed mass of rock attached on the bottom bed and back to the parent rock; the length was 95 ft. and the width 11 ft. It had a series of transverse cuts on the top bed, indicating blocks for sarcophagi. Mr. Brindley had come to the conclusion that it was not an obelisk, but a bed of stone, dressed by a gang of task-workmen or convicts, to be cut up into sarcophagi, and that it was work of the Roman period.

**Mons Claudianus.**—The grey granite "Lapis Psaronius" (spotted like a starling) had been extensively used in Rome for the Forum of Trajan and the monolith pillars of the Pantheon. The quarries, which appear to have been worked only by the Romans, were near the porphyry quarries between the Red Sea and the Nile, and ruins of workmen's huts, a temple of the Roman era, and monastic buildings of a later date still existed there. They appear to have been worked only by the Romans. Mr. Floyer, in a letter to the author, states that pillars, 59 ft. by 8 ft. 6 in. diameter, accurately wrought, were still in the quarries. In history they were called the quarries of Mons Claudianus, but must have been worked previously to that period as they had been used for the Pantheon.

**Durability of Granites.**—The granites and syenites of Egypt had not worn well, compared with some inferior stones. The decay was chiefly from the peeling off of the polished surface. Patches, a few feet square and about an inch in thickness, all loose and ready to drop off at the slightest touch, were to be seen. The great polished blocks in the Temple of the Sphinx appeared generally sound, but if tapped with the rule sounded hollow, and the obelisks at Karnak were peeling. It should, therefore, be remembered with regard to our Cleopatra's Needle that we had not received it sound.

**Imperial Porphyry.**—The ancient Egyptians appeared never to have discovered their most beautiful stones; this had been done by the Romans, whose men of science had not neglected even places most difficult of access. For example, a noble red purple stone had been found on the summit of a desolate mountain

4,000 ft. high and 100 miles from habitations. A colony was established of thousands of workmen, who received their provisions from the Nile, stations being built, wells sunk, and huts erected on the route. This route Mr. Brindley and his wife had journeyed over on camels from Keneh, for thirteen days, in order to visit the quarries.\* The Bedouins in whose charge they had been were most trustworthy, and far more intelligent than is generally credited, having been most useful in Mr. Brindley's researches. The quarries were on Gebel Duchar (the mountain of smoke), which rose abruptly out of the plain in the shape of a long horseshoe; the valley between containing a small town, wells, and reservoirs, with a temple, in pink granite, of small dimensions. In addition to many ordinary roads and footpaths there existed the remains of two grand block roads, with piers at the sides for lowering stupendous blocks by means of ropes. The porphyry was in masses, some 120 ft. wide, while many of the choicest varieties were only about 10 ft. wide, and appeared to have been upheaved through a mass of granite and blackshale, trap rock, the granite being burnt apparently through the heat of the porphyry. The whole mass appeared of fairly uniform texture, but some of the obtrusive parts were very different, being volcanic worn masses of variously-tinted porphyry boulders embedded in a purple felsite paste. This gloriously coloured stone was the only one in the scale of colour the Romans lacked, and it had never become a commercial material, having been imperial from the first, and worked only by and for the State. There still existed about 300 monolith porphyry pillars in Europe, and the stone was to be found in Asia as far as Baalbec and Palmyra. In all cases it still retained its freshness of colour, proving beyond a doubt its durability. The Romans had evinced great partiality to porphyry for sarcophagi. That of Nero was the first mentioned, and the largest known to exist were those of Helena and Constantia, the mother and daughter of Constantine the Great, now in the Vatican. A room named the "Porphyrea" in the Imperial Palace at Constantinople had been lined with porphyry brought from Rome by Constantine, and in the reception-hall of that palace there had been a large porphyry slab under a baldachino, on which the Emperor stood at great festivals. What with Christian conquerors at Constantinople and Doge Dandolo little now remained. The most important monument erected by Constantine was the column 100 ft. high, built with eight cylindrical pillars, each 11 ft. long, and this was still standing, although damaged by fire and earthquakes.

**Opus Alexandrinum.**—A great quantity of precious porphyry had been cut up for pavements in early Christian times. Some of the circular plaques were very large, one in St. Peter's being 8 ft. 6 in. across. According to Dr. Schneider, Prince Charles of Prussia had formed the most famous collection of ancient porphyry works of art, including a colossal statue of Minerva and a grand pavement of opus Alexandrinum, brought from Ravenna. Amongst the works in porphyry in this country might be mentioned the plaques and pavement to the royal tombs in Westminster Abbey and the pavement under "Becket's crown" at Canterbury. The South Kensington Museum contained some very beautiful examples of Renaissance and French work, and the British Museum some of the Byzantine period.

**Marble Verde Augustus.**—This was a green serpentine, and was called by other names according to the variations of the markings. It had been used by the Egyptians for small figures, and by the Romans for articles of vertu. In the desert at Din Station there had been workshops for small articles in porphyry and this serpentine. Mr. Mitchell, the geologist, had found it in an adjoining mountain while making his interesting collection of rock specimens of the Red Sea formation, which is now part of the new museum at Cairo.

**Oriental Alabaster.**—The lapis onyx or marmariticum of the ancients was called onyx, owing to its semi-transparency, like the finger-nails. A number of old quarries had been discovered, and those near Benis-coef had been re-worked for the great mosque of Mohamed Ali at Cairo. Alabaster was a favourite material with the Egyptians and Greeks, taking its name from the vessels for perfumed unguents.

\* See account of this journey in the *Builder* for the 12th inst., p. 683.



called "alabastra," and was for domestic purposes and the interior decoration of temples, as well as for sculpture and sarcophagi. The grandest sarcophagus yet discovered was that in the Stone Museum. Egyptian alabaster was usually white and yellow, with occasional thin markings of red and purple. Alabaster had been used by the Romans and Greeks for every description of decorative work.

**Breccia Verde.**—This was a very beautiful and rare marble conglomerate, found only in Egypt. The general colour was greenish, due to the quantity of green granite boulders, in addition to which were pieces of porphyry, red jasper, green felspar, different kinds of slate rock and serpentine; the whole being cemented together by a greenish silicious paste. The quarries had been known and worked by the ancient Egyptians and were situated at Hammamat. There was a considerable quantity in Rome and Constantinople obtained during the Roman occupation, and during the Renaissance period much old material had been cut up for ornamental purposes by the French and Italians.

**The various Anathites.**—Dionites, felsites, and all similar very hard stones, used for sculpture and mummy cases, were all dykes or intrusive veins formed in the igneous rocks at Syene and in the Eastern desert.

**Gems and Ornamental Stones.**—The Egyptians had been great lapidaries, and used nearly every sort of gem stone known to us, except the diamond, ruby, and sapphire. The emerald mines at Gebel Zabara had been worked from early times down to that of Mohammed Ali; the gold mines were at Gebel Allakke, south of Assuan, and copper was obtained near the porphyry quarries.

**Quarrying and working hard Stones.**—Mr. Brindley was of opinion that the Egyptian methods were precisely the same as our own were up to a few years ago, viz.:—heavy pick tools for scrabbling dressing and making holes or wedges, the blocks being split with metal wedges; dressing masonry surfaces with large and small picks; then rubbing down with flat stone rubbers and sand; and finishing with bronze or copper rubbers and emery powder. The wedge holes, plentiful enough in the granite and porphyry quarries, were the same as ours. Some Egyptologists thought they had discovered the results of gem-stone drills and saws by a few holes and slabs being drilled, but a piece of granite (exhibited) bored with a copper tube and coarse emery powder produced the same result as found in Egypt, while Dr. Schlimmann told the author that he thought the stone hammer-heads of pre-historic times were bored with wood and emery powder.

In the discussion which followed, Mr. Waterhouse, B.A., in proposing a vote of thanks to Mr. Brindley, remarked that he had always considered porphyry was to building materials what the diamond was to other gems. It had hitherto been out of the reach of the ordinary architect, but he hoped Mr. Brindley could tell them something about the re-opening of the old quarries for the benefit of the present and future generations.

Mr. Aitchison, A.R.A., seconded the vote of thanks. Mr. Waterhouse's remarks as to porphyry were perfectly true, and he was afraid that although the quarries were renewed, it would not be available at a much lower rate than before. Even when landed on the shores of England it was a desperately hard material to cut, and would consequently be still very costly. He had had little opportunity of using porphyry, but what he had used had generally cost at the rate of 5l. per foot super, and that 4 in. thick. He had used occasionally for slabs and pavements, much the same way, but on a smaller scale, as it could be seen at Rome and elsewhere. The *opus Alexandrinum*, he believed, was so termed not because it came from Alexandria, but because it was patronised by Alexander Severus. Any of the marbles, granites, and porphyries were magnificent materials for ornamenting the interiors of buildings, and porphyry had the peculiar advantage of becoming more and more polished by the agency of the traffic over it. Hard materials generally would polish under the heaviest traffic, and some of the hardest granite laid down in the streets of London had to be removed because it became too highly polished, and consequently very slippery. Some years ago, when he was at the St. Katharine's Docks, he found the staircases of the warehouses so polished by the continual tramping up and down of the labourers, that it

had to be roughed every few years to prevent people slipping.

Mr. R. Phene Spiers, F.S.A., said that one of the most interesting points referred to by Mr. Brindley was the extraordinary preservation of the materials in Egypt, and it was impossible for those who lived in this damp climate to understand what a great element of destruction moisture was. Mr. Brindley had referred to the action of intense heat and cold on granite, but he (the speaker) had no idea that so much destruction of stone and granite surfaces could be produced without moisture. As an instance of the extraordinary preservation of materials, he might note one of the rock tombs standing opposite the Island of Philæ, with an inscription which, though it appeared to be of modern date, was really of the time of Rameses the Great.

Mr. Aitchison asked Mr. Brindley, in his reply, to say if anything was known as to where the porphyry enrichments of the tombs in Westminster Abbey had come from.

Mr. Topley, F.G.S., of the Royal School of Mines, said that Mr. Brindley had correctly asserted that alternations of heat and cold had as much effect in the disintegration of rocks as moisture had. The great agency of water in northern climes was by its freezing and expanding with enormous force, and thus breaking off the rocks. What happened in dry climates was precisely the same, but from an opposite cause. The great alternations of temperature between day and night acted so strongly in the contraction and expansion of rocks that they broke off as rapidly from the action of extreme heat as they did from intense cold. So much was that the case that he had been told that travellers in Arabia were sometimes woke during the night by a cracking all round, due to the contraction of the rocks which had been expanded during the daytime. An interesting question had been raised by Mr. Brindley as to the composition of the rock he had referred to as being red porphyry. Several papers had been written on the subject, but it was evident that the writers of them had examined the rock only in small pieces, and had not had the opportunity now afforded of seeing such large slabs. It had been spoken of as Breccia, and the first glance would lead one to think it was, but it would be well to have a further examination made of the larger specimens. Mr. Brindley had referred to the mosques near Cairo, but nothing had been said about the most wonderful mosque of all, viz., that of Cordova, which contained some 1,200 or 1,300 columns brought from all parts of the Mediterranean.

Mr. T. Graham Jackson, M.A., considered that Mr. Brindley was practically the re-discoverer of those porphyry beds, but whether it would become a material to be used by architects remained to be seen. If porphyry and green serpentine could be in any way brought within the compass of ordinary means it would be a very great aid to the development of schemes of permanent decoration.

Mr. Freeman (Penryn) believed that some of the hieroglyphics showed the means used by the ancient Egyptians for transporting large blocks, but he was not aware that there was any indication of the way in which the masses of rock were detached. The method of cutting up a detached block was comparatively simple, but we had no knowledge of the ancients having had any explosive power. He believed that of late years great advances had been made in the working of those very hard materials, which would tend to introduce the much greater use of porphyry. There were now processes of sawing the porphyry and granite, by which as much work could be done in one hour as used in the olden times to occupy two days.

The vote of thanks was then put and carried with applause.

Mr. Brindley, in replying, stated that the ancient quarries of porphyry were situated about 100 miles from the Nile, and about twenty-two geographical miles from the coast. From the quarries to the coast there was a gentle incline all the way, and the district was now being surveyed for him. There were hieroglyphics and sculptures in the quarries which showed the ancient methods of drawing by oxen and slaves. With regard to the re-working of the quarries, he hoped to be able to ship the stone at the port of Myoshoemus, and bring it to London via the Suez Canal, selling it here for about 3l. per foot cube. Hitherto

he had had to pay 5l. per foot cube. He possessed a column for which he had refused 700l., but he was afraid now he would have to take less for it. He had received a piece of porphyry bored at Mr. Freeman's Granite Mills in Cornwall at the extremely rapid rate of  $\frac{1}{4}$  in. per hour. The serpentine should not be confounded with the English serpentine, or with that of the Italians. The latter was used with red porphyry, which came a few miles from Sparta, in Laconia. Its component parts were the same as those of the other porphyry, with a little colouring matter. As to the porphyry in Westminster Abbey, it was recorded that certain Italian workmen brought their materials with them, and the chips found in the Chapter-house were those which were knocked off. He was not the first discoverer of the quarries in modern times. Burton visited the quarries about 1832, and shortly after Sir Gardner Wilkinson wrote an interesting account of them, but did not bring away any chips. Lepsius had also visited the quarries, but the man who had done most was Schweinfurth, who had carefully surveyed and mapped the district.

#### APPRENTICESHIP AND TECHNICAL EDUCATION.\*

UNTIL the present time there have been,—at least in the majority of mechanical trades,—only two recognised kinds of apprenticeship. In one the apprentice, entering at about fourteen years of age, served his seven years as a workman, receiving for his work practically nothing beyond instruction in his trade, save a small pittance for his weekly maintenance, which may be taken to represent the modern equivalent of the board and lodging which in olden times the master gave his apprentice in his own house. In the other the young man is received into the works at the age of eighteen or nineteen as a premium pupil, to serve an apprenticeship of a very different and often very unsatisfactory kind.

But now, it would seem, there is a third sort of apprenticeship arising, in which the technical college or school plays a part; the work of the technical school or college being either preparatory or supplementary to the commercial apprenticeship in the shops. This remark must not be misunderstood. It is true that in France, and, to some extent, in Germany and elsewhere, a fourth kind of apprenticeship has been attempted, namely, one in which a training wholly within the walls of a college or school was substituted, or supposed to be substituted, in the place of an industrial apprenticeship. There is no need to refer to this matter in detail, because this kind of training does not exist in England, nor does it seem as if such would ever meet the requirements of British industries.

Assuredly, that is not the aim of the few existing British technical colleges and schools; they aim to supplement, not to supersede, the actual experience of the shops. The writer can answer for it that no Finsbury student imagines that the work of the College can supersede the work of the shops. In the case of the day students, they know full well that their work is but preparatory; in the case of the evening students that their work is only supplementary. It is really a great gain to the members of the teaching staff that they come into contact with both kinds of student. It helps to preserve the balance in the character of the teaching, that it shall neither grow, on the one hand, too theoretical, nor yet, on the other, degenerate into merely teaching that which can be better taught in the shops.

There are, indeed, other ways in which technical teaching and industrial experience can be combined, as, for example, the way that has been followed out for some six or seven years with marked success in the Engineering Department of the University College of Bristol. That institution has induced a number of local engineering firms to enter into an arrangement whereby the engineering students spend the six winter months only at the college, and the six summer months in the works; the course extending over about three years. Of course these students enter works as premium pupils, not as working apprentices.

\* From a paper read by Professor Silvanus P. Thompson, Principal of the City and Guilds' Technical College, Finsbury, at a Conference on Technical Instruction, held November 3th, 1887.



The aim of the Finsbury College differs distinctly in this, that its two years' course is designed to obviate the subsequent payment of a premium, and to enable the student when, at the age of about seventeen, he enters the works, to take his place there as a working apprentice the same as if he had been already apprenticed there for three years. This is, therefore, an attempt to create a modified apprenticeship lasting not more than five years, wherein the College course takes the first two years and the shops the last three. The success of the system has certainly surpassed the expectation. There are now, and their number is certain to increase, a few masters who, when they take an apprentice for a term of five or six years, expressly stipulate that they shall send their apprentice to the Finsbury Technical College for the first two years. In some cases they pay the fees for the apprentice. Perhaps the time will come when the parent who apprentices the boy will on his part insist that the master shall send the apprentice for the first two years for a preliminary technical training. Many parents of small means do not quite like to take the responsibility of sending their boys for two years to a technical school or college on the chance that at the end of that time they may be able to find a master willing to take them for a shortened apprenticeship of only three years. Amongst our day students we have, as remarked above, a few who are actually apprenticed. One well-known electric-lighting firm which takes pupils at a very high premium, has voluntarily offered to the City and Guilds' Institute to take one student every two years in regular succession without premium, as a pupil. In another instance, an employer, who takes pupils at moderate premiums, makes it a condition that every pupil shall attend a regular evening course of instruction at the Finsbury Technical College. The evening class fees at this College are in every case reduced to one-half for apprentices, whether indentured or not, and under this regulation there are some 250 apprentices attending the evening courses. In one case, a few weeks ago, a youth applied who had just had his indentures cancelled because his master was either unable or unwilling to teach him his trade, but kept him at odd jobs.

Now these things seem to indicate that this question of apprenticeship is really entering upon a new phase with the growth of technical classes. The new phase is certainly worthy of the attention of masters, and will assuredly receive sooner or later the attention of the various trade societies and organisations. Indeed, it is to be hoped that they will see their way to helping forward the movement. It is obviously to the interest of the various trades that the apprentices who have entered it should be as well and fully trained as possible. If, owing to the altered conditions of the time and the division of labour, the masters are unable to teach the apprentice his trade, then it should be regarded as a moral obligation (to say nothing of legal obligations) upon the master to afford his apprentice every facility for obtaining the instruction that he fails to impart. Nay, ought he not to do more than merely afford facilities; ought he not to provide them? Do those cabinet-makers of the Finsbury district, who will not let their apprentices come to the Technical College classes at half-past seven to learn the technicalities of their craft,—for there are, unfortunately, some who will not,—know what an injury they are doing to those apprentice boys? Do they wish the ranks of the East London cabinet-makers to be filled with un-instructed workmen who can only do the one or two things that they have learned in their shop? Perhaps this paper may lead to a discussion that will throw some light upon this aspect of the question. The various trade organisations insist, and rightly insist, on the importance of regulations that will keep incompetent and untrained men from creeping into their ranks by indirect ways; might they not equally rightly insist on regulations that will preserve themselves from the incompetent men who necessarily grow up within their own ranks as the result of neglected and un-instructed apprenticeship?

#### *The Future Organisation of Technical Instruction.*

Another most important question arising out of the consideration of the present position of technical instruction is the form to be given

to its future organisation. It has become a question of national, one may say of imperial, importance; and it should be treated on no narrower basis of consideration. So far, the only parts of the educational system in Great Britain that can be considered as organised on a national basis, are the elementary schools and a few normal schools under the Department of Education, and the classes in Science and Art, including the Normal School of Science and the National Art School at South Kensington Museum, under the Department of Science and Art. It is true that the three Welsh University Colleges are nominally under the Education Department; but practically, the so-called Education Department is a department of primary education only. It is also true that the University of London is nominally under Government, and nominally draws some 13,000*l.* annually from the Treasury; practically, it receives only about 2,000*l.*, and is self-managed. Beyond this, there is no national organisation of education. To complete anything like a national organisation, the following additional departments need to be organised: A Department of Secondary Education, including under its operations three classes of schools or colleges, namely (1) Higher Literary, or Grammar Schools; (2) Technical Schools and Colleges; (3) Schools of Commerce; A Department of Higher Education, including under its supervision (1) Normal Schools for Training Teachers; (2) University Colleges of the modern type; (3) the several Universities of Great Britain.

It will be seen that in the above classification, Technical Schools and Colleges have been placed along with the Grammar Schools and the future Schools of Commerce in a Department of Secondary Education. The Schools of Commerce do not yet exist; the Grammar Schools,—and under that term are included here not only the few higher middle-class schools, but the great so-called public schools of England, frequented almost exclusively by the sons of the rich,—are for the most part maintained upon old endowments originally intended for the poor. At present they stand in no relation whatever to our primary schools. Fancy a system of scholarships to take capable poor boys from the Board Schools of London to the great secondary schools of Eton or Harrow! Yet it ought to be the recognised course to the University from the primary through the secondary school. Think of the dislocation in our national systems of education that is involved in the fact that not one per cent. of the masters of our public elementary schools, probably not one per cent. of even the head-masters of our public elementary schools, have been trained even for so short a period as one year in any of our Universities. The organisation of secondary education is a matter of absolutely vital importance in this country, but one of which, in the clamour of party politics, scarcely a syllable is heard. The proper co-ordination and maintenance of the local university colleges, though of more pressing moment, is a minor matter compared with the task of organising secondary education.

But the immediate question before us is:—What is the best form to give to the national organisation of technical instruction? At present there appear to be three claimants to the honour of directing the future organisation. 1. The City and Guilds of London Institute, who have a claim by virtue of being, as it were, in possession of the field, by virtue of the large sums which they have expended upon the promotion of technical instruction, and by virtue of the fact that they have already, in their scheme of technological examinations, the germs of a national organisation. 2. The National Society for the Promotion of Technical Education, a body recently formed under the presidency of the Right Hon. the Marquis of Hartington. The claims of this body cannot be based upon anything that it has yet done, or upon the intimate knowledge of the subject possessed by its members, who are mostly eminent politicians. It is, nevertheless, a very powerful body; and its appearance upon the scene at this juncture should be considered as an important factor. 3. The Department of Science and Art situated at South Kensington.

The City and Guilds of London Institute has during the decade of its existence accomplished so much that its claims to be left in charge of the organisation are very strong; they would be stronger still if it were clear that its resources, great as they are, and generously as

they have been provided, were adequate to the permanent maintenance of the immense work now begun. The maintenance of the work it has undertaken will soon overtax its present means. Supposing that no increase is made in the grants to the Central Institution, and to the Finsbury Technical College, still the Technological Examinations must be maintained. Last year they cost over 4,000*l.*, this year nearly 5,000*l.*, next year it will be 6,000*l.* In the meantime the available funds are decreasing. The Grocers' Company, which contributed 2,000*l.* per annum, now contributes only 1,000*l.* The Corporation of the City of London, which formerly contributed 2,000*l.* per annum, last year gave only 1,000*l.*, and has not yet sent any contribution for the year 1887. Under these circumstances,—unless, as can scarcely be expected, the generous contributors are prepared to capitalise their grants, it can hardly be said that the permanence of their organisation, even on its present scale, has been secured. It is not for me to suggest the ways and means, but it seems to me that an organisation that has shown such splendid promise should not be lightly thrust aside from taking charge of the work it has begun.

A powerful bid for the future management of technical instruction was made by the Department of Science and Art during the last session of Parliament, in the introduction of the abandoned Technical Instruction Bill. To understand aright the real importance of this move, a little knowledge of the operation of the Science and Art Department is requisite. It is notorious to all who have had anything to do with the South Kensington organisation, whether as students or teachers, how completely stereotyped are all the methods and ideas of that Department. Their training in art appears to be based upon the assumption that all originality must be ground out of the student by putting all students through the same mill. In science their assumption appears to be that any man who has passed an examination in a subject is fit to teach that subject; and that every graduate of an English university is fit to teach every subject in the whole round of the sciences. (See the Regulations in the Official Directory of the Department of Science and Art, July 1887, p. 31, Article 10.) They draw up a syllabus of twenty-five subjects called "Science Subjects," and refuse to recognise even the existence of any science teaching that does not fit to their artificial classification. Optics is not a science unless taught along with heat and acoustics. Heat is not a science unless taught along with optics and acoustics. Teaching about the steam engine is science; but teaching about the gas engine or the electric motor is not! There is a Government grant for teaching the one; there is nothing for teaching the others. The subjects must be taught in a cut-and-dried fashion on the syllabus prepared by the officials, quite irrespective of local industrial applications. Everything seems to be done that could well be done to prevent able and independent instructors from earning grants upon the successes of the best pupils, and to encourage the success of the mediocre "science teacher" in cramming mediocrity of his school for examination in a host of miscellaneous sciences. Cases have come under my personal knowledge that illustrate the system. In one, a most accomplished English chemist, trained during several years in the best laboratories in this country and in Germany, was disallowed from earning, on his successes as a teacher, grants which would have been allowed without hesitation had he been either a Master of Arts of Oxford, a Bachelor of Theology of Durham, or even the holder of a South Kensington Certificate in Chemistry. In another case, an accomplished engineer and draughtsman, who had served his time in the great firm of Maudslay, and who had occupied every post in engineering works up to manager, was disallowed as a teacher of machine construction and drawing because he had never passed the South Kensington examination, whilst at the same time any Board School teacher who had passed that examination was recognised as competent to teach, though he might never have been inside an engineer's drawing office in his life! Nor are the absurdities in the treatment of art less patent. A single example will suffice. At the recent exhibition in South Kensington Museum of the works which had won prizes in national competition, there were shown some wood-carvings executed



in the Young Men's Christian Polytechnic Classes. They were not great works of art; there was nothing really original in the design or treatment; they appeared to be ordinary subjects, perhaps a little stiffly copied, but still very creditable works. It was a pleasure to see them there, and to note that they had been awarded a medal. It looked like a new departure in South Kensington ways to see wood-carving recognised as an art, and encouraged. But this was not at all the official view. The state of official art may be judged when it is known that the medal awarded to these was not awarded to them as wood-carving at all, but simply as if they had been so much raised ornament in clay! There is the level to which the official mind can rise: raised ornament must be judged simply as a pattern, apart from the material in which it is to be executed, apart from all technical excellence. This is the very degradation of art. It is the divorce of the artist from the workman, the very thing that true technical education deplores and seeks to remedy.

Nevertheless this body, which does not understand the first principles of technical instruction, which does not comprehend that the adaptation of the teaching to the local wants, and that the adaptation of the design to the material, are things of the very essence of technical instruction, is the body to which the abandoned Technical Instruction Bill proposed to hand over the national organisation of technical education! According to this Bill, this incompetent body was to be allowed to levy rates for the purpose of teaching to the most foolish of the scholars in our elementary schools its five-and-twenty specific science subjects, or anything else that it might choose to prescribe for the time being; and the term Technical Instruction was to be defined to mean "instruction in the branches of science and art with respect to which grants are for the time being made by the Science and Art Department, or in any other subject which may, for the time being, be sanctioned by the Department." The friends of the technical education movement may, indeed, congratulate themselves that this amazing bill was withdrawn before it reached Committee.

What, then, must be done for the national organisation of technical instruction? In the writer's opinion the first and most important point of all is to secure the creation of a real Education Department under a real Minister of Education. At present we have no Minister of Education, only a Vice-President of Council, whose duties appear to be extensive and peculiar. They comprise apparently the work of looking after the regulations for statute fairs and diseases of cattle, of supervising the Elementary Education Department and the Science and Art Department, and of superintending the proceedings of the Judicial Committee of the Privy Council. What is wanted is a real Minister of Education, presiding over an organisation in which the Elementary Education Department, the Science and Art Department, and the Departments of Secondary (including technical) and Higher Education, should all make their appropriate places under officials responsible directly to the Minister himself, and not to that mysterious body "My Lords of Council." No attempt by Parliament to organise technical instruction can be satisfactory unless it involves the appointment of a responsible Minister of Education, and a reconstruction of the whole Departmental machinery.

**The "Empire Palace," Leicester-square.**—Are informed that Messrs. Campbell, Smith, & Co., of Newman-street, who decorated the Lyceum Theatre, have been entrusted with the whole of the decorative work at the "Empire Palace," Leicester-square, which is being done under the superintendence of Messrs. Romaine-Walker & Tanner, architects, who designed the decoration of the Gaiety Theatre about a year ago.

**A New German Canal.**—In addition to the North Sea, Baltic, and the Oder-Spree Canals, now in course of construction in Germany, a new one is under the consideration of the Government of Prussia and Lubeck for a canal between the rivers Elbe and Trave, whereby the city of Lubeck is to be placed in direct communication by water with the interior of Germany. The estimates and designs for this canal have already been prepared, and the work will, no doubt, shortly be taken in hand.

## THE ARCHITECTURAL ASSOCIATION'S "SKETCHING CLUB" SCHEME.\*

"Our Sketching Club Scheme" is an organisation for assisting architecture students in their sketching tours. The method proposed to be adopted is a complete system of advisers and local representatives which, for lack of better names, we had called *consuls* and *vice-consuls*, the titles used for similar officials in the Cyclist Touring Club, an important organisation to which we are indebted for the first suggestions of our scheme. I may remark that we are not at all satisfied with the title of our scheme, and that some of the gentlemen who have kindly undertaken to help us strongly object to being called "*consuls*." We should, therefore, be greatly obliged if any gentlemen can suggest better terms for both. The object of my paper to-night is to call attention to the movement and raise a discussion on the question of the desirability of the Association taking the matter up and making it one of its recognised methods of advancing the architectural education of its members, and in the event of this being agreed to, I would suggest the formation of a committee in order to carry on the work. And now I will endeavour to explain our scheme.

It is suggested to divide the whole of the United Kingdom into districts, following as much as possible the county boundaries, but in the case of the larger counties, of course, these have again to be divided. A *consul* will be appointed for each of these divisions, and up to the present we have succeeded in filling up twenty-seven of these, leaving twenty-five divisions to be filled up. We are in communication with several gentlemen about these places, but we make an urgent appeal to all those who sympathise with the movement to help us to fill up these vacancies as soon as possible. We have only succeeded in appointing ten *vice-consuls* up to the present, and we are particularly anxious to appoint as many of these as possible, as on them will fall the chief portion of the work, and certainly, from a student's point of view, the greatest benefit. It should, I think, be a great inducement for a student to feel that he was not only benefiting himself in his studies, but at the same time taking part in a work of permanent value, for if our scheme succeeds we hope that it will have the effect of recording in more permanent form than the perishing materials of which the actual buildings consist the architecture of our country. I think we might speedily succeed in interesting the clergy of England and Wales in our scheme. As a rule, they have a great interest in architecture, and from their position in the country they are able to afford valuable information, and often give permission to visit buildings to which the public are not admitted. The exact boundaries of the divisions cannot be defined until the appointments are made, as it is obvious that it is of vital importance to our scheme that the *consul* should have an intimate acquaintance with his district. We do not consider it a *sine qua non* that the *consuls* should reside in their divisions, and in England and Wales we have endeavoured to enlist the sympathy and assistance of the Diocesan Surveyors, and have succeeded in obtaining the consent, as will be seen, of several of these gentlemen to act as *consuls*. The following is a list of the divisions and the appointments made, and vacancies that have to be filled up:—

### I.—Northern Division.

1. Northumberland.
2. Cumberland.
3. Durham—C. Hodgson Fowler, M.A., F.S.A., F.R.I.B.A., The College, Durham.
4. Mid York—G. H. Fowler Jones, 8, Lendal, York.
5. East York—John Bilson, A.R.I.B.A., 23, Parliament-street, Hull.
6. West York—J. D. Webster, F.R.I.B.A., 21, Church-street, Sheffield.
7. Lancashire—R. Knill Freeman, F.R.I.B.A., Bolton-le-Moors, Lancashire.

### II.—Northern Central Division.

8. Cheshire—T. M. Lockwood, F.R.I.B.A., Chester.
9. Derbyshire—F. J. Robinson, F.R.I.B.A., Strand Chambers, Derby.
10. Nottingham.
11. Lincoln—James Fowler, J.P., F.R.I.B.A., Louth, Lincolnshire.
12. North Northampton and Rutlandshire—J. A. Gotch, F.R.I.B.A., Kettering.
13. Staffordshire—C. Lynam, F.R.I.B.A., Stoke-on-Trent.
14. Shropshire.
15. Leicester.

\* A paper read by Mr. H. D. Appleton, F.R.I.B.A., at the meeting of the Association on the 18th inst., as elsewhere mentioned.

### III.—Eastern Division.

16. Norfolk—E. P. Willins, A.R.I.B.A., 6, Bank Plain, Norwich.
17. Suffolk.
18. Cambridge—W. M. Fawcett, M.A., F.R.I.B.A., 1, Silver-street, Cambridge.
19. Essex—Fred. Chancellor, F.R.I.B.A., 20, Finsbury-circus, E.C.
20. Huntingdonshire and Bedfordshire.
21. Hertford.
22. Middlesex.

### IV.—Southern Central Division.

23. Warwickshire—F. B. Osborne, F.R.I.B.A., 13, Bennett's Hill, Birmingham.
24. Worcestershire—Aston Webb, F.R.I.B.A., 19, Queen Anne's-gate, S.W.
25. Herefordshire and Monmouthshire—E. Seward, A.R.I.B.A., Cardiff, South Wales.
26. South Northamptonshire—W. T. Brown, A.R.I.B.A., Wellingborough.
27. Buckinghamshire.
28. Oxfordshire—T. G. Bruton, F.S.A., F.R.I.B.A., 17, New Inn-street, Oxford.

### V.—Southern Division.

29. Gloucestershire.
30. West Kent—E. J. Bennett, A.R.I.B.A., 5, Harmer-street, Gravesend.
31. East Kent—H. Benstead, F.R.I.B.A., 86, Week-street, Maidstone.
32. Surrey—E. Locke, St. Michael's House, Basinghall-street, E.C.
33. Sussex—L. W. Ridge, F.R.I.B.A., 7, Upper Woburn-place, W.C.
34. West Hampshire—C. R. Pink, Castle Hill, Winchester.
35. East Hampshire.
36. Wiltshire—C. E. Ponting, Lockeridge, Marlborough.
37. Berkshire.
38. North Somerset.
39. South Somerset.
40. Dorsetshire.
41. North Devon.
42. South Devon—E. A. Appleton, F.R.I.B.A., Torquay, Devon.

### VI.—Welsh Division.

43. Flint, Denbigh, Carnarvon, Anglesey—A. Baker, 14, Warwick-gardens, Kensington, W.
44. Pembroke, Cardiganshire, Carmarthenshire—D. E. Thomas, Haverfordwest.

### VII.—Scottish Division.

45. South-east Scotland.
46. South-west Scotland.
47. East-central Scotland.
48. West-central Scotland.
49. Northern Scotland.

### VIII.—Irish Division.

50. East Ireland—J. L. Robinson, A.R.H.A., 189, Great Brunswick-street, Dublin.
61. South Ireland.
62. West Ireland.
63. North Ireland.

### List of Vice-Consuls.

6. West York—G. F. Terry, Buckingham Chambers, St. James-street, Sheffield.
11. Lincoln—E. Fowler, Louth, Lincolnshire.
14. Shropshire—W. A. Webb Souerille, Wellington, Salop; J. F. Fogarty, Priors Lee Hall, near Shinal, Shropshire.
22. Essex—J. W. Lee, North-street, Colchester; H. Saul, Dover House, Fairport-road, Leytonstone.
29. Gloucestershire—G. W. Sadler, jun., 6, Clarence Parade, Cheltenham.
33. Sussex—Eastbourne Division—N. C. Nisbett, A.R.I.B.A., 20, Oakley-square, W.
38. Wiltshire—C. Ayre, Bradford-on-Avon.
42. South Devon—H. E. Mallet, 11, Burton-crescent, W.C.
43. Merioneth, &c.—Telfer Smith, Rhayader, Radnorshire.
49. Carmarthenshire—H. H. Moses, 55, Lower Cathedral-road, Cardiff.

With regard to the vice-consuls we are anxious to nominate as many for each division as will come forward. If possible they should be resident in their respective divisions, although a vice-consul living in London who had an intimate acquaintance with some locality in the provinces could render great assistance in connection with the central register.

The duties of a consul are chiefly to receive reports of the vice-consuls and check the information supplied by them, and supply information to students who intend making sketching tours in his division. It will be obvious that everything depends on the accuracy of the information registered, and we cannot expect all the vice-consuls to be equally qualified to make a good report on the buildings in his district. After this information has been checked and corrected, one of the vice-consuls, whose duty it will be to keep the register for the division under the superintendence of the consul, will enter the matter in the register and send a duplicate to the central office in London, where copies of all the reports will be filed. The form of the report should, I think, be based on the excellent examples to be found in Mr. E. Sharpe's book on the "Architectural Excursions in Lincolnshire," and to this might be added references to books which contain descriptions or illustrations of the building, a note whether the building has been measured, and, if it has been measured and not illustrated, a reference to the place where the drawing can be seen if possible. We have specially in view, as a first step, the indexing of what has been done in the way of illustrating



interesting buildings. Many of the best illustrations are in recent publications, such as our A.A. Sketch Book and other similar books. The professional press contains a wonderful collection of illustrations of old work, and the Transactions of other societies must be carefully searched for information. The work of keeping this index posted up to date with the vast number of publications will be a great work of itself. As the scheme gets into working order, and students avail themselves of it to obtain information, it is to be hoped that they will endeavour to measure up work that has not been previously illustrated, and it should be a point of honour with them to supply copies of their drawings to be deposited in the central office. A small collection of measured drawings exists in the library of the Institute, and some of the drawings which obtain the Architectural Union Company's prize are also deposited in the library. I think, therefore, that we could not do better than to add to the collection already begun, and I would suggest, that, subject to the approval of the Council of the Institute, all the measured drawings obtained through the agency of this scheme should be presented to the Institute library, unless this scheme can be further developed, as I shall endeavour to indicate, and an imperial collection be formed at the Imperial Institute, when our scheme might furnish the section devoted to the United Kingdom. Should this scheme meet with your approval this evening, I hope that I may succeed in enlisting the practical assistance of all present as well as your sympathy, as already an enormous mass of information exists on the subject. One of our past Presidents has favoured me with the following list of books that must be consulted:—

W. Upcott's "Bibliographical Account of the principal Works relating to English Topography," 3 vols., London, 1818, 8vo. This is, of course, an antiquated book now, but the information in it, and in all works containing similar information, should be made use of, as we desire to have, first of all, as far as they can be got at in that way, the facts about each building as already shown by published works.

R. Gough's "British Topography: or, an Historical Account of what has been done for Illustrating the Topographical Antiquities of Great Britain and Ireland," 2 vols., London, 1780, 4to., would thus come into notice also. R. Gough gave his books on British Topography to the Bodleian Library in 1799, and there is a catalogue of them (Oxford, 1814, 4to.).

M. J. Anderson's "Book of British Topography." The index is classified under counties. This is a comparatively new book, but refers only to books in the British Museum.

Mr. E. Sharpe's account of the churches visited in the Lincoln excursions of the Architectural Association, London, 1871, does admirably for a limited number of buildings what we wish to do for the whole of the buildings in the United Kingdom. It will be impossible (probably) to secure that every building shall be examined afresh by a competent person. It ought not, however, to be impossible to give in the great index some account of it after Mr. Sharpe's method.

"Notes on the Churches of Kent," by the late Sir Stephen Glynne, Bart. (London, 1877, 8vo.), is, of course, a very different work from Mr. E. Sharpe's, but it contains the carefully recorded views of a well-intentioned and by no means incompetent person. As edited by Archdeacon Harrison and the Rev. Scott Robertson, both possessed of good local knowledge, it is brought nearly up to date. The visits of Sir Stephen Glynne were in many instances made forty years ago and more. The book might be taken as a starting-point for the county with which it deals, the information in it being thrown into Mr. Sharpe's form or one still more approved. The size of this book may be illustrated thus:—

Mr. Sharpe's book deals with  $1 + 13 + 14 + 8 = 36$  buildings, and  $103 - (\text{say}) 25 = 78$  pages are devoted to them, including summaries, appendix, &c., which make up a total of 152 pages in the volume, say two pages in a building. Sir S. Glynne's book deals with 312 churches in 351 pages, that is, 1.12 pages to a building. There are 120 parishes in Herts. Thus there is a piece of steady work cut out for the vice-consuls of a small county, and a fine task for the officers in a big one.

In a few "Hints on the Practical Study of Ecclesiastical Architecture and Antiquities," for the use of the Cambridge Camden Society,

4th edition, 1843, we have a form which was largely used for recording the whole of the features of a building.

In Whewell's "German Churches," 3rd edition, 1842, are some hints on methods of taking notes as to vaulting, and which would also deserve consideration.

The "Ecclesiastical and Architectural Topography of England," published under the sanction of the Central Committee of the Archaeological Institute of Great Britain and Ireland (Packers, 1851), dealt with Oxford, Beds, Huntingdonshire, and Cambridgeshire.

The method is good, and the observers were generally competent. The index of styles and lists of dated examples are good features. Domestic architecture is also brought in, as it, and, indeed, all structures, should be in our scheme.

With regard to unpublished matter, Sir Stephen Glynne had, when he died in 1874, surveyed and put on record his notes as to 5,530 churches. The Kent publication dealt with 312, leaving 5,218 not likely to be published now in any separate form.

Doubtless these papers could be obtained if properly applied for by any one duly empowered.

Mr. E. Sharpe intended to make a complete list, and give an account of the buildings in Sussex, and, I believe, did a large amount of the work (note the list of Mr. Sharpe's publications in the "Charente" Book, published by the Architectural Association in 1853). He visited all the churches in Sussex of ancient date which are worthy of notice, except two (letter of September 4th, 1853). The notes have been preserved. "The Churches of Sussex" was, I think, to have been the title of the book, as Prof. Willis on Chichester, Rev. J. L. Petit on Boxgrove, E. Sharpe on Shoreham; but the part, "The Church Architecture of the County of Sussex," by E. Sharpe, M.A., which would justify the comprehensive title, was never finished, though the publication was delayed for seven years, waiting for it.

The Ecclesiological Society, no doubt, has a great quantity of information obtained in the name of the Cambridge Camden Society, which has not been published, and, in addition to this, in the portfolios of architects all over the country lie innumerable drawings of interesting buildings; and may I appeal to them to send a post-card to me at 157, Wool Exchange, Coleman-street, E.C., if they are willing to place these at the disposal of our scheme? Practically speaking, the great bulk of this information is utterly lost to the public for want of proper indexing, and the question is, how can we make these dry bones live? I believe that by some such organisation as I have endeavoured to sketch out to-night much of the valuable work done can be made of living interest, and, in course of time, of great historical importance.

Of late years there has been a tendency to substitute sketching for measured drawings, and the result has been the production of much most delightful and interesting work; but for a register of this nature I am of opinion that, while sketchers should not be excluded, efforts should be made to obtain as many measured drawings as possible, and that there is an idea that, perhaps, after all, measuring is a better training than sketching, is, I think, indicated by the fact that the Institute has given the example of Mr. Burges's work as the method to be pursued for the Edis prize. I hope I shall not from this remark be thought to disparage sketching, but for the purposes of a register of the two I think that measured work will have the more permanent interest.

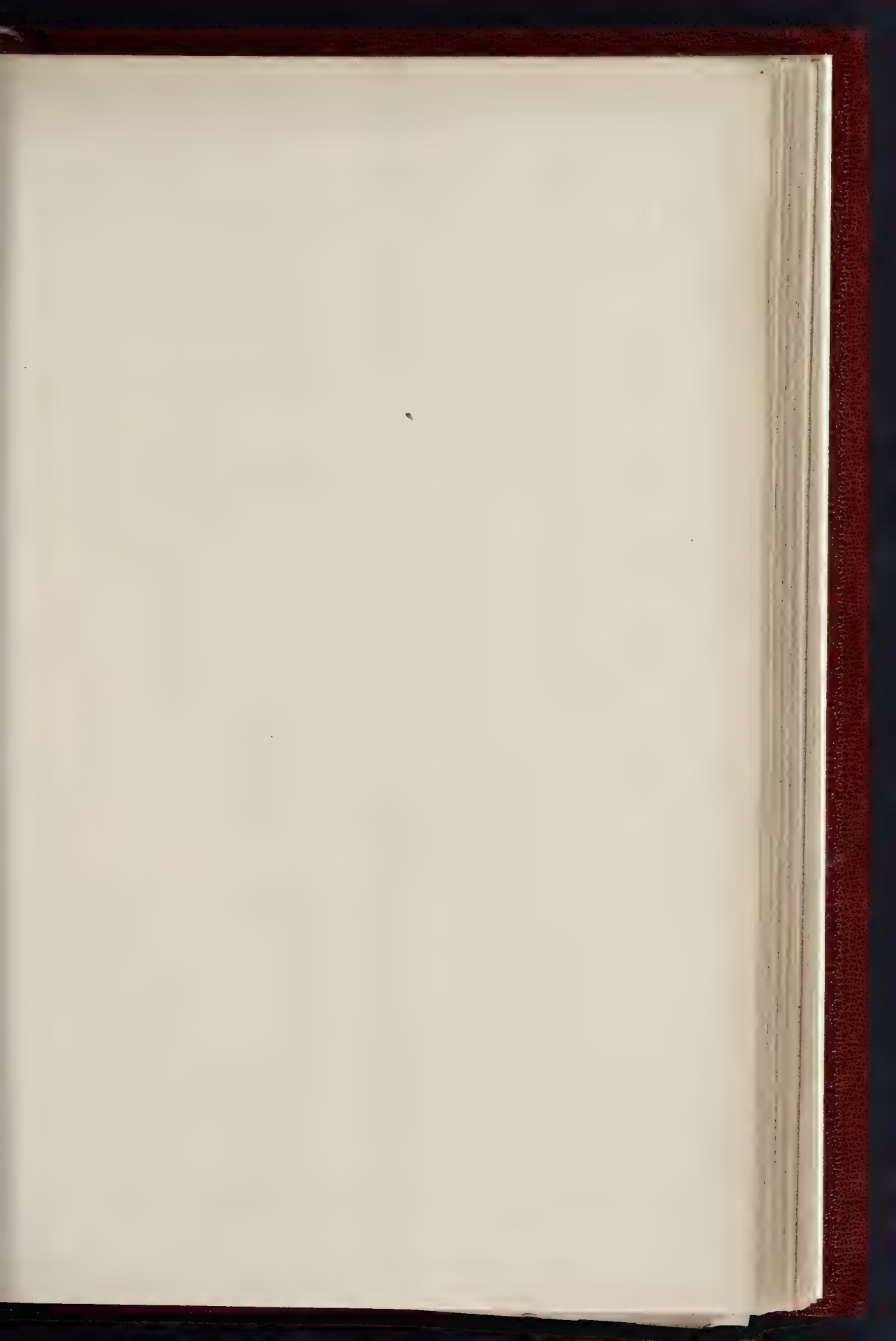
Now, when our scheme has got to work the student who has made up his mind which district he proposes to visit writes to the consul for that division and receives from him a list of the buildings of architectural interest and notes of the books which refer to the particular buildings and the number of buildings that have been already illustrated. The student is thus able to judge at once of the character of the work he is about to study, and to either read up beforehand the historical or antiquarian information that he may wish to acquire to render his studies complete or to take such books with him as will assist him in his investigations. Of course, I do not wish to recommend students to neglect those buildings that have been illustrated as I am quite aware that there are a certain number of buildings which it is almost essential that a student should study to really become efficient in his

art, but I am sure that there are many rich examples of architecture that have not been illustrated, and I can fancy the student would naturally be ambitious to venture on pastures new. From my experience, as secretary to the Annual Excursion of the Architectural Association, I know the difficulty there is in finding good and accurate information about the buildings in particular districts. Even when we have had the assistance of the local architects and the accumulated wisdom of the committee it has been the custom for some years past for the secretary to go over the ground before the excursion is arranged, and report on the number of good buildings to be found in the neighbourhood of the headquarters proposed. Now, much of this information the private student is quite unable to obtain, and it is to fulfil this purpose that our scheme was mainly started. To the student properly introduced to the consul special facilities for obtaining permission to visit buildings not usually open to the public might be granted, and generally the vice-consuls would act as guide, philosopher, and friend to the tourist; such necessary information as to board and lodging would also be supplied by the vice-consuls, and, possibly, in course of time, we might arrange tariffs like our prototype the C.T.C. The reason why the former attempts to form a register of buildings in the United Kingdom, as far as I am able to judge, have more or less been failures, seem to me to be on account of the want of youthful vitality in the undertakings, those who started them having, in the inevitable course of events, grown old and passed away, leaving no successors to carry on their work; but we hope to attract to the scheme a constant accession of young blood, so that the work being done by students for students it may, like our Association, always boast of perennial youth and enthusiastic support.

But it is always easy to create an interest in foreign missions, distance lending enchantment to the view; but "why should London wait?"

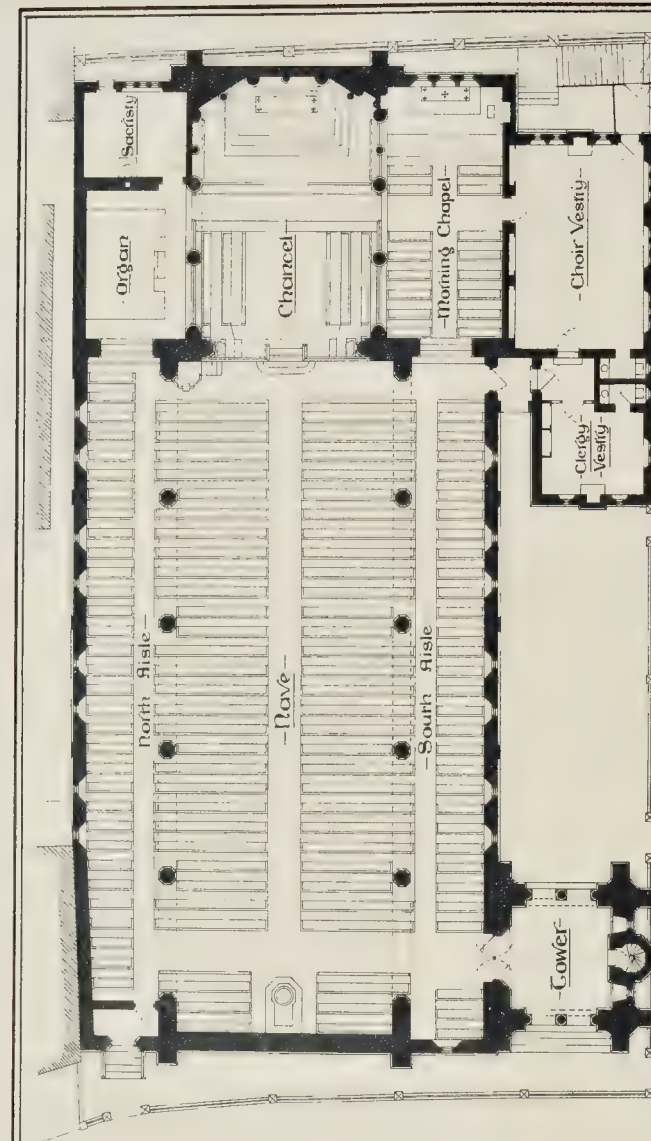
How many of us here to-night could give, say an American architect on a visit, a satisfactory list of the best buildings of architectural interest in London, the names of their architects, and the dates of their erection? It seems to me that there is enough scope in London alone to occupy the attention of a large committee for a considerable period, and how grateful the provincial students would be for carefully-prepared lists of buildings to visit for a holiday in London of fourteen days, and others for longer periods, I cannot say, but both from provincial architects and our American cousins I have had applications for such lists, and I have always regretted that I could only very inadequately supply the information required. A vigorous effort on the part of the London committee would be a splendid example to our country members, and the experience gained in arranging the register of the wonderful collection of buildings of interest to be found in London would be the best method of ascertaining what results could be obtained in the larger undertaking. When it is possible to enlist the co-operation of so many skilled hands, the individual labour need be but small. If each member of our Association living in London would undertake to work up only two buildings, we should have made a good start. Nearly all the London examples have been carefully measured, therefore it would be only necessary to obtain copies of these drawings, and register the other information, and a really splendid result could be obtained. I think also the Vacation visits might co-operate with this scheme.

A little organisation similar to the method pursued by the late Mr. E. Sharpe would, I am sure, most gratifyingly result, and there are still among our number a few of the original excursionists who worked under him, and who, I have no doubt, would be willing to instruct the present generation in the way in which they worked in their salad days. The annual excursion in August, too, might also take part in helping forward this work, and the week's excursion would be of great value to the vice-consuls of the district, as we invariably find that the provincial architects are glad to avail themselves of the opportunity of going round with our party, and often confess that they were not aware that so much good work existed in their particular neighbourhood. I have been kindly furnished by Mr. Holden, of Manchester, with a list of the buildings of architectural interest in the neighbourhood of that city, which has been prepared by the Man-

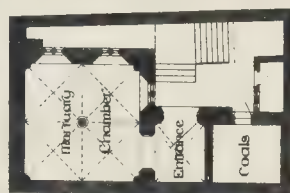




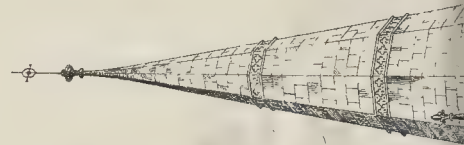
THE BUILDER, NOVEMBER 26, 1887.

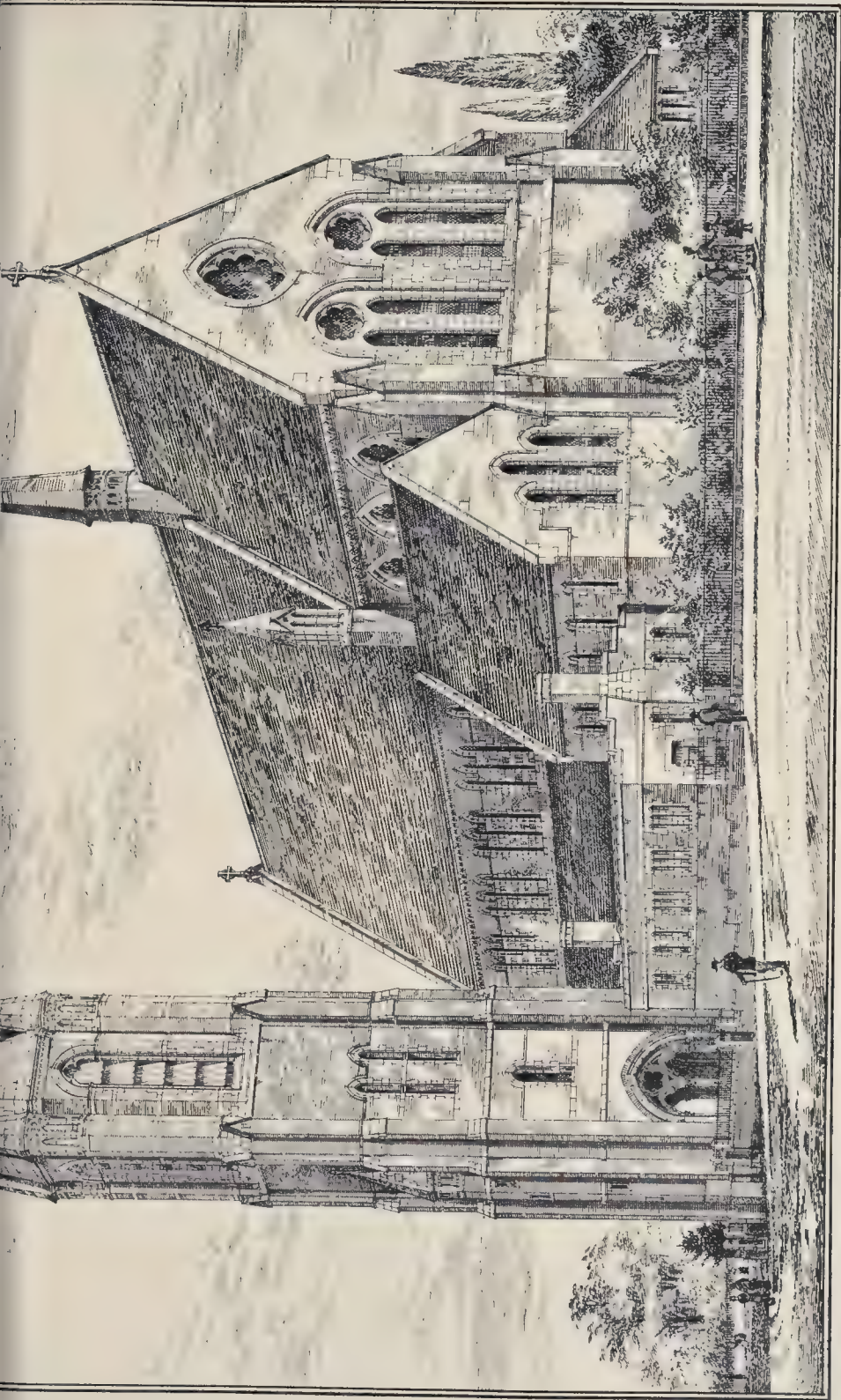


SCALE OF FEET  
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—Plan of Morning Chapel—  
—under Morning Chapel—

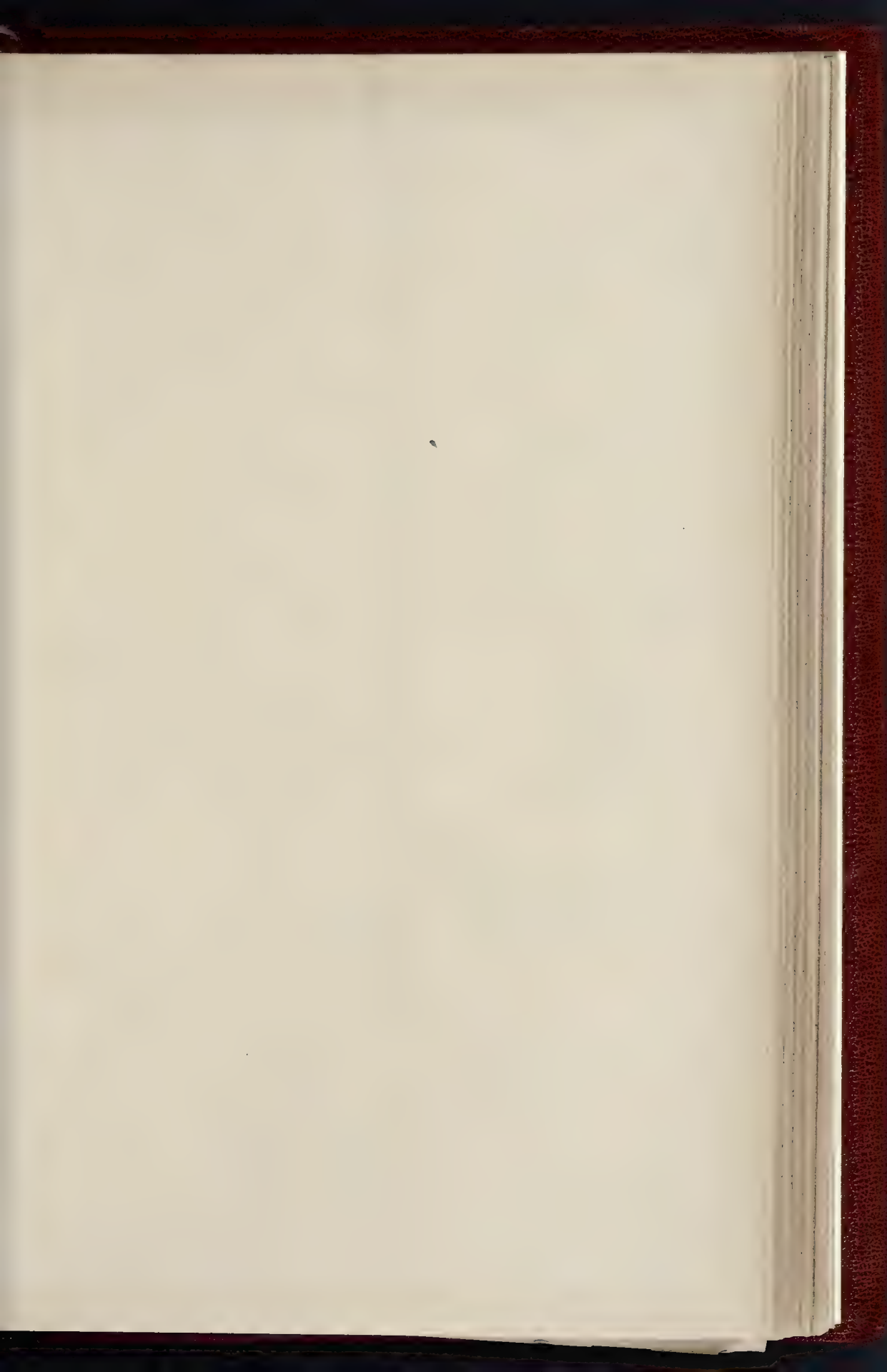




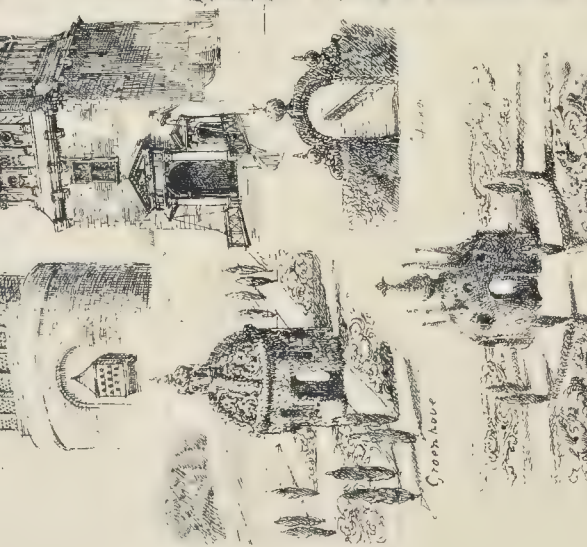
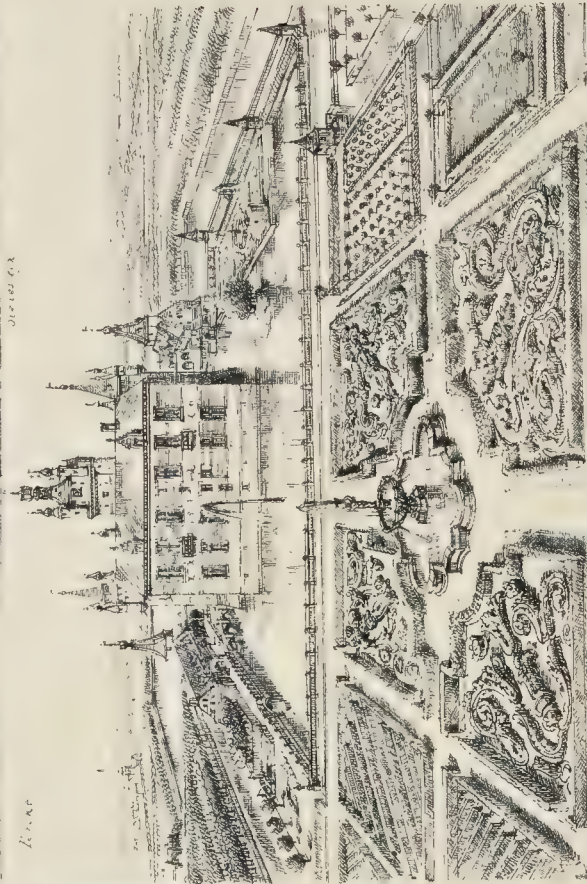
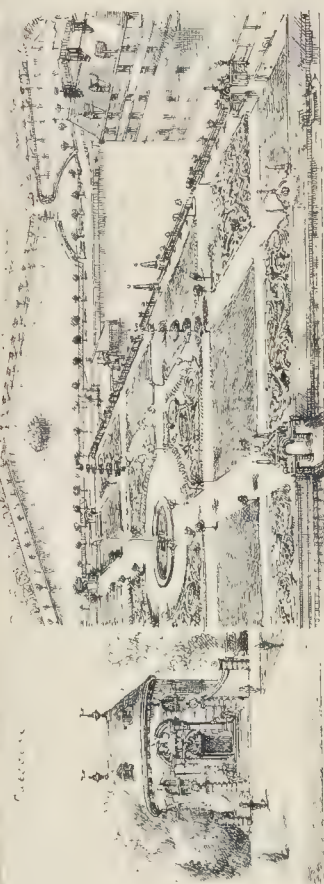
CHURCH OF ST. BARNABAS, TUNBRIDGE WELLS.—MESSRS. J. E. K. AND J. P. CUTTS, ARCHITECTS.

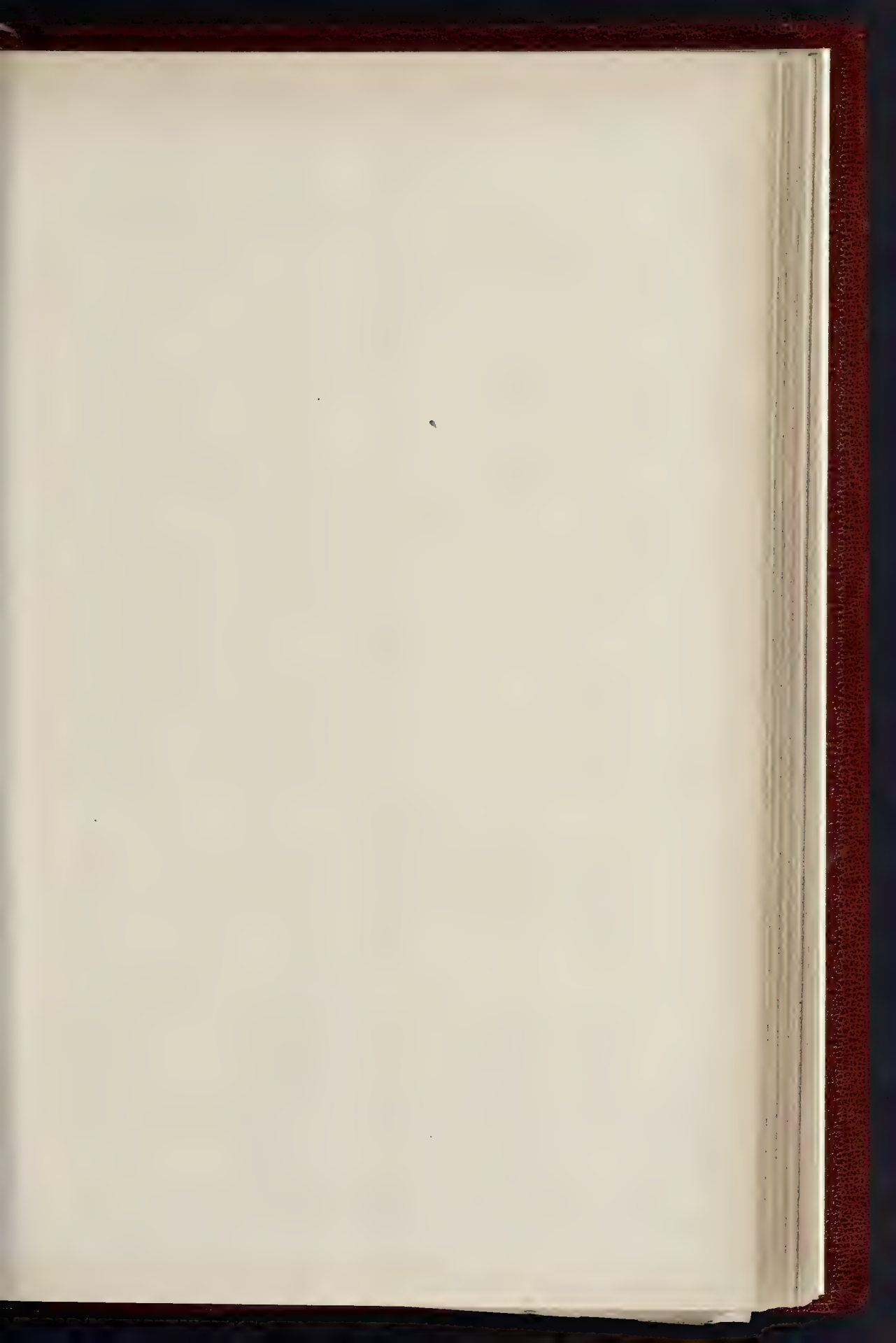






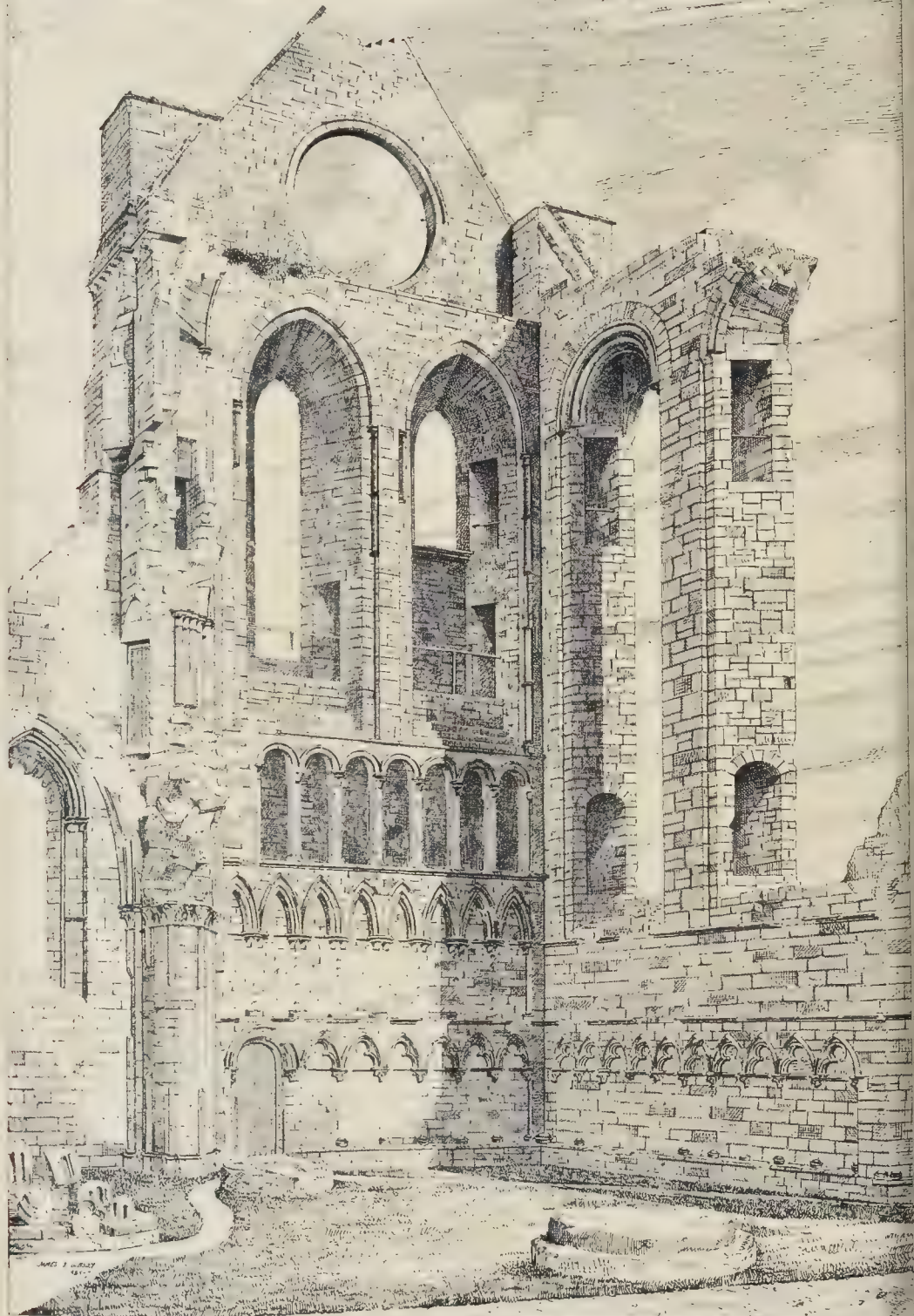


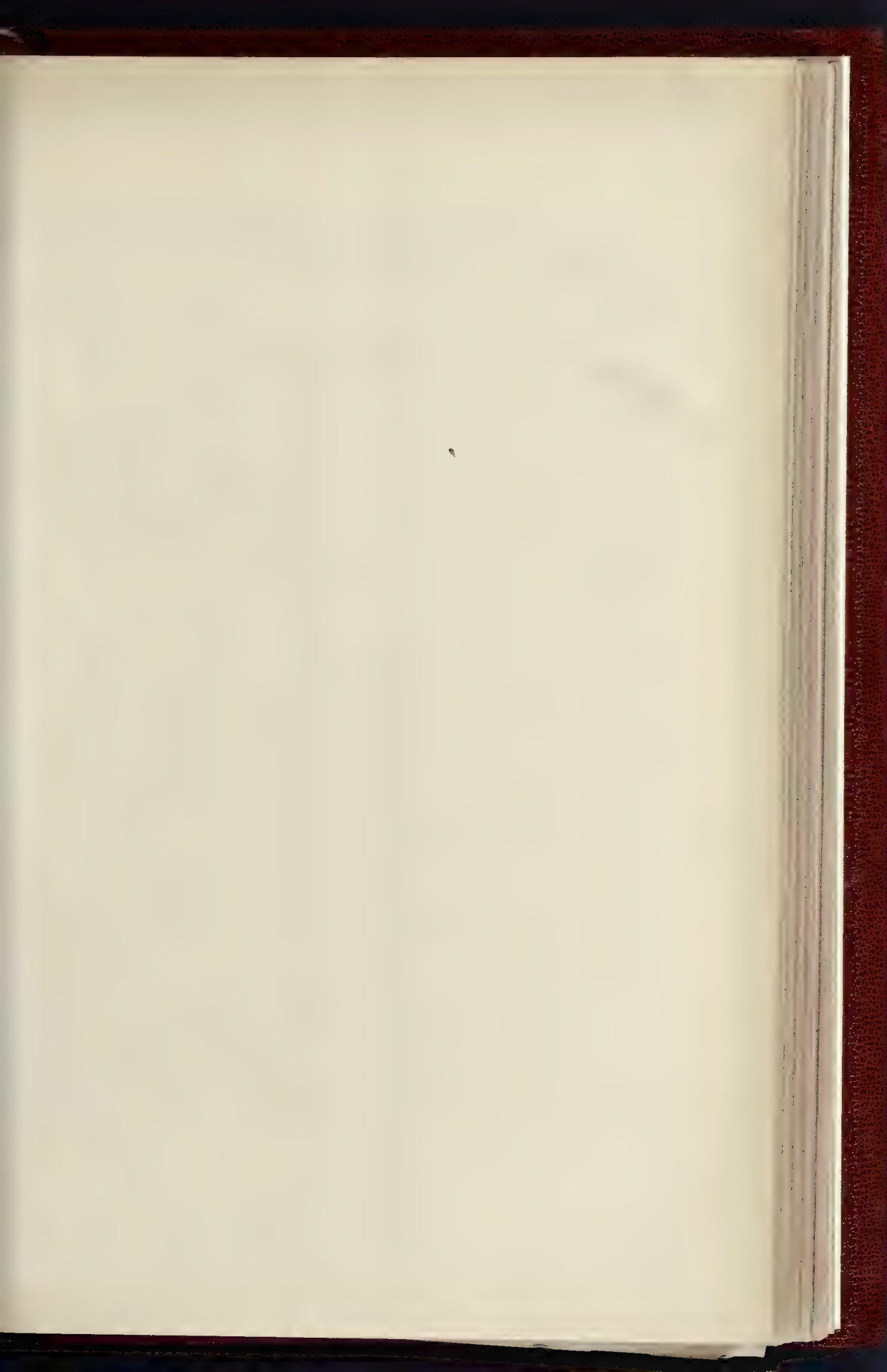






Abbeots' Abbey  
South transept.









The Photo-type Co., 26, Strutton, London

GATES AND GRILLE IN THE CHURCH OF St. OUEN, ROUEN.





The Phototype Co., 507, Strand London.

REFREDOS IN THE CHURCH OF St. PIERRE, AVIGNON.





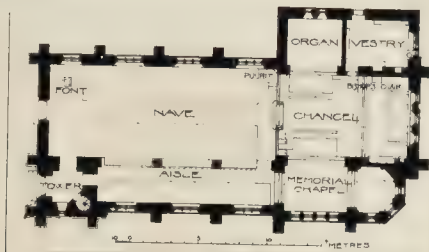


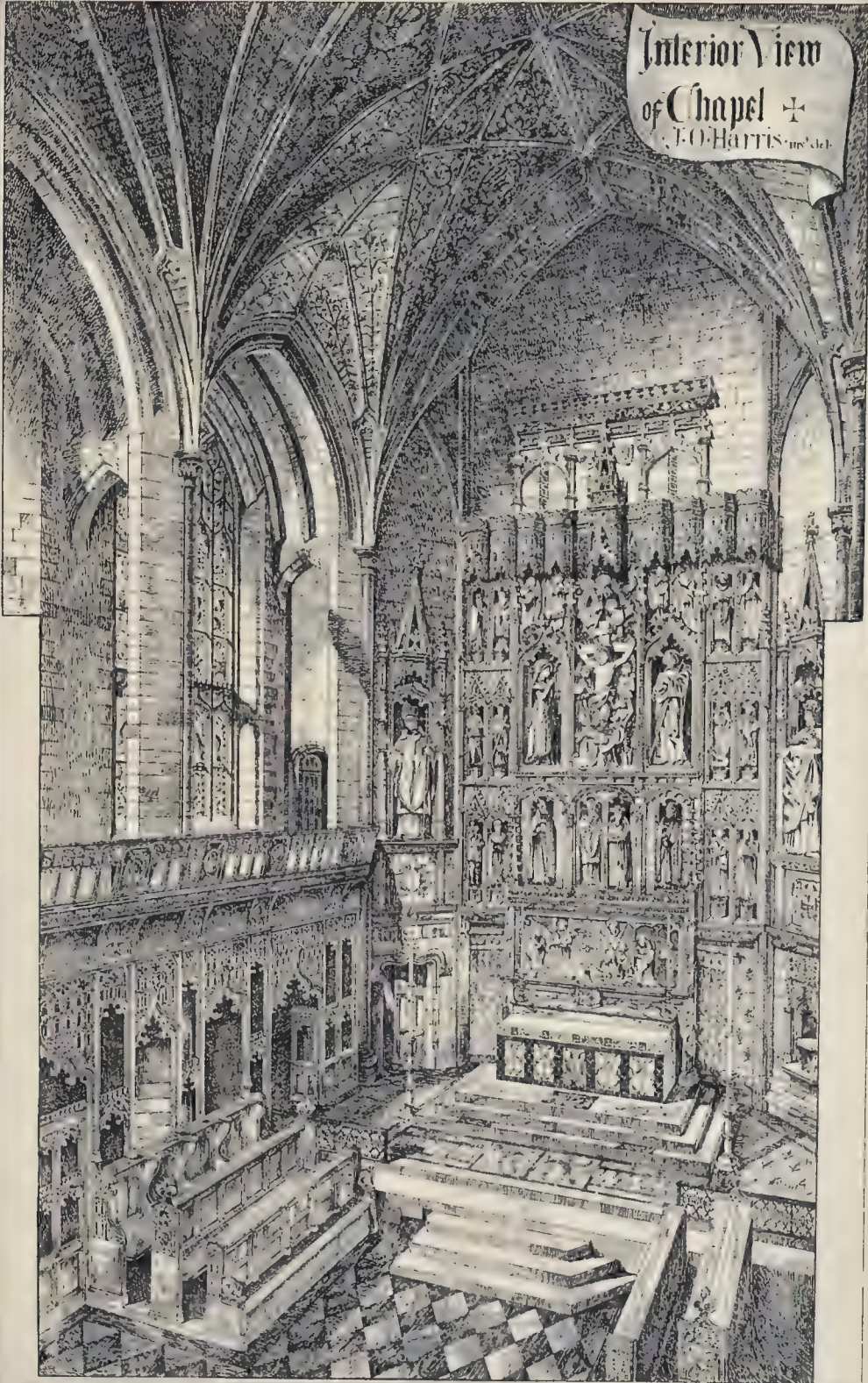
PHOTO LITHO SPRAGUE & CO. 22, MARK LANE, LONDON, E.C.

CHURCH OF ST. GEORGE, CANNES.—MR. A. W. BLOMFIELD, M.A., ARCHITECT.



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Interior View  
of Chapel +  
J.O. Harris, m.d. del.







chester Architectural Association, and I hope to be able to enlist the co-operation of that association so that they may join in our scheme, and the information that they have already collected be made at once available for our register. I have no doubt that the other architectural societies could easily compile similar lists, and in this way a good start be made in the provinces. The historical side of the scheme would be the collection of well-executed and carefully-authenticated drawings of buildings which the inexorable hand of Time and the equally destructive hand of the restorer are fast removing from the face of the land.

In conversation with an eminent diocesan surveyor the other day, he remarked to me that much of the bad restoration which had been carried out in the early part of the century in Caen stone is suffering as much from decay as the old work, and he prophesied that in a short space of time it will be difficult to distinguish between the restored work and the original work. One of the benefits of our register will therefore be to preserve the reputation of the original work; and had such a record been begun only one hundred years ago, how much might not have been saved that is already lost.

The President of the Royal Institute of British Architects, in his presidential address, remarked that "it had occurred to him that one most fitting work for the Imperial Institute would be the production of a thorough and complete record,—perfect in all its details,—of the more important architectural monuments contained in India, and the many historical sites and ruined cities to be found within the various dependencies of Great Britain and Ireland." This, no doubt, has already been accomplished to a slight extent by private enterprise and liberality, but there is no complete or national work of the kind, and I venture to hope that there may soon be found means by the agency of the new Imperial Institute to furnish the world with at least a catalogue of the historical monuments extant within the confines of the British Empire. I venture to suggest that we might help in this Imperial idea, by presenting the materials for the sections devoted to the United Kingdom. I have said that this scheme is for students worked by students, but if we might be allowed to work for an Imperial scheme as well as benefit ourselves, surely it ought to give an additional impulse to the movement. The President of the Institute referred to the fact that, unfortunately, architects as a corporate body had not been able to contribute to the funds of the Imperial Institute for reasons which many of us feel to be most unanswerable; but if silver and gold we have none, we can all help in placing on record the splendid inheritance which our forefathers have left us. The best work of the past was not true for an age, but for all time, and as we know that day by day, by slowly disappearing, what more gracious art could we play than to endeavour to stay Time's devouring hand and record what is left of our glorious heritage? The collection of such a register as Mr. L'Anson foreshadowed would be almost the complete architectural history of all time, and I can imagine no prouder position for the Association to occupy than to do its humble part in helping forward so monumental a work. What splendid material it would furnish for the future historian of our noble art! Again, the value to our colonists of a complete record of all the architectural buildings in the United Kingdom would be almost greater than to ourselves. We are so accustomed to be surrounded by these relics of old times that, to a certain extent, we fail to appreciate them; but to those who come from new countries the opportunity of studying these works of art and comparing them in one collection would, I fancy, stimulate their enthusiasm, and they would with little trouble be able to concentrate their study of the actual buildings in the short space of time most of them have for such work, and to select those examples which best illustrate the particular branch of the art they are interested in.

The value of some such collection is so obvious that surely an appeal has only to be made to the Council of the Imperial Institute for it to be warmly taken up, and I would suggest that as soon as our scheme had succeeded in making some substantial progress, which could be done in a very short space of time, we should offer

to place the information it had collected at the disposal of the Imperial Institute as a foundation for the larger scheme, and that we should push on our own work as vigorously as possible, so as to create a good precedent for the other portions of the empire to take example by. Gentlemen, I simply suggest this ambitious view of my subject, in its ultimate development, for your consideration, but I hope that, should it not meet with your approval, it will not prejudice the simpler scheme out of which it has grown. The value of the great index of buildings of architectural interest is hard to exaggerate, and this could be compiled without the illustrations which I suggested for the larger scheme; but I venture to think that the collection, preservation, and systematic arrangement of carefully-measured drawings of old buildings is well worthy of the consideration of the Architectural Association as affording facilities for the study of civil architecture,—the leading object of the Association as set forth in the rules,—and, therefore, Sir, with your permission, I will conclude by proposing "That the Sketching Club scheme be adopted as one of the recognised methods of the Architectural Association, and that the Committee be asked to appoint a sub-committee to carry on the work."

[Of the discussion which followed we give a report on another page.]

### Illustrations.

#### REEREDS, ST. PIERRE, AVIGNON.

ST. PIERRE D'AVIGNON is a "Monument Historique," and the most interesting of the buildings in the town after the cathedral and the Palace of the Popes. The church is said to have been founded in 433; it was, however, entirely rebuilt in 1358, and the west front, which is usually considered a *chef d'œuvre*, dates only from 1512. The reeredes that we illustrate, with the exception of the three full-length figures, which are evidently modern, seems to be of about the same age. The church possesses a pulpit, noted for its exceptional beauty, and some good pictures.

#### GATE AND GRILLE, ST. OUEEN, ROUEN.

The Abbey Church of St. Ouen has sustained less damage than might have been expected, seeing that it has been twice desecrated by iconoclasts. Not only did the Revolutionists of the First Republic turn the church into an armourer's shop and erect a forge in it, but in 1562 the Huguenots made three bonfires in the building for the purpose of destroying the stalls, pulpit, organ, and priests' robes. Among other damage done at this time, the rich screens of gilt bronze in the arches surrounding the choir were destroyed. Some of the arches seem to have been subsequently built up, for it is recorded that "in 1743 the monks caused the five arches surrounding the sanctuary to be opened out for the purpose of placing in them iron grilles enriched with gilt ornaments."

The screen represented in our illustration is doubtless one of those erected at that time; it stands in the easternmost bay of the south arcade, next to the three which form the apse.

#### ST. BARNABAS CHURCH, TUNBRIDGE WELLS.

A CONSIDERABLE amount of the work of this church has been buried underground, as, unfortunately, the only site available was on an old filled-up stone quarry; consequently the foundations had to be carried down 24 ft. through the loose filling in to get to the solid rock. The church is being built of red brick, with pillars, arches, and dressings throughout of local stone, a very large amount of which is being used in the building. The chancel arcade arches are filled in with stone tracery. The roofs are to be of the best Crown Memel fir, which has been specially imported for this work. In the basement there is a groined mortuary. The doors and seats are to be English oak; carving will be liberally used. The work was commenced last September, and it is expected that it will be completed before the end of next year. The total cost of the building complete, with fittings, will be about 17,000. Mr. Thomas Williams, of London, is the builder, and the church is being built from the designs and under the superintendence of Messrs. J. E. K. and J. P. Cutts, architects.

#### ARBROATH ABBEY.

THE remains of this interesting structure are situated near the centre of the town of Arbroath, in the county of Forfar. The abbey was founded in 1178 by William the Lion, and dedicated to St. Thomas à Becket, who was slaughtered at the high altar of Canterbury Cathedral in 1170, and canonised in 1173.

It has been the subject of much speculation why a Scottish king should dedicate one of the finest of our abbeys to an English saint; but as far as I am aware, no satisfactory explanation has been found. The Norman barons also contributed generously towards the endowment of the abbey, and in 1204 King John granted a charter of privileges to the abbot, monks, and citizens of Arbroath, "to buy and sell their proper goods, through our whole territories (England) with the exception of London, freely and without molestation."

The abbey was completed and consecrated in 1233, and was one of the richest and most magnificent in Scotland.

The drawing illustrates the south transept, known as St. Catherine's Chapel or altar, and shows the building as it now appears. The details are very delicate and beautiful, and many interesting peculiarities are to be found throughout the buildings. The stone used is of a dark red colour, which weathers fairly well, but the building has been subjected to a lot of bad usage.

The abbey possessed some famous men as abbots, amongst them being Gavin Douglas, the translator of Virgil. At the Reformation its wealth was converted into a temporal lordship, and in the seventeenth century the greater part came into the hands of the Panmure family, whose present representative is the Earl of Dalhousie. J. S. G.

#### ST. GEORGE'S (ALBANY MEMORIAL) CHURCH, CANNES.

WE give an illustration of this church, which was built from the designs of Mr. A. W. Blomfield as a memorial to the late Duke of Albany.

We gave full particulars in regard to the church in the *Builder* of January 22nd and February 19th of this year (pages 165 and 304, of our last volume).

#### DESIGN FOR A CHAPEL.

THIS design is by Mr. J. O. Harris, who gained the Soane Medallion in 1884 for a Design for a Theological College. The design now published was made with the idea of representing the interior of the chapel of such a college.

The drawing from which it is taken was in the Royal Academy exhibition.

#### FIFTY YEARS' PROGRESS IN ENGINEERING.

THE INSTITUTION OF CIVIL ENGINEERS.

THE President of the Institution of Civil Engineers, Mr. G. B. Bruce, in the course of his recent opening address, said that having entered upon his apprenticeship in the locomotive works of Robert Stephenson within a few months of the beginning of the present reign, he chose the state of Engineering then, and in the Queen's Jubilee year, as the subject of his remarks. Starting with the workshop, in 1837 machine-tools were practically unknown, reliance being placed upon the skill of the workmen, who could chip and file by hand almost as truly as the machine. It was scarcely credible, but it was a fact, that there was not a single crane in Robert Stephenson's shops in 1837, and the only steam-engine in that which was the most important locomotive shop in the world of that day was a vibrating pillar-engine, with a single 16 in. cylinder and 3 ft. stroke. About the only machine-tool, properly so-called, in the works was a planing-machine, which probably weighed about three tons. At the present time there were lathes 75 ft. long, weighing 100 tons, giving a yield of steel-turnings at the rate of 10 and 20 tons a-day, and planing-machines weighing 90 tons and operating over surfaces of 20 ft. by 15 ft. Referring to the changes in the position of the workman, in 1837 the wages of an engineer in Newcastle were 23s. per week, working sixty-one hours; in 1887 the wages were 32s. per week, working fifty-four hours.



The increase in money earned was 39 per cent., and the rise in rate of pay per hour (from 4.62d. to 7.10d.) was 57 per cent. Taking into consideration that the prices of nearly all the necessaries and the ordinary comforts of life, with the exception of English beef and mutton, were considerably less now than in 1837, it was very clear that the position of the British mechanic had greatly improved during the reign of Queen Victoria, for though he only dealt with one class of workmen, the same circumstances had been at work in favour of them all. Speaking of foreign competition, the President said, "We are constantly told that the difficulty Britain has in holding its own in the markets of the world is due to our want of technical education. There is something in this, but in my judgment very little. The true cause of the difficulty is the large increase in wages and the diminution in hours of labour. It would be pleasant to think that this was not so, but I have not the shadow of a doubt that it is the main cause of the difficulty of meeting foreign competition." Turning from the workmen to the work produced by them, the President contrasted the 9 or 10-ton locomotive of 1837 with the 40-ton engine of to-day, noting also that the bogie truck, which was in the first instance sent out to America from this country, had been now largely adopted in the land of its birth, where for so many years it was not recognised. In the construction of public works great changes had occurred, mainly due to the very extensive introduction of iron and steel instead of masonry, and to the use of Portland cement concrete. These changes had had their greatest development in the case of bridges, the leading dimensions of many of the largest of which were mentioned. The substitution of iron and steel for brick and stone was not, however, in his view, an unmixed advantage. Whatever the cause, the graceful and time-honoured arch had largely given way to a substitute which had neither grace nor beauty about it, and which should therefore be avoided, except where the physical conditions to be obtained could not be secured by the adoption of the arch.\* In this respect the President ventured to think that former days were better than to-day, that the use of iron had been carried to an extreme, and that engineers would do well to retrace their steps and not use flat iron girders where a brick or stone arch was admissible. The progress of railways might be briefly told. In 1837, there were 200 miles of public railways open in the United Kingdom; in 1887, there were 19,332 miles open, representing a total capital of £28,354,254. The President dwelt at some length on the great development of iron and steel industries since 1837, the most important changes having been brought about by the inventions of Sir Henry Bessemer and Sir William Siemens, with the important modifications of Messrs. Thomas and Gilchrist, whereby these processes were now available in the case of ores formerly quite unsuitable. The manufacture of iron plates, and, later, of those of mild-steel, had enormously affected the progress of steam-shipping; for, while the tonnage of British steamers in 1837 was only 67,969 tons, it had risen in 1886 to 4,318,153 tons. In the interval the old form of engine had been completely altered, the side-lever type, consuming 6 lb. and upwards of coal per indicated horse-power per hour, giving place successively to the compound, the triple-expansion, and, lately, the quadruple-expansion engine, with a coal consumption about four times less: at the same time the effective speed of Atlantic liners had risen from about 9½ knots to 19 knots. The President next referred to sanitary engineering, in which, during the Queen's reign, the most notable advance had been brought about by the passing of the Public Health Act of 1848. The far-reaching consequences of this Act and its successors might be summed up in the fact that whereas the annual death-rate in England in 1837 was 20 per 1,000, in the application of hydraulic machinery to engineering, the progress during fifty years had been very great, especially in the direction of devices for the lifting and handling of goods, formerly entirely effected by human labour. At the present time, by the aid of hydraulic power, it was not uncommon for a steam collier of from 1,200 to 1,800 tons to

\* We are exceedingly glad to find that there is one engineer, at all events, who can see this.—Ed.

enter a dock at high-water, discharge her ballast, receive her outward cargo of coal, and leave at high water next day, all being done within twenty-four hours. Amongst the changes which the civil engineer had had a share in effecting during the last fifty years, none had taken so strong a hold on the imagination of the world as the application of electricity to the work and wants of man. The principles concerned were of older knowledge than the past half-century; it was mainly in the practical utilisation of this older knowledge that advance had been made. Reference was made to the electric telegraph, which had developed from the five-needle instrument of Cooke and Wheatstone, employing six wires and working at about the rate of four words a minute, to the system of multiplex and automatic telegraphy, by means of which six messages could be sent at once on one wire, with a speed of, say, 600 words per minute. Touching successively on the telephone, electric-light, and the application of electricity as a motive-power, the President hazarded the opinion that when some way should have been discovered of storing up in a more efficient and financially successful manner the unemployed forces of nature, such as the winds and tides, then would electricity become a factor in the world's life compared with which it was at present as nothing. In conclusion, the President remarked that he had purposely made no reference to instruments of war, whether guns or ships, holding that the "progress" which spoke of "peace on earth" was more in accord with the sound of "Jubilee" than the development which dealt with munitions of war.

#### THE ARCHITECTURAL ASSOCIATION.

The third meeting of this Association for the present session, was held on the 18th inst., in the meeting-room of the Royal Institute of British Architects, Mr. John Slater, B.A. (President), in the chair.

The following new members were elected, viz., Messrs. S. H. White, A. Huddart, F. W. Dorman, J. S. Stuart, W. W. Kenworthy, E. Thornton, R. I. B. Proctor, F. W. Bedford, F. W. Shenton, H. Tooley, W. J. Roberts, W. B. Clarkson, E. Box, C. T. Loftis, S. B. Silcock, H. Ayling, P. Leeds, and E. P. Howard.

Mr. T. E. Pryce (Hon. Sec.) read a letter from Mr. Freeman, the Secretary of the Architectural Union Company, announcing a donation of twenty guineas to the library fund of the Architectural Association, for the purchase of books.

Mr. W. Burrell (Librarian), in proposing a vote of thanks to the Architectural Union Company, said it was an unsolicited gift, made without any advance on the part of the Association.

Mr. H. W. Pratt seconded the vote.

The Chairman, in putting the motion, said the gift was a most acceptable one, as the number of books, especially in the lending library, was none too great. The resolution was then carried by acclamation.

The Chairman said that for the last few months the Carpenters' Company had been forming a library of works of reference, chiefly connected with carpentry, but including many others connected with building, and also a lending library. He had received a communication from Mr. Banister Fletcher, one of the Wardens of the Carpenters' Company, stating that any member of the Association furnished with a letter of introduction from the Hon. Secs., or with his ticket of membership, would have the advantage of using the reference library, and be able to take home books on paying a deposit of 5s., to be returned when the book was brought back.

Mr. F. R. Farrow (Hon. Sec.) announced that on the 15th inst. a meeting of the cycling members of the Architectural Association was held at 9, Conduit-street, when a resolution was passed to the effect that it was advisable to form a club to be called "The Architectural Association Cycling Club," having for its object the combination of architecture and athletics, by instituting cycle runs to places of architectural interest. It was further resolved that the subscription should be merely nominal. Mr. Herbert D. Appleton had been elected Captain, the Hon. Sec. being Mr. Leonard V. Hunt, 35, Queen Victoria-street, E.C. The meeting stood adjourned until December 6th. Members of the Architectural Association wishing to join the Cycling Club were requested to send their names to the Secretary.

Mr. H. D. Appleton then read a paper entitled "Our Sketching Club Scheme," which we print on another page.

Mr. J. A. Gotch seconded the motion with which Mr. Appleton's paper concluded. To make an index, he said, such as Mr. Appleton had foreshadowed, of all the references that had been made to buildings, was a task as the thought of which many men might quail, though such things, of course, could be done by the exercise of time and patience. On the other hand, the first aspect of the question, viz., the keeping of a list of buildings, would seem to be quite or nearly feasible. He would have great pleasure in undertaking the consular, or whatever the post might be termed, of the district in which he resided. He believed that in that particular district it would be possible, first of all, to tabulate all the towns and villages, and then from personal knowledge to put down all the most notable buildings. It would be a difficult task to sift the good information, as many of the books were now out of date, and the illustrations were only of interest from a historical point of view, and as showing how wretchedly people used to draw (laughter). It was also difficult to obtain reliable information even from local architects and parsons. The latter, as a rule, would probably be found to be animated with an ecclesiastical and Gothic feeling, and would know nothing about domestic work, despising, or holding of little account, anything Jacobean. What they had to do, therefore, was to obtain the assistance of men of catholic mind, who would be willing to give information about anything, say from the prehistoric boat discovered at Brigg, down even to post-Reformation work.

Mr. F. T. Baggsallay proposed a vote of thanks to Mr. Appleton for his paper. The scheme seemed to be a most excellent one. The ordinary guide-books were nearly worthless for use when on a sketching tour, while such a list of buildings as was now proposed would be most helpful, especially if means were used to indicate the different degrees of importance.

Mr. S. F. Clarkson seconded the vote of thanks to Mr. Appleton.

Mr. F. M. Elgood said he thought that sketching tours might be started in connexion with the Cycling Club now about to be formed by some members of the Association.

Mr. W. Randolph remarked that he would be ready to contribute his quota of information regarding the district with which he was acquainted, viz., South Yorkshire.

Mr. H. W. Pratt suggested that the consuls and vice-consuls should be asked to supply information to head-quarters as soon as possible, so that it might not be necessary for students going to their several districts to trouble them. It would be well, too, if the consuls could in some way furnish information as to how certain buildings could be inspected, and if possible get permission for students and others to measure, sketch, or inspect the buildings. He would also advise that, say once a month, a district should be taken up and the information published in the "A. A. Notes." By that means the information would, in course of time, be available for reference, and would save people going even to head-quarters for it. The great indexing scheme would doubtless furnish work for several generations, and was rather an appalling task to talk about, let alone to commence upon, besides which much of the information got by the expenditure of considerable labour would not be of much value. He would, therefore, rather see an index attempted comprising fewer publications, but which might be the nucleus of a larger one. He was glad that stress had been laid upon the fact that the Architectural Association was the body best fitted to deal with such a task, because it was only young men who could give time to measuring work. When they got older and were engaged in practice they would have little time for such work; therefore it was most desirable that those who were in their articles should devote their time in measuring.

Mr. F. R. Farrow said he believed it would be necessary to centralise the information obtained, so that members could learn what they desired without troubling the consuls.

Mr. T. E. Pryce thought that active parties of cyclists might very well fish out a great deal of information which might be sent to head-quarters without troubling the consuls. He would like to see the scheme carried out in its integrity, but it was a difficult matter to draw the line as to what were the important



buildings in a particular locality. In a weak moment, a few years ago, he undertook to do something of the same kind for a local society, but he found, to his astonishment, that there was work for a long life-time in that one district alone.

Mr. Clarkson advised that discrimination should be used from the first with regard to the list of buildings. The index, in its main features, might be in existence in a couple of years, and could be added to as additional information came in.

The Chairman spoke of the scheme as one of great value, and referred to the part which Mr. Owen Fleming had taken in connexion with it. He might say, in reply to the questions, that a Roman wall would be a fit subject to deal with, and that the appointment of consultants should be left to the sub-committee. In county histories descriptions of buildings were to be found which were suggestive of things to be looked at. He was glad to hear what Mr. Appleton had said about the measurement of old work, which was of more use to students than any amount of mere sketching. He could also endorse what Mr. Appleton had said about London, for many years ago he used to take the opportunity, at times when there was little traffic about, of roaming through out-of-the-way streets, and he was astonished at the amount of interesting bits of old work he came across. He was rather sorry to hear Mr. Pratt say that as soon as an architect got into practice he had not time to measure anything. Such men as Street and others might be referred to as refuting that idea, and he hoped that many of them, even when they did get into practice, might not find it so entirely absorbing as to allow no time for picking out a little bit of work to be measured or sketched.

Mr. Appleton's motion was then unanimously agreed to, as was the vote of thanks.

Mr. Appleton briefly replied.

#### THE ASSOCIATION OF PUBLIC SANITARY INSPECTORS.

The inaugural address of this Association for the present session was delivered by Mr. Hugh Alexander (Chairman of Council), Chief Sanitary Inspector, Shoreditch, at the Westminster Town Hall, on the 5th inst. In the course of it he said,—My first duty and privilege in the position I occupy by your favour this evening is to congratulate you on the great success that has attended our Association during the past four years. Like good and enduring institutions generally, its foundations being well laid, it has grown from its inauguration steadily, but surely, in popular estimation and in the good opinion of sanitary inspectors throughout the country, until now we number 200 members, 27 hon. members, including the names of many of the most distinguished scientists of the day; and 13 associate members, who are gentlemen of position, interested in sanitary science in various ways. We have occasion also to rejoice greatly that the movement is spreading widely all over the land. One branch, which numbers fifty-two members, has been formed for the North-Western district, with its head-quarters at Liverpool; another branch, which numbers forty-eight members, has been formed for the Midland division, with its head-quarters at Birmingham; and several others are projected in various large centres of population.

This is a record which I cannot but regard as all of promise that before long all the competent sanitary inspectors in the kingdom will be ousted from indifference, and will take their part and shoulder with their comrades a defence of their own interest and the interests of the public, which are one and indivisible in so great a cause of sanitary reform.

And now, gentlemen, as I am sure of your concurrence in my estimate of what has been one, so also I am sure of your full sympathy or a few words in recognition of our great indebtedness to our distinguished President Mr. Edwin Chadwick, C.B., not only for the prestige our Association enjoys in having at its head a gentleman whose name is honoured throughout the world as the pioneer of sanitary reform, but for most valuable active interest in the development of our cause, the full success which promises to be a fitting crown to a long life of the very highest usefulness devoted to the interests of the State, and to the interests of our common humanity.

I would also, in your name, like to bear testimony to the worth of our late energetic Chairman, and our invaluable secretary and treasurer, and to their self-sacrificing labours in laying down the foundations, and subsequently guiding the fortunes, of the Association during the first four years of its existence. It was not a light undertaking for those gentlemen in the early days of our formation, to gather together the units of our force, and to give purpose and direction to its movements. Inspectors in those times were very much like "Hal' o' the wynd;" every man "fought for his own hand," and no one gave effective support to, nor received help from, the disorganised army to which he belonged, and the whole force was discredited in public estimation simply and solely for want of guidance and organisation. This was our condition when these three gentlemen pushed to the front and raised the standard of "The Association of Public Sanitary Inspectors," around which we are gathered this evening. Mr. Jerram has left the chair, and the Association has already testified its high appreciation of his labours. Mr. Legg still continues, and, I trust, will long continue, in the position of secretary, which he has so long filled with credit to himself, and with signal advantage to the Association. Mr. Raymond also retains his position as treasurer, a position in which he has won the high respect and gratitude of the Association for the very able manner in which he has discharged the duties of that important office.

What legislation may be proposed in the coming session we must be prepared to examine dispassionately, and disinterestedly, from the vantage-ground of our knowledge and experience of the law as it stands, and of the changes which we perceive are needful, that we may, so far as we are able, prevent misdirection in legislation; for we must by no means overlook the fact that it is quite possible changes may not mean improvement, either for the public or for the officers of the public. It is therefore the duty of the Association, being forewarned, to be forearmed, and your Council, taking this view of their duty, and looking forward to the time which is now drawing near, presented so far back as March, 1886, a report on "the impending changes in sanitary law," as affecting initial procedure and the powers, responsibilities, emoluments, and status of sanitary inspectors, which report was presented by a deputation, introduced by our President, to the President of the Local Government Board, and received most favourably.

Gentlemen, that report was not adopted in hot haste, in the face of a Government Bill, but in quiet deliberative council eighteen months ago. In that report, while legislation was yet far off, it was declared that sanitary inspectors were placed in positions of great responsibility, armed with totally inadequate powers to efficiently respond to the expectations of the public; and that is the case still. That the sanitary enactments were unnecessarily complicated, unreliable in administration, and not calculated to encourage zealous officers in efforts to secure prompt abatement of nuisances, and they continue so to this day. It is further declared in the Council's report that the most essential amendments required in sanitary law to secure efficient administration are:—(1) That sanitary officers should be duly qualified, and should only be removable from their position by local authorities, for misconduct, neglect of duty, or proved incompetence. (2) That sanitary officers should be held more directly responsible for the abatement of nuisances, and should be required on their own responsibility to serve notices on behalf of local authorities, requiring all necessary works to be done for that purpose, such notices to be read to the local authority or committee appointed for such purpose at their next meeting, and if approved to be adopted, and proceedings ordered to be taken for the abatement of nuisances. Penalties to accrue from the date of inspector's notice. (3) That more simple, stringent, and summary powers should be given for the abatement of nuisances; and lastly, that a minimum rate of salary should be enacted for sanitary inspectors.

It is pretty certain that everyone will agree to the proposition that only a properly qualified man should be appointed to the important and responsible position of a sanitary inspector; but when we come to definitions, public opinion requires guidance and direction; and, above all,

local authorities, with whom rests the appointment of sanitary inspectors, should be restricted and protected in their selection of those officers by an enactment defining and prescribing essential qualifications in candidates for that position.

The absence of any legal or authoritative judgment upon the essential qualifications of sanitary inspectors, and the results naturally arising therefrom, suggested to the members of the Sanitary Institute of Great Britain nine or ten years ago the propriety of instituting examinations and granting certificates of efficiency; and it is reported that 238 aspirants have, up to June of this year, passed those examinations, and have gone forth stamped with the certificate of the examining body as fitted to fill the position of sanitary inspectors. But as to the examination, and as to the certificate of efficiency, there exist grave doubts as to the sufficiency of the one, or the reliability of the other, as a guarantee to the public of efficiency.

It has been said by some members of the Sanitary Institute that some form of examination must be better than none; but, on the other hand, it is alleged by experienced sanitary inspectors that unless an examination is all that it should be, its certificate of competency must be misleading and mischievous. The examination of the Pharmaceutical Society protects the public against poisoning, by taking care that only skilled and properly trained men are allowed to dispense medicine. A medical officer of health must be a man who has devoted his whole life to the acquirement of medical knowledge; and a sanitary inspector, whose business is not to cure diseased bodies, but to cure disease-breeding houses, it is contended should be a man trained and skilled in building construction, so that he may be competent to detect and to correct the errors and the misdeeds of builders and builders' workmen, and even the mistakes of architects, and to diagnose and trace out the hidden causes of disease, otherwise he and the dwellers in houses will be largely at the mercy of interested persons. Can it be maintained that any man taken from any walk of life is sufficient for these things, if coached for a few months, so as to secure the certificate of the Sanitary Institute? I think not; and I am not alone in that opinion. Mr. Cubitt Nichols, the adviser of the Home Office on Artisans' Dwellings Schemes, gave it in evidence to the Royal Commission on the Housing of the Working Classes that, in his opinion, all inspectors ought to be acquainted with building construction, and that even disciplined men of good character, like old soldiers, who are sometimes employed, are of no use unless they have served in the Royal Engineers. This testimony, from a gentleman of large experience and high authority, was fully supported by Mr. Owen, the secretary to the Local Government Board, and by Mr. Edwin Chadwick, our President.

The evidence of these eminent gentlemen I may very fully supplement with the expressed opinion of the Chairman of the Council of the Sanitary Institute itself, Captain Douglas Galton, one of our honorary members, and one of our most valued friends. In his address, read at the annual meeting of the Sanitary Institute, May 26th of this year, an address full of interest and suggestiveness, there is this passage as to treatment of infectious disease:—"The occurrence of a case of infectious disease in any house should be in itself taken as an index of the possibility of defects existing, and should be *prima facie* ground for a thorough examination of the premises and the surroundings by skilled persons."

I quite agree with Captain Galton, for I must assume he means men skilled and experienced in building construction. Nevertheless,—and it is something extraordinary,—it is not required by the Sanitary Institute that candidates for its certificate shall be practical and experienced builders; on the contrary, we cannot help observing that men whose life-long avocations have not had the slightest affinity with building operations of any kind, have been successfully coached up, and have passed the Institute's examination, and are now ready at any time, with the aid of the certificate they have secured, to assume the functions of a sanitary inspector.

We all remember that this examination was instituted ostensibly to improve the status and efficiency of sanitary inspectors, but there can exist no doubt in the mind of any experienced and observant sanitary inspector that it has



missed its aim from the very first, and that its certificate, granted as it is, wholesale to men who are not acquainted practically with every detail of building operations, is delusive and dangerous to the public, and, instead of elevating the position of sanitary inspectorship, tends largely to its degradation. I adduce in evidence of that the fact that it was some time back publicly and ostentatiously announced (as a rather good thing) that a labouring man, employed on a railway, had passed the examination of the Institute. And that announcement was followed very shortly afterwards by an advertisement issued by the vestry of a large metropolitan parish, for a man who held the certificate of the "Sanitary Institute" to fill the position of sanitary inspector, and the reward unblushingly offered for the man who held that distinction, a distinction certifying that he was a fit and proper man to discharge the duties devolving upon a sanitary inspector, was 30s. per week,—that is to say, the wages due to, and often obtained by, unskilled labourers.

Out of evil cometh good occasionally, and in this instance it was really fortunate that the members of the Vestry referred to were so mean as to permit the issue of such an advertisement, for, as the result showed, they had correctly gauged the value of the certificate of the Sanitary Institute, and they demonstrated its entire worthlessness to the public, in the fact that they had no trouble in getting what they wanted, and for the money they offered.

I will make no further comments on the facts I have adduced and the opinions I have quoted than this,—that they incontestably demonstrate the necessity for a proper definition by law of "the essential qualifications required in a Sanitary Inspector," and to that I will only add and submit the following questions to you, and to enlightened local authorities, and to society generally:—(1) Can the certificate of the Sanitary Institute be regarded as a reliable guarantee of efficiency in any man seeking an appointment as a sanitary inspector? (2) Does the examination and certificate of the Sanitary Institute tend to improve the status and consequent efficiency of sanitary inspectors? or does it not rather tend to degradation and levelling down to the status of a day labourer?

#### ARCHITECTURAL SOCIETIES.

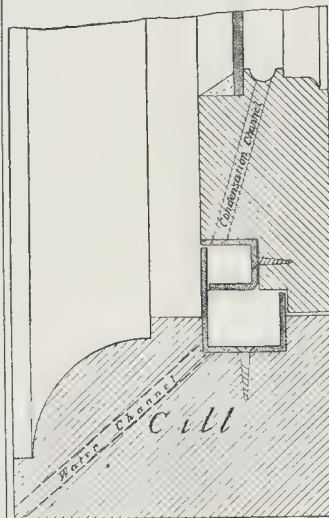
**Manchester Architectural Association.**—The ordinary fortnightly meeting of this Association was held on the 15th inst., in the Diocesan Buildings, Mr. T. Chadwick in the chair. Mr. J. Corbett, Sanitary Engineer, read a paper on "House Hot-water Fittings," which was elaborately illustrated. The development was traced from the crude "set pot" or water-box in a cooking-range, to the present cylinder, with its necessary circulating pipes, safety valve, &c. Special appliances were described for intercepting and removing deposits of lime and mud from the boiler. Necessary precautions against frost were described, and instances were quoted of collapsed cylinders, frozen pipes, damaged boilers, &c. A vote of thanks, proposed by Mr. Hodgson, seconded by Mr. Woodhouse, and supported by the chairman, was carried unanimously.

**Leeds and Yorkshire Architectural Society.**—At the second meeting of the present session of the Leeds and Yorkshire Architectural Society, an address was delivered by Mr. Basil Champneys, of London, on "Victorian Architecture and Originality." Mr. H. Perkin, one of the vice-presidents, presided. The lecturer said that architecture was very much guided by precedents, and was bound more than any other art by mechanical and mathematical laws. It would therefore be unreasonable to expect any rapidity in its development or progress. They could find but two great original styles of architecture evolved by the inventive powers of humanity,—Greek and Gothic. In public taste, which must always be a factor in the development of style, there was no guidance for architects. But, however bad the conditions were, he saw no reason for despair so long as architects were not expected to do too much. Victorian architecture had accomplished a great deal, and had formed a scaffolding for successful enterprise in the future. It had shown that the essential principles of the two great schools of architecture had been mastered. By no conscious effort of originality would real progress

come about. A vote of thanks to Mr. Champneys for his lecture was proposed by Mr. Corson, seconded by Mr. Connon, and supported by Principal Bodington, of the Yorkshire College. Referring to a remark made by Mr. Connon, Mr. Bodington said that the very essence of success lay in their having an instructed public to deal with. It seemed to him that the basis of national art was to educate the public to whom they had to appeal. Those who had seen the Manchester Exhibition had been amazed at the strength and fruitfulness of English art in painting. He could not help thinking that if they could see collected together the best architectural works of the last fifty years, it was quite possible they might stand amazed at the fruitfulness and strength of English architecture.

#### ELLIOTT'S "PERFECT SIMPLEX" METAL WEATHER BAR.

This bar is adapted for all kinds of casements opening inwards, and is applicable to existing windows and doors. As will be seen by the accompanying section, which represents the casement when closed, the lower bar is constructed in sectional shape, somewhat like the letter L, and is screwed into a groove formed in the sill, the highest side of the bar being on the outside; or it can also be screwed on to an ordinary cill without forming any groove at all. The bar is



pierced in one place at the bottom, and a hole is also bored through the cill to carry off the condensation or other water that may accumulate in the bottom of the bar. The top bar is somewhat similar in shape, but of a smaller section, and is screwed into a rebate formed on the outer edge of the casement. This bar is also pierced to convey the condensation down through the bottom rail, as shown. The lower external angle of this bar is bevelled to form a drip, which is fixed flush with the bottom edge of the rebate in the sash. The long edge of the bar fixed on the casement laps on the top of the long edge of the bar fixed in or on the sill, and forms the outside joint of the casement, consequently the short edge of the small bar touches the inside face of the cill bar.

This weather-bar, which speaks for itself as to its efficiency, is manufactured by Mr. Samuel Elliott, of the Albert Joinery and Moulding Mills, Newbury.

#### Melbourne Centennial Exhibition, 1888.

As some misapprehension appears still to exist respecting the dates fixed in connexion with the allotment of space and the opening of the Melbourne Centennial Exhibition, we are requested by the Agent-General for Victoria to state that, as at present arranged, the opening ceremony will take place on the 1st of August, 1888, and that applications for space will be received up to the 31st of December next at the offices of the London Commission, 8, Victoria-chambers, Westminster.

#### ARCHITECTURAL ASSOCIATION.

##### "OUR SKETCHING CLUB SCHEME."

SIR,—Will you kindly allow me to invite the assistance of all who take an interest in the proposal made in the paper on "Our Sketching Club Scheme," either by volunteering to act as vice-consuls, or if not able to undertake the regular duties, to furnish up with particulars of any buildings of interest they are acquainted with? Any information forwarded to me at 157, Wool Exchange, Coleman-street, E.C., will be most gratefully acknowledged. It should be tabulated in the following manner:—

Subject.	Name.	Place.	County.	Date of work, or style.	Architect.	Any features of particular interest.	Remarks. Especially note if illustrated or not.
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We hope that the value of such a register will be sufficient to induce all who have the power to forward the movement to the utmost of their ability.

HERBERT D. APPELTON.  
November 21st, 1887.

#### A SYMBOLIC STONE.

SIR,—After reading the article on "Christian Symbolism in Great Britain" which appeared in the number of your journal for the 5th inst., I am induced to call the attention of the writer or some member of the Surrey Archeological Society to an interesting specimen illustrative of the subject which is now lying by the roadside near Weybridge, about a mile out of the town, and close to the barge-out of the river Wey; in fact, at present it does duty as a guard-stone to prevent carts, &c., damaging the Pelican Inn.

Although broken into two pieces, it will, on inspection, be found to be part of the cover of a stone coffin, and bears carved upon it part of a cross and an inverted omega over another.

When put together it measures about 3 ft. long, and appears to have been broken where the transept of the cross would occur, so that originally it must have been about 7 ft. in length. The omegas are very clearly defined.

I was informed that it was brought out of old Weybridge Church during its restoration.

The belief that it is well worthy of an inspection by some one interested in these matters, and that it deserves a better resting-place than it now has, is my excuse for troubling you with this note.

WILLIAM GIBDON.

P.S.—I enclose a rough sketch of it as I saw it a month ago.

#### MITCHAM LINOLEUM COMPANY'S COMPETITION.

SIR,—In your Note on the above in last week's issue [p. 695] you do not make any mention that the Company reserve the right to buy any of the designs sent in, and not to premeditate, at one guinea each. Now this price, for anything of a design, drawn to 18 in. by 18 in. and coloured, is ridiculously small, even for the draughtsmanship. I think if the company were to alter this clause and allow an unsuccessful competitor to give them the refusal of his designs, at a price to vary say from one to three guineas each, they would obtain more designs of a higher class; for competitors must bear in mind that "many will run and there are but few prizes."

V. S.

\* \* We have received other letters raising the same objection, which we consider a very reasonable one.

#### THE METROPOLITAN BOARD OF WORKS SCANDAL.

SIR,—Referring to Mr. Richardson's speech, reported in the *Financial News* of Saturday last, in which a Mr. Fuller is stated to have bought a book of reference from one of the officials, I have challenged Mr. Richardson to give the name and address of the Mr. Fuller referred to, and I now beg to disclaim all knowledge of such a transaction.

I am most desirous that this letter should have publicity, as I am the only surveyor practising in London by the name of Fuller who is a Fellow of the Surveyors' Institution.

GEORGE J. FULLER.

**Palpit, Truro Cathedral.**—In our issue of the 12th inst. (p. 659), the pulpit of Truro Cathedral is described as being constructed of "Hopton Wood stone, from the Wirksworth quarries in Nottinghamshire": it should have been "Derbyshire."

**The Vintners' Company.**—Mr. William Wimble, of Queen Victoria-street, has been appointed architect and surveyor to this company.—*City Press*.

\* Printed in this week's *Builder*.



## PROVINCIAL NEWS.

**Newcastle-on-Tyne.**—The foundation-stone of the new College of Medicine, Newcastle, was laid on the 3rd inst., by the Duke of Northumberland. The design of the new structure is Elizabethan, and the site is in the Bath-road. The building is planned so as to leave a quadrangle in the centre. The western and southern sides are not being built at present, but in the future will be available for the extension of the physiology department, laboratories, animal pathology department, and a wing containing a residential hall for fifty students. The college now being erected consists of the principal and north front, facing Bath-road, and the east wing. This wing contains the anatomical department. On the ground-floor is the dissecting-room, 70 ft. by 30 ft., lit by a "ridge-and-furrow" roof. Adjoining are a large locker-room and lavatory. On the same floor is the anatomy theatre (for 150 students) and professors' private room. Above is a bone room, 20 ft. by 20 ft., and another room, 20 ft. by 15 ft. There is a basement, containing a summer dissecting-room, 20 ft. by 20 ft.; two rooms, 41 ft. by 30 ft., and 30 ft. by 28 ft.; a mortuary and infectious rooms, with private yard; also a heating vault, coal-cellar, store-rooms, &c. The walls of this wing are lined out with glazed bricks. The main front contains the entrance, in the centre under a tower, with oriel window corbelled out above the archway. On the right and left are rooms for the porter and registrar. The remainder of the ground-floor is occupied by the council and professors' room, 35 ft. by 25 ft., with a large bay window; a materia medica room, 25 ft. by 25 ft.; and a smaller lecture theatre, 38 ft. by 25 ft., having a private room for the professor and a dark room opening from it. An oak staircase, with double flights of steps, leads to the upper floor, which contains the library and examination hall, 80 ft. by 35 ft., and the museum, 60 ft. by 35 ft. The mullioned windows are being carried out in stone, and the walls and dressings in red bricks and terra cotta. The architects are Messrs. Dunn, Hanson, & Dunn, of Newcastle, and the principal building contract is in the hands of Mr. S. B. Barton, of Newcastle, and amounts to 15,000l., the first portion of the building being entrusted under a 2,000l. contract to Mr. Walter Scott, also of Newcastle. The Normanby Brick and Tile Company, Middlesbrough, have the order for the red facing and moulded bricks, and Messrs. Doultou & Co., Lambeth, the terra cotta. Mr. Relf is the clerk of works. The total cost of the building will be about 25,000l.

**Stourbridge.**—On the 14th inst., Earl Beauchamp inaugurated the new Town Hall at Stourbridge. The building is Renaissance in style, the material used being red brick, with terra-cotta for the ornamental work. There are two main entrances from Market-street, and one for artists, as well as one from Smithfield to the back of the room. The hall is 76 ft. by 46 ft., and in addition it has a stage 34 ft. wide by 26 ft. deep. The height to the ceiling is 38 ft. A gallery at the opposite end of the stage will accommodate about 200 persons, and the floor of the hall will seat over 800. The doors have been fitted with double axle hinges, and there are eight exits from the hall to the corridors and six external exits. Cloak rooms, lavatories, and other accommodation, have been provided. The hall is lighted by ten windows, five on each side, of cathedral tinted glass, in stone mullions. The building is heated by hot-water pipes, supplied by Messrs. Jones & Attwood. In addition to the Town Hall the Commissioners are building in connexion with it, and of uniform design, a suite of public offices. The Commissioners' Room, which is to be 38 ft. long by 21 ft. wide, will have a strong room attached. There will also be offices for the Town Clerk, collector, surveyor, and other officials. One of the entrances to the Town Hall has been carried upwards so as to form a tower 100 ft. high, connected with which is an open balcony 55 ft. high. At the back of the public offices there will be the new fire-engine station, and this will be accessible from Smithfield. The total cost of the hall is about 4,500l., and that of the Town Offices and Corn Exchange it is estimated will be 2,400l. more. The architect is Mr. T. Robinson, of Stourbridge, the contractor being Mr. J. Guest, also of Stourbridge.

## DISSENTING CHURCH-BUILDING NEWS.

**Honor Oak.**—Two memorial stones of a Baptist school-chapel at Honor Oak, between Peckham and the Crystal Palace, were laid recently. The building will consist of a school-chapel measuring 61 ft. 6 in. by 32 ft. 6 in. inside, having a partly open-timbered roof and ceiled at a height of 25 ft., with inner and outer front lobbies, all doors opening outwards; and a vestry, 10 ft. by 12 ft., &c. The style is Early Gothic, and the materials to be used externally are red brick with Bath stone dressings, and slated roofs. The contract for the chapel has been taken at 1,093l. by Messrs. F. & H. F. Higgs, of Loughborough Junction. Dwarf walls and iron railings are to be erected around the whole of the site, upon which a new church is to be erected within four years, when the building now in progress will be used as a school. This is the second chapel erected during this year under the auspices of the London Baptist Association, the first being at Cann Hall-road, Stratford, which was opened in the Spring. The architect of both buildings is Mr. George Baines, of Great Winchester-street, London.

**Newton (Leeds).**—The memorial stones of a new chapel for the accommodation of Baptists and Congregationalists were recently laid at Newton, near Leeds. The exterior of the new building will be in the fourteenth-century Gothic, slightly decorated, with an octagon end to Chapel-town-road. In the centre of the octagon the principal entrances and portico will be placed, and above there will be an apsed end of three two-light windows, supported with flying buttresses, and finished in gables. Above the latter there will be a central clock tower with traceried lights and dials in four sides. The scheme will entail the expenditure of 5,000l. or 6,000l., exclusive of the site. Accommodation will be provided for over 500 worshippers. The building will be well lighted and have clearstory windows. The work will be carried out from the designs of Mr. Archibald Neill, of Leeds.

**Whetstone.**—The memorial stone of a new Congregational school-chapel at Whetstone has recently been laid. The style of the building is a very simple treatment of the Early Gothic. It is faced with white bricks with Bath stone dressings, and tiled roofs. The accommodation on the upper floor consists of the school-chapel, 60 ft. by 35 ft., seating about 350 adults, with a vestry, tea-making room, &c. Two fireproof staircases lead down to the lobbies. On the ground-floor will be an infants' class-room, 25 ft. by 18 ft.; a lecture-room, 30 ft. by 35 ft., with vestry, 14 ft. by 11 ft.; and five class-rooms, 13 ft. 9 in. by 9 ft. 6 in. each. A corridor 6 ft. wide leads to the lecture-room and class-rooms. It will be heated by hot water. The contract for the main building, including lighting, heating, &c., is 2,007l. The architect is Mr. George Baines, of Great Winchester-street, E.C., whose designs were accepted in a limited competition. The builder is Mr. R. G. Battley, of Old Kent-road, S.E.

**Fork.**—A new Wesleyan chapel was opened in Bishopthorpe-road, York, on the 13th ult. The building will seat about 650 persons, has been erected from designs prepared by Mr. C. Bell, of London, and is in the free Italian style of architecture. It contains, besides the chapel proper, a spacious schoolroom with fifteen class-rooms opening into it, as well as an infants' schoolroom, &c. The cost will be upwards of 6,000l.

## STAINED GLASS.

**Blackburn.**—Viscount Cranborne a few days ago unveiled a stained-glass window which has been placed in the west end of Christ Church, Blackburn, at a cost of about 300l. The window has been erected, as an inscription on it indicates, as a "Jubilee" memorial. It is the work of Mr. Swaine Bourne, of Birmingham. The subjects treated are eleven in number, eight being arranged in two rows in the lights, with architectural canopies.

**Charlton Abbotts.**—The east window of the Parish Church has been filled with stained glass, illustrating Faith Hope, and Charity. The work has been designed and executed by Messrs. Warrington & Co., of London.

**Grappenhall.**—The parish church of St. Wilfrid, Grappenhall, near Warrington, has just received a considerable addition of stained glass. The present work consists of two five-

light windows representing the "Adoration of the Magi" and "Christ with the Four Evangelists"; two four-light windows illustrating "The Feeding of the Multitude" and "Acts of Charity"; and one window of three lights. This latter window contains nearly all the ancient glass, dating from the fourteenth century, which was scattered about in various windows in the church. These pieces have now been collected, and an arrangement designed to bring them into use, so that the whole should form one complete window. These additions were entrusted to Messrs. Mayer & Co., of Munich and London.

**Longton.**—A special service has been held in St. James's Church in dedication of two two-light windows which have been placed in the chancel as a memorial to illustrate and perpetuate the life and work of the Rev. Adam Clarke, late rector of the parish. The subjects of the windows were selected by a committee, and are as follows:—1, As teaching the ignorant, "Our Lord Instructing Nicodemus"; 2, As comforting the afflicted, "Our Lord Comforting Martha and Mary"; 3, As feeding the hungry, "Our Lord Feeding the Five Thousand"; 4, As visiting the sick, "Our Lord Visiting St. Peter's Wife's Mother." Each subject has been made to run through two lights, and is framed with architectural canopies and bases of late fifteenth-century character. The work was designed and executed in the studios of Messrs. Heaton, Butler, & Bayne, of Garriock-street, London.

**Rochester.**—A three-light stained-glass window has just been placed in St. Nicholas Church, Rochester, in commemoration of Her Majesty's Jubilee. It is the gift of Mr. W. Patten-Haymen, J.P. The lights are composed of heraldic devices, with emblems, &c., a large portrait bust of the Queen being placed in the quatrefoil. A similar window for the same church has also been placed as a memorial of the late Alderman Charles Foord by the family of the deceased gentleman. Both windows have been executed by Messrs. W. James & Co., Willes-road, Kentish Town.

**St. Columb (Cornwall).**—St. Columb Minor Church, Cornwall, has recently been enriched by the fixing of a four-light window at the east end. It represents four of the subjects from Our Saviour's life, viz., "The Annunciation," "The Adoration," "The Baptism," and "The Saviour blessing the Children." They are surrounded by rich floral canopy work on alternate blue and ruby grounds, the bases being in keeping. The window is to the memory of the late Mr. Thomas Nicholls, and was carried out under the superintendence of the Vicar by Messrs. Gibbs & Howard, of Charlotte-street, Fitzroy-square, London.

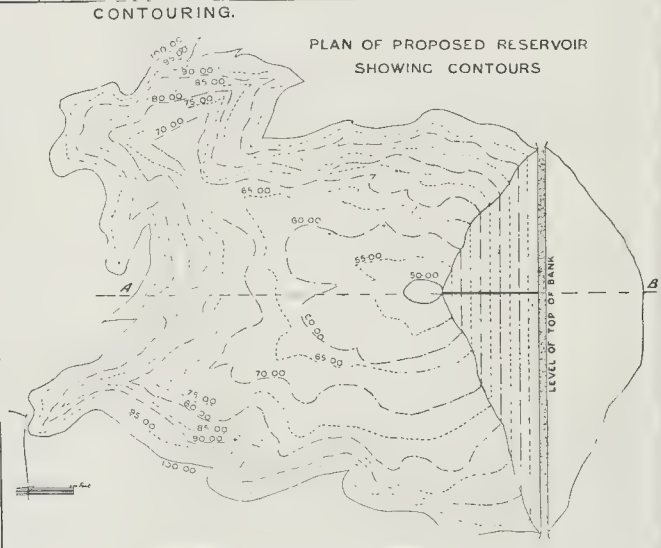
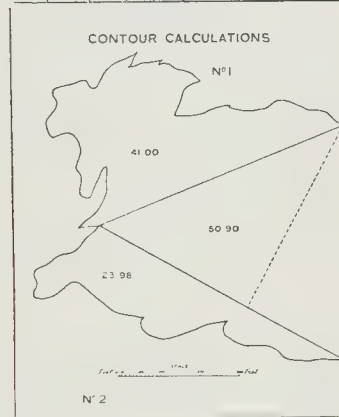
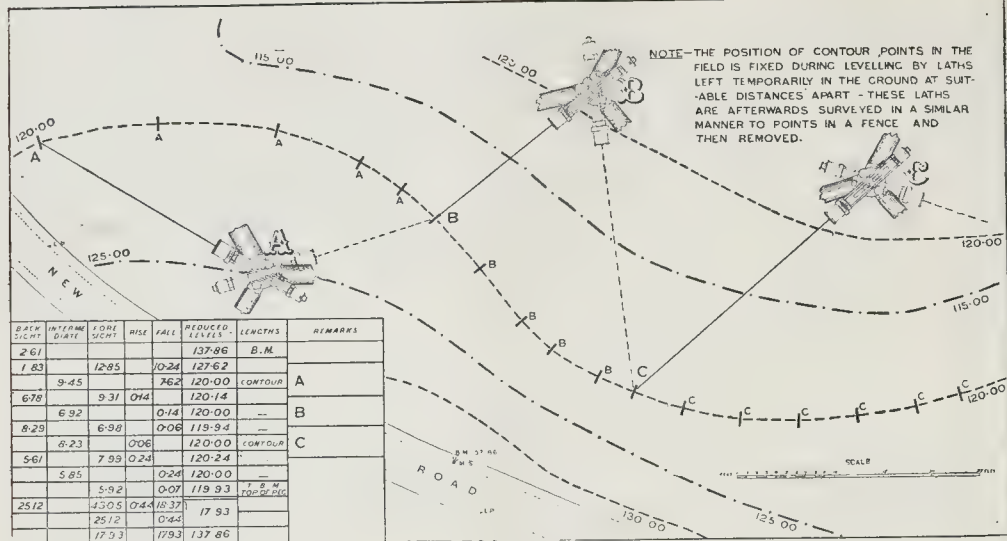
**Swansea.**—Sir John Morris, Bart., has lately had erected, at his seat, Havod, Sketty Park, a large painted window, to commemorate the Jubilee of Queen Victoria. In addition to a representation of Her Majesty and the royal symbols, the window contains the Morris arms, and the national emblems of England, Ireland, Scotland, and Wales are worked in as a ground-work to the whole. The window has been designed and executed by Messrs. Chas. Evans & Co., London.

**Wakefield.**—The west window of St. Mary's Church, Wakefield, has been filled with stained glass by way of memorial to the late Misses Scott, of St. John's, Wakefield. Figures of some of the greater prophets occupy the chief lights, with the patron saint and angels in the tracery. The work is from the studio of Messrs. Powell Brothers, of Leeds.

**Widdington.**—A two-light painted window to the memory of Mary Ann Hill Firth and Mary Ann Firth, relatives of the vicar, has recently been executed for this parish church by Messrs. Chas. Evans & Co.

**Destruction of a German Castle by Fire.**—Last week the famous Castle of Jever, in Oldenburg, was almost completely destroyed by fire and water. The castle is the autumn residence of the Grand Duke of Oldenburg, whose arrival had been announced, and it is thought that excessive heating of the stoves of the castle caused the fire. The building, formerly the ancestral home of the Dukes of Anhalt-Zerbst, was one of the oldest in Germany, and famous for its fresco paintings and Gobelins tapestry. There is also a fine picture-gallery. Fortunately all these art treasures, as well as the antique furniture, were saved.





### The Student's Column.

#### LAND SURVEYING AND LEVELLING.

##### XXII.—CONTOURS.

**C**ONTOUR plan enables the surveyor to judge the undulatory nature of any ground, and in setting out work to run lines approximately of equal level or of uniform gradient. It is prepared in the following manner. Suppose the altitude of the contour required to be 120 ft. above a given datum, and that the nearest reliable bench mark is known to be at a level of 137.86 ft. above the same datum, there is a difference of 17.86 ft. between the level of the bench mark and the required contour. The instrument is set up in a convenient position and adjusted, and if, for example, the staff reads 2.61, this is booked as a back-sight and shows the line of collimation to be at a level of (2.61 plus 137.86) 140.47 ft. above the given datum. Now the contour being 20.47 ft. below this, it is evident that the line of collimation must be lowered in position before a level staff, 14 ft. or 16 ft. long, could be read by the instrument when set up level. A fore-sight for the purpose of connecting the levels is taken in such a position that the staff is read near the top, say at 12.85, and the level is re-set in a new position to read near the foot of the staff, say 1.83. Reducing the book we find the level of the point upon which we changed the level of the line of collimation to be 127.62. The position of this point is not recorded in the level book, as it is not required to be indicated upon the plan, but we have by this means fallen from a known level of 137.86 to

a known level of 127.62, and have now only to fall 7.62 ft. lower to find the position of a point upon the required contour. Adding 7.62 to 1.83 we obtain 9.45 as the necessary reading upon the staff to give the height required, and this figure is then booked for reference in the intermediate column. If the staff reads less than 9.40 the staffman is told to go to lower ground, whereas if the staff reads more than 9.50, the staffman is told to come to higher ground. Except where extreme precision is required, the divisions indicating hundreds may be disregarded in reading the staff, but it is well to observe them in the Level Book for sake of accuracy in connecting the levels. Signals will have to be agreed upon by which the surveyor can communicate with the staffman when they are too far apart to be within hearing of one another. The position of the contour points in the field is fixed during the process of levelling by stout laths pointed at the ends, so as to be left temporarily in the ground at suitable distances apart. The number of laths required will entirely depend upon the intricacy of the ground and the size of the features. Laths are placed in positions determined by levelling at such points as will best define the shape of the contour, and these laths are afterwards surveyed in a similar

manner to points in a fence. It is advisable only to level and lath out as much as can be surveyed before leaving the ground for the day.

The plan of the proposed reservoir shows contours at heights having an interval of 5 ft. between them. The altitudes are supposed to range between 50 ft. and 100 ft. Watersheds are indicated by a salient or outward bend in a contour line; watercourses by a re-entering bend in the contour line. The vertical interval at which the contours are to be levelled having been decided, a line of section is taken (sometimes called "the initial line"), upon which pegs as temporary bench marks are fixed near the level of each contour, and in running the required contours the instrument is set up so that the telescope, when levelled, may intersect the levelling staff which is held upon the initial point, or top of each contour peg in order to arrive at the reduced level to be read upon the staff for tracing the required contour.

The areas of the contours enclosed can be best arrived at with the use of a planimeter (*Builder*, Oct. 29th, p. 618). The diagram indicates the method of calculating the area enclosed by the top bank contour. In this case the enclosure being large it is divided into three parts, and

one side being straight a triangle is formed in the centre the area of which can be most accurately calculated in the ordinary way by multiplying the base by half the height, it would be waste of time to go round the boundary of any regular geometrical form with the planimeter. The two adjoining enclosures

to the triangle being irregular in outline are more accurately determined by the planimeter than by drawing "give and take lines" in the usual way.

The subjoined table gives a systematic method of drawing up the statement of capacities.

## CALCULATION OF CAPACITIES.

PROPOSED RESERVOIR.						
Reduced Level.	Sq. ins. Area on paper.	Area in sq. feet.	Mean Area.	Depth.	Cubic feet.	Capacity in gallons up to level.
50.00	0.46	1656	6912	x 5	34560	55.00
55.00	3.38	12168				216000
60.00	12.53	45108	28038	x 5	143190	1110938
65.00	21.24	76464	60786	x 5	303930	65.00
70.00	34.42	123012	100188	x 5	500940	3010500
75.00	40.04	176544	150228	x 5	751140	70.00
80.00	61.52	221472	199008	x 5	995040	6141375
85.00	74.52	268272	244872	x 5	1224360	75.00
90.00	87.44	314784	291528	x 5	1457640	10836000
95.00	111.03	363708	339246	x 5	1696230	80.00
						17055000
						85.00
						24707250
						90.00
						33817500
						95.00
						44418937

Area of Top Bank Level 9.58 acres.

## RECENT PATENTS.

## ABSTRACTS OF SPECIFICATIONS.

16,701, Excavating. T. Whitaker.

This invention has for its object the application of the steam-crane machinery to excavating. On the top of a portable crane a swinging arm is swivelled. This carries an excavating-bucket with a hinged or movable bottom, so as to allow the contents to escape. The bucket is provided near the top with a stirrup or bow, by which it is suspended to the hauling-chain of the crane, and is so arranged that in excavating the pull of the chain is always in a direction parallel to the face of the out, and not direct to the job head. Or the chain of a horizontally-moving crane carries an excavating-bucket, which is guided up and against the face of the cutting by a radius rod projecting from the wagon. When the bucket is full it is swung round and emptied into a wagon behind the crane, or into any other desired place.

16,811, Door Checks, &c. H. House.

This invention relates to a door check after the American pattern, but the arm, instead of being straight, is curved, and the end runs against a cylindrical buffer which gives ease and certainty of action. Mechanism for regulating the pressure of the spring, &c., is also adaptable.

16,847, Bolts for Doors. F. H. Collins.

Instead of attaching the thumb-bit, push-piece, knob rigidly to the rod, it is by this invention allowed to have a slight rocking motion lengthways, so as to cause the thumb-bit to travel by the pressure of the fingers first causes the thumb-bit to rock on the disengaged stud, and withdraw the other stud out of the slot in which it was locked. The thumb-piece can then slide to the other end of the traverse, when the second stud falls into the other slot, and is secured by the action of a spring mentioned.

8,939, Concrete Pavements, Floors, &c. J. & J. Crombie.

According to this invention the area to be covered is flagged with a layer of sand, and on this is arranged a system of moulding boards, which divide the area to be paved into the number of flags or slabs required. Then a layer of calico, cloth, cardboard, or some such suitable material is placed so as to make a fair and level surface, and to prevent the bed from being disturbed by the concrete when it is put into the mould. By this a level surface on both sides of the flags is ensured; the top sides of the flags being trowelled in the usual manner to make them smooth. The joints are treated with plumbago to prevent adhesion.

12,638, Flooring or Decking for Bridgework, &c. A. W. Ramage.

This invention relates to flooring or decking used in bridgework, culverts, landing stages, piers, &c., or for fireproof structures designed to bear a great strain per given area. It is impossible to describe in detail the improvements, but steel or iron in suitable segments is used, the decking being filled in with concrete or similar substance.

12,821, Weather-guard for Doors, Windows, &c. S. Pitt.

The guard which is the subject of this invention, instead of being in the usual form of a spring, is made of a cylinder or roller held by a strap, and so made as to effectually shut out draught. The inner part of the roll is elastic, while the outer portion is of hard felt or some durable substance.

## NEW APPLICATIONS FOR PATENTS.

Nov. 11.—15,406, A. Orr, White Lead.—15,426, H. Walker, Firestoves.—15,437, W. Smetburst, Curtains, Doors, or Divisions for Theatres, &c.

Nov. 12.—15,467, G. Bulmer, Ventilators.—15,475, T. Lethereen, Silent Water-waste Preventer Cistern.—15,476, E. Loftis, Ventilating.—15,483, J. Boulter, Automatic Indicator for Water-closets.—15,509, R. Oakley, Warning and Ventilating Buildings.—15,520, W. Stanford, Jointing Stonework and other Pipes.

Nov. 14.—15,527, G. Davis, Fireproof Revolving Screen for Grates, &c.—15,531, J. Dyson, Inlet Ventilators.—15,542, T. Worthington, Ventilating

Sewers and Drains.—15,545, J. Lawrence, Bellows Regulators for Water-closets.—15,560, B. Finch, Fireproof Scenery, and Doors for same, for Theatres, &c.

Nov. 15.—15,593, J. MacKnight, Artificial Pavement.—15,603, W. Payne, Pivoting Fanlights, &c. &c.—15,626, A. and R. Kerr, Wood-working Machinery.—15,634, J. Gay and F. Wood, Fire-bricks, &c.—15,655, F. Scheidemann and F. Bender, Hinges.—15,660, G. Layton.

Nov. 16.—15,660, G. Wood, Manufacture of Glass.—15,739, J. Stephens, Portland, Roman, and other Cements.

Nov. 17.—15,763, A. Haslam and J. Settle, Fire-places or Grates.—15,764, J. Stevenson, Fastening Sashes, Windows, Doors, and Shutters.—15,769, R. Bucknall, Folding Roof Trusses and Pillars.—15,771 and 15,773, F. Crane, Varushes.—15,781, T. Abbott, Folding Wall-ladder and Fire-escape.

## PROVISIONAL SPECIFICATIONS ACCEPTED.

12,383, B. Cocker, Protection for Gas-piping in Case of Fire.—12,900, T. Morris, Slate Working Machinery.—13,127, A. Stephenson, Butt Hinge and Method of Fixing to Doors.—13,524, W. Hearn, Fastening Windows.—13,688, H. Gross, Kilns for Bricks, Tiles, &c.—14,231, J. Pettor, Fireplaces.—14,422, G. Newman, Door Springs and Checks.—14,545, M. Frankenburg, Parquetry Wood Flooring.—14,556, J. Stones, Fireproof, Iron, or other Curtains for Theatres and Large Openings.—14,634, J. Newton, Rocking Basin Water-closet Apparatus with Trap.—14,716, A. Hopkins, Wood-block Flooring.—2,517, H. Moore, Self-locking Bolt for Doors.—13,472, J. Coppard, Closing or Opening Doors, Windows, &c.—13,576, W. St. Aubin, Window-sash Fasteners, &c.—13,923, J. Hind and F. Sharp, Automatically Opening Doors from the Interior of Buildings in Cases of Emergency.—13,946, H. Whiteley, Opening and Closing Fanlights, &c.—14,206, D. Scroless, Automatic Wind and Rain Excluder for Doors.—14,347, B. and C. Townsend, Draught, Dust, and Rain Excluder for Doors.—15,114, G. Sonnenenthal, Pile Drivers.

## COMPLETE SPECIFICATIONS ACCEPTED.

## Open to Opposition for Two Months.

14,707, E. Longe, Communicating with Upper Stories of Buildings in Case of Fire, &c.—734, T. Royle, Preservation of Wood, &c.—12,969, J. Crighton and S. Robertson, Flushing Cisterns, &c.—678, E. Jones and C. Brand, Paving Blocks from Scoria or Slag.—698, O. Elphick, Water Waste Preventers.—1,354, G. Smith, Door Fasteners and Locks.—5,796, W. Holland, Automatic Discharge Valve for Water-closet Cisterns and Tanks.

## RECENT SALES OF PROPERTY.

## ESTATE EXCHANGE REPORT.

## NOVEMBER 15.

By SAMUEL B. CLARK & SON.  
Perthshire, near Dundee Station—the residence called Carliney, and 1,074 acres, freehold..... £9,063  
By ROGERS, CHAPMAN, & THOMAS.  
Balham, Ormsley-road—Branksome, term 92 years, ground-rent 7s..... 1,150  
Muswell Hill—Ground-rent of 64s. 12s. reversion in 96 years..... 610  
By DRIVER & PIERCE.  
Highbury—11, Mort-road, 89 years, ground-rent 6s..... 250  
By PERKINS & CHASE.  
New Cross-road—No. 106, freehold..... 635  
By A. & A. FIELD.  
Stepney—17, Walter-street, 27 years, ground-rent 1s..... 200  
Marylebone—Improved ground-rent of 4s. a year for nine years, with reversion to 10s. a year for 13 years..... 116  
6, Harcourt-street, 5 years, ground-rent 8s..... 69  
Walsworth-road—No. 108, Profit rental of 8s., term 23 years..... 75

By FAREBROTHER, ELLIS, & CO.  
Northampton, near Horton House, with mansion, advowson, and 2,553 acres, freehold..... 40,000  
A perpetual rent-charge of 54s. 10s. a year..... 1,280  
Hackleton—Freehold house and shop..... 350  
The Hackleton Working Men's Club and a plot of land, freehold..... 150  
An enclosure of freehold land, 5a. 3s. 5p..... 680  
Isleworth—The freehold residence, Fendens, and grounds..... 1,960

## NOVEMBER 16.

By BAXTER, PAYNE, & LEPPER.  
Green-street Green, Kent—Two enclosures of freehold land, 17a. 0r. 7p..... 1,350  
Beckenham—The residence called Roslyn, 80 years, ground-rent 3s..... 1,900  
Dorset—77, Church-street, freehold..... 250  
Lambeth—306, South Lambeth-road, 52 years, ground-rent 7s..... 670

By FLOOD & SONS.  
Woodford, near—The freehold beerhouse called the Prince of Wales..... 705  
Notting Hill—No. 142, Portobello-road, 72 years, ground-rent 3s..... 490  
14, Buckingham New, 72 years, ground-rent 4s. 10s..... 135

By TATTERSALL, BARN, & CO.  
South Kensington—25, Heild-road, 68 years, ground-rent 8s..... 345

By GRIFFIN & CHED.  
Islington—23, Linton-street, 43 years, ground-rent 6s..... 460

## NOVEMBER 17.

By WOOD & TAYLOR.  
Camberwell—Piston-street, a plot of freehold land..... 55



By A. WATSON.	
Walthamstow—Hatherleigh-road, a plot of freehold land .....	£165
Suffolk Park-road, two plots of freehold land .....	130
Hammermith—6, Richmond-street, freehold .....	603
By W. A. BLAKEMORE.	
Wood Green—1 and 2, Deborah-villas: 1 and 2, Oak-villas; and 1 and 2, May Cottages, freehold .....	1,220
Pimlico—16, Pallford-street, 50 years, ground-rent 3s. 15s. ....	310
By DANIEL WATNEY & SONS.	
Limehouse—57 and 59, North-street, freehold .....	225
Bromley—215 and 221 odd, Devon's-road, freehold .....	800
Poplar—47 and 53 odd, Pennyfields, copyhold .....	750
4 and 5, Turner's-buildings, copyhold .....	90
Stepney—19 and 20, Mary-street, 19 years, ground-rent 4s. 10s. ....	243
Upper Clapton, High-road—Three freehold houses with shops .....	3,560
1 and 2, Northwold-road, freehold .....	710
Horley, Surrey—Lee-street Farm, 27a. 1r. 25p., freehold .....	860
By NEWBORN & HARDING.	
Islington—23, Compton-terrace, 30 years, ground-rent 16s. ....	700
Camden Town—Improved ground-rents of 40l., term 73 years .....	790
Stoke Newington—41, Queen's-road, 72 years, ground-rent 5s. ....	300
Canonbury—49, Halkon-road, 31 years, ground-rent 10s. ....	336
Clerkenwell—26, Myddelton-street, 18 years, ground-rent 7l. ....	250
By JONES, LANG, & CO.	
City—10 and 11, Aldermanbury, 15 years, ground-rent 350l. ....	1,860
By Mr. GAIGER.	
Hyde Park—16, Cambridge-street, 32 years, ground-rent 10s. ....	1,335
By CRAWLEY & SON.	
Hackney—48 to 56 even, Moya-street, freehold .....	790
5, York-street, freehold .....	400

## MEETINGS.

## MONDAY, NOVEMBER 28.

*Society of Arts (Cantor Lectures).*—Mr. H. H. Statham on "The Elements of Architectural Design." 1. 8 p.m.  
*London and Yorkshire Architectural Society.*—Mr. J. W. Cannon on "The Legal Registration of Architects." 7.30 p.m.

## TUESDAY, NOVEMBER 29.

*Institution of Civil Engineers.*—Further discussion on Sir F. A. Abel's paper on "Accidents in Mines." 8 p.m.

## WEDNESDAY, NOVEMBER 30.

*Society of Arts.*—Mr. J. B. Hannay on "Economic Illumination from Waste Oils." 8 p.m.

## THURSDAY, DECEMBER 1.

*Parkes Museum.*—Sir Douglas Galton, F.R.S., on "Smoke and Fog." 6 p.m.

## FRIDAY, DECEMBER 2.

*Architectural Association.*—Mr. F. T. Baggallay on "Perspective Drawing." 7.30 p.m.  
*Institution of Civil Engineers (Students' Meeting).*—Mr. A. W. Metcalfe on "The Classification of Continuous Railway Brakes." 7.30 p.m.

## SATURDAY, DECEMBER 3.

*Association of Public Sanitary Inspectors.*—Dr. W. Collingridge, M.A., on "The Duties of Port Inspectors of Nuisances." 6 p.m.

## Miscellaneous.

**Tottenham Surveyorship.**—A correspondent writes:—"The Tottenham Local Board having advertised for the services of an engineer and surveyor, ninety-five candidates applied for the appointment, from which the following six were selected:—Messrs. F. W. Lacey, Brentford; F. Wike, Leicester; G. P. Laffan, Bridgwater; T. Bennett, Cheshunt; A. T. Davis, Stratford-on-Avon; and J. E. Worth, Burslem,—all of whom attended, with the exception of Mr. Wike, of Leicester, who had withdrawn. None of the candidates could have satisfied the requirements of the majority of the Board, judging from the fact that after interviewing them separately, they passed a resolution to select and interview six others. This treatment very naturally did not meet with the approval of the selected applicants, as Mr. Worth, of Burslem, threatened to, and Mr. Lacey, of Brentford, did, withdraw from the contest. The extraordinary resolution, however, above referred to was on the 15th inst. rescinded, and Mr. Worth was appointed Surveyor to the Board without opposition."

**Awards at the Adelaide Exhibition.**—With reference to the list of awards at the Adelaide Exhibition published in our issue of the 12th inst. (p. 684), we are asked to mention that Mr. J. F. Ebner's exhibit of mosaic, parquet, and artistic joinery, has been awarded a diploma of the first order of merit.—It should also have been mentioned that Messrs. Steven Bros. & Co., of Upper Thames-street, London, and Milton Ironworks, Glasgow, have been successful in securing the first award for their kitcheners, and the same for their ornamental and architectural ironwork, at the same Exhibition.

## British Archaeological Association.

At the meeting of this Association on the 18th inst., Sir James A. Picton, F.S.A., President, in the chair, an interesting series of sketches of ancient buildings and recently discovered antiquities was exhibited by Mr. J. T. Irvine, the greater number being found in the neighbourhood of Peterborough. Mr. Thomas Blashill exhibited photographs of the Roman buildings at Treves. Mr. Williams exhibited some mortar of flint-like hardness, which had been sawn out of the Roodeye wall, Chester, as an example of the mortar used in its composition. There are a few fragments of Roman brick in its composition. After some other exhibits, a paper was read by the President on the walls of Chester. After referring to the differences of opinion relative to the age of the walls which have recently been put forth, the belief was expressed that the truth would be arrived at only by a critical investigation not only of the walls themselves but of the historical records. This the lecturer had endeavoured to accomplish. Commencing with the notices of old writers, many curious facts were elicited. Thus Giraldo Cambrensis speaks of the great quantity of Roman buildings which remained in his time. Roger de Hoveden, William of Malmesbury, Matthew Paris, and Higden, all speak of the walls, and the latter mentions the stones laid like the work of Hercules. Turning to the present condition of the walls, Sir James gave the results of the recent excavations. After comparing the ruins of Chester with the destruction of Anderida, which also remained desolate for many years, he referred to the continuous existence of Roman walls at both places. Turning to a series of elaborate plans showing the construction, he indicated that at all the points where excavation has been made and some others Roman masonry is visible. Speaking of one of the sculptured stones, on which the figure appears with a stole, he quoted Horace to show that stoles worn by women were sometimes worn by men. An animated discussion followed, in which Mr. George R. Wright, F.S.A., described the fortunate coincidence which enabled the members of the Association to visit the walls during the recent Congress. Mr. Blashill referred to the construction of the Porta Nigra, Treves, in which no mortar was used, the masonry being put together with metal cramps. Mr. Loftus Brock, F.S.A., reported the latest results of the excavations, which at the Roodeye, he said, showed that the wall is backed up by 13 ft. of solid concrete.

**Engineering Feats.**—Our contemporary *Iron* says that "a very interesting engineering work is in progress at the New England Railroad Bridge over the Connecticut, north of Hartford. The new bridge, which is of steel, is to stand exactly where the old wooden one is, and the problem was how the work was to be done without interfering with the traffic. It is being effected in the following manner. A number of piles were driven, those under the eastern spans going 30 ft. into the river-bed, and being 50 ft. long. Above these piles temporary work was constructed to support the track, which was built up higher than it used to be. Then the trusses of the old bridge were removed in sections, and the old roadway remained held up by the piles and temporary work. It had been raised enough to leave a space where it used to be, and here the roadway of the new bridge is being put in. Thus the steel bridge is being built in the place of the wooden one, and when it is completed, all that remains will be to remove the elevated wooden track bed and let the trains run on the new bridge. The steel bridge will rest temporarily on the piling until its trusses are in place." To this we may add that such feats as this are not unknown in this country, though perhaps our renewals are on a smaller scale. For instance, a new iron girder bridge has been for some time in course of erection on the London, Chatham, and Dover Railway, just south of the Elephant and Castle station. This bridge, like its predecessor, carries four lines of rails. The old bridge was of iron, and its removal was necessitated by the widening of the Walworth-road at this point. The old bridge has been removed, the abutment set back some 8 ft. or 10 ft., and the new bridge is in course of construction, without raising the level or altering the course of the rails, and without any interruption of the traffic beyond the slackening of the speed of the expresses as they pass over the heavy wooden

staging or temporary bridge, which has three ways beneath it, one for foot passengers, one for the tramway line, and one for ordinary vehicular traffic. The cross-beams which carry the longitudinal railway sleepers of this temporary bridge are so arranged that, now that the three main girders of the bridge are in position, the cross-girders are pushed in between the temporary cross-beams and connected to the main girders. When this work is completed the temporary bridge will be relieved of its duty and removed. The contractors for the work, which is being carried out under the direction of Mr. Mills, the Company's engineer, are Messrs. Young & Co., of Pimlico.

**Tramway Extensions in the Metropolis.** The period has now arrived for giving notice in respect of Private Bill projects for the next Parliamentary session, which it is expected will include several applications for tramway extension in different parts of the Metropolis. In response to a memorial presented to them by upwards of 12,000 of the residents and owners of property in Balham and Tooting, the London Tramway Company are about to take the necessary steps for obtaining Parliamentary sanction for extending their lines from the present terminus at Clapham, through Balham and Upper Tooting, to High-street, Lower Tooting. From the company's present terminus the proposed extension would proceed along the east side of Clapham-common, thence along the Balham High-road, and on to Tooting, a distance of about three miles. The company will apply for powers to lay down a double line along the entire distance. In the session of 1886 a body of promoters designated the South Metropolitan Company sought similar powers. The project received the necessary sanction of the District Board and the Metropolitan Board of Works subject to the roadway being made 47 ft. throughout. This proviso caused the promoters to withdraw their application. The Holborn Board of Works will support an application to the North Metropolitan Tramways Company for powers to extend their lines from Clerkenwell-road to the City boundary.

**The New Roman Catholic College Buildings at Tooting.**—The extensive new Roman Catholic College at Tooting, which when completed, is intended to be occupied as an educational establishment in connexion with St. Joseph's College at Clapham, is being rapidly proceeded with, the building having already been carried to the height of three stories. The site upon which the College is being erected embraces, with the grounds, an area of about 18 acres. It is known as the H. House Estate, which was some time since purchased by the Roman Catholic authorities. The estate was for many years in the possession of Alderman Venables, a former Lord Mayor of London, who occupied it as his country seat. It is bounded on the north-west side by Church-lane, Mitcham-road, Tooting, and extends in a westerly direction from the burial-ground of Tooting parish church to the southern boundary of Tooting Common. The portion of the site fixed upon for the college buildings forms about the most elevated part of the grounds, free of which there is a commanding view southwards of the country around. The college buildings will cover a ground area of something like 25,000 ft., having frontages of about 200 ft. x 125 ft. respectively, the structure containing four stories besides a deep basement. The elevations are faced with red brick and stone dressings. Mr. W. Harvey, of Whitehall-place, is the architect, and Messrs. Higgs & Hill are the contractors, the amount of their contract being about 30,000l. The cost of the land is said to have been a little more than 15,000l.

**Public Baths at Battersea.**—The Battersea Vestry are about to erect public baths in the parish. The site fixed upon forms a portion of the Latchmere Allotments estate, about the centre of the parish. The baths will contain two spacious swimming-baths, one first-class and one second-class, the arrangement being that on certain days in the week they are to be exclusively set apart for females. There will also be provided ten first-class and thirty second-class slipper baths, for males, while for females there will be six first-class and fourteen second-class baths of a similar character, the entire number of private baths provided being sixty, with a corresponding number of dressing-rooms. The designs for the baths have been prepared by Mr. Rowland Plumbe, architect. The estimated cost of the baths, including furnishing, is 15,000l.



**The West End and Wimbledon Railway Works.**—The construction of the new line of railway between the Putney Bridge terminus of the Metropolitan District line and Wimbledon, which is now in course of construction by the London and South-Western Company, will, it is stated, be followed by the erection of a extensive new station at South Kensington by the last-named company, to be known as the West-end terminus. The completion of the new route across the Thames from Fulham and Putney to Wimbledon will enable the South-Western Company to run main-line trains direct from South Kensington. The works between Wimbledon and Putney are being actively pushed forward, and are expected to be completed and opened early in the ensuing year, but the through traffic between South Kensington and Wimbledon cannot be commenced until the completion of the bridge across the Thames, which forms the heaviest portion of the undertaking. The construction of this bridge, which will cross the Thames immediately to the west of the new Putney Bridge recently erected, it is understood, to be commenced next spring. It is stated that the site of the intended new station at South Kensington will be almost identical with the site on which the South-Western Company propose to erect a West-end terminus a few years since. This site, for which the company then obtained Parliamentary powers, is on the north-west side of Fulham-road, and embraced the property known as Pelham-crescent, and other property in the immediate locality adjoining the present South Kensington Station. The designs and plans for the intended new station were prepared, and the works were to have been commenced, but after being postponed for one or two years subsequently to the company obtaining their Act the undertaking was for the time abandoned.

**Registration of Plumbers.**—Mr. W. R. E. Joles, Secretary of the Worshipful Company of Plumbers, Glasgow, was present in the City Chambers, Glasgow, on the 21st inst., and distributed Certificates of Registration to a number of the principal master plumbers, as also journeymen, of Glasgow and the West of Scotland. Mr. W. P. Buchan proposed that councillor W. R. W. Smith, who was present, should be empowered to arrange with the Hon. the Lord Provost for a public meeting to be held as soon as convenient to formally inaugurate the movement and appoint a local committee, which was agreed to. The business closed with votes of thanks to Mr. Joles and councillor Smith for their attendance.

**The Office of City Architect.**—Mr. Charles Barry, Mr. W. H. Crossland, and Mr. Alexander Bebbles are amongst the candidates for this appointment.

## PRICES CURRENT OF MATERIALS

	£.	s.	d.	£.	s.	d.
neheart, B.G. .... ton	6	5	0	7	10	0
ch, E.I. .... load	8	0	0	9	10	0
guia, U.S. .... foot cube	0	2	8	0	3	0
n, Canada ..... load	3	0	0	4	10	0
" " " " " "	2	10	0	3	10	0
" " " " " "	2	10	0	3	10	0
" " " " " "	1	10	0	2	0	0
" " " " " "	2	10	0	4	10	0
" " " " " "	3	0	0	8	0	0
" " " " " "	3	0	0	3	10	0
" " " " " "	2	0	0	0	0	0
" " " " " "	3	0	0	5	0	0
" " " " " "	4	0	0	5	10	0
" " " " " "	2	10	0	0	0	0
" " " " " "	7	0	0	8	0	0
" " " " " "	5	10	0	6	10	0
" " " " " "	5	10	0	13	0	0
" " " " " "	7	0	0	8	0	0
" " " " " "	8	10	0	8	10	0
" " " " " "	7	0	0	8	10	0
" " " " " "	10	0	0	14	0	0
" " " " " "	16	0	0	24	0	0
" " " " " "	10	0	0	15	0	0
" " " " " "	8	0	0	9	0	0
" " " " " "	5	0	0	7	0	0
" " " " " "	5	0	0	7	10	0
" " " " " "	4	0	0	11	0	0
" " " " " "	0	8	0	0	10	0
" " " " " "	0	8	6	0	7	6
" " " " " "	0	4	0	0	6	0
" " " " " "	0	4	0	0	3	6
" " " " " "	0	0	2	0	0	3
" " " " " "	0	0	2	0	0	3
" " " " " "	0	0	4	0	0	7
" " " " " "	0	0	3	0	0	7
" " " " " "	0	0	3	0	0	5
" " " " " "	0	0	3	0	0	5
" " " " " "	0	0	5	0	0	7
" " " " " "	0	0	5	0	0	7
" " " " " "	7	0	0	9	0	0

TIMBER (continued).		£. s. d.	£. s. d.
Box, Turkey .....	ton	5 0 0	12 0 0
Satin, St. Domingo .....	foot	0 0 5	0 0 9
Porto Rico .....		0 0 6	0 0 10
Walnut, Italian .....		0 0 3½	0 0 5

MATHS.		£. s. d.	£. s. d.
Iron—Bar, Welsh, in London.....	ton	415	0
" " " " "Wales .....		410	0
" " " " "Staffordshire, London .....		8	0
<b>COPPER—</b>			
British cake and ingot .....	ton	0	0
Best selected .....		66	0
Sheets, strong .....		0	0
Chili, bars .....		53	0
Yellow MATAL .....	lb.	0	0
<b>LEAD—</b>			
Eg. Spanish .....	ton	12	6
English, common brands .....		13	0
" " " " "English .....		13	7
<b>SPIELER—</b>			
Silesian, special .....	ton	17	5
Ordinary brands .....		17	0

TIN—	METALS (continued).	£.	s.	d.	£.	s.	d.
Straits.....	ton	1	16	0 0	0	0	0
Australian .....		146	0 0	0 0	0	0	0
English ingots .....		143	0 0	0 0	0	0	0

OILS.							
Ginsed .....	ton	19	2	0	19	7	0
Cocanot, Coch .....		80	0		3	0	0
Ceylon .....		23	10	0	0	0	0
Palm, Lagos .....		21	10	0	0	0	0
Rapeseed, English pale .....		20	15	0	0	0	0
" .....		25	5	0	25	10	0
Cottonseed, refined .....		20	5	0	0	0	0
Tallow and Oleine .....		25	0	0	0	0	0
Lubricating, U.S. ....		5	0	0	6	0	0
" .....		5	0	0	12	0	0
" .....		5	0	0	12	0	0
TURBENTINE—							
American, in casks ..	Cwt.	1	4	9	0	0	0
Stockholm .....	barrel	0	15	0	0	0	0
Arachangel .....		0	16	0	0	0	0

## COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

*Epitome of Advertisements in this Number.*

### COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designato to be delivered.	Page.
Public Library and School of Art.....	Doncaster Corporation	50 <i>l.</i> and 25 <i>s.</i> .....	Jan. 10th	ii.
Hotel and Boarding House, Douglas (I. of M.).	Mr. Louis Kelly .....	25 <i>s.</i> .....	Not stated.	ix.

## CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Contracting and Sewering Road, Norwood ..	Governors, Whitgift Foundation ..	Blake, Haddock, & Co. <i>Official</i> ..	Dec. 1st .. Dec. 5th .. do. ..	ii. ii. ii.
Pipe-Sewer, &c. ....	Surbiton Imp. Com. ....	W. Weaser ..	Dec. 6th ..	ix.
Rebuilding Steam Laundry, Windsor ..	St. Mary Abbott's (Kensington) Vestry Com. of H.M. Works ..	<i>Official</i> ..	do. ..	ix.
Clearing Site, &c. ....	Wandsworth Bd. of Wks. St. Mary, Islington ..	do. ..	do. ..	ix.
Postal Sorting-Office, Herts Hill ..	Great Northern Ry. Co. ..	do. ..	Dec. 7th ..	ix.
Making-up and Paving Road ..	Greenwich Bd. of Wks. ..	do. ..	do. ..	ix.
Re-Erection of Iron and Steel Grating ..	Horsham U. B. & A. ..	do. ..	Dec. 12th ..	ix.
Supply of Stores, &c. ....	Lewisham Bd. of Wks. ..	do. ..	Dec. 13th ..	ix.
Valuing Ground ..	West Ham Council ..	do. ..	do. ..	ix.
Watering, Tree-Planting, Gravel-ling, &c. ....	Com. of H.M. Works ..	Lewis Angell ..	Dec. 20th ..	ix.
Engine Repairs ..	School Bld. for London ..	<i>Official</i> ..	do. ..	ix.
New Post-Office, London Bridge ..			Not stated ..	ix.
Enlargement and Alterations to Schools ..				

## PUBLIC APPOINTMENTS

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Two Borough Surveyors' Assistants .....	Reading Corporation ...	100 <i>l.</i> each .....	Dec. 7th	xiv.

## TENDERS

N. Allen	£780	0	0
Royal & Co.	780	0	0
Burman & Sons	191	0	0
W. & F. Croaker	188	0	0
R. G. Battley	686	0	0
A. Garratt & Son (accepted)	563	0	0

CAVERSHAM (near Reading).—For detached house		
on the Ivy Cottage Building Estate, for Mr. Geo.		
Hanning. Mr. W. R. Talbot, architect, Caversham:—		
A. W. Dodd .....	£450	0 0
W. H. Jones .....	410	0 0
Geo. Pilgrim .....	387	0 0
G. & T. Ruffell .....	3-5	0 0
A. J. Carter .....	354	0 0
Patience & White, Reading (accepted)	330	0 0

CAVERSHAM (near Reading).—Accepted tenders for a detached villa, for Mr. David Cox, Mr. W. R. Talbot, Chislet, Caversham:—  
*Brs. Klayer, &c.*—W. Ivin, Caversham.  
*Carpenter and Joiner.*—A. J. Carter, Caversham.  
*Plasterer.*—Alfred Bridgman, Caversham.  
*Mason.*—Wm. Jones, Reading.  
*Slater and Tiler.*—Wormley & Co., Reading.  
*Plumber and Smith.*—C. H. Tucker, Reading.  
 [Work to be done under schedules, at an estimated sum of £78.]

CHELSEA.—For the erection of a Cookery Centre on  
ches, and new water-closets for the girls and infants, in  
one, with the "Fox" School, Silver-street (Chelsea  
for the School Board for London. Mr. T. J. Bailey,  
birect:—

G. Wilkinson & Sons .....	£1,221	0
Cowley & Drake .....	1,114	0
T. Bendon .....	1,113	0
Norris & Luke .....	1,048	0
W. Johnson .....	997	0
Stimpson & Co.* .....	885	0

Recommended by the Works Committee for acceptance.

HELSEA.—For alterations at the Stanley public-house, King's-road, for Mr. A. Rehm, Mr. J. W. Baker, architect:—

Smith & Son .....	£1,368	0	0
Wm. Downs .....	1,274	0	0
Mark .....	1,239	10	0
Jackson & Todd .....	1,220	0	0
W. & F. Croaker .....	1,178	0	0
R. G. Battley .....	1,098	18	0
Ed. Calvert & Co. (accepted) .....	1,040	13	0

FOREST GATE.—For new roads, sewers, &c., for the			
British Land Company, & Messrs. H. Nicholl, architects, 10, Abchurch Lane, London, E.C. 4.			
Estate No. 3. Mr. Henry H. Nicholl, surveyor, on their Forest Gate Estate No. 3.			
Killingback, Camden Town	£2,365	0	0
Catley, Pentonville	2,100	0	0
St. George's, St. George's	2,000	0	0
Cunliffe, Docking	1,810	18	6
Cooke & Co., Battersea	1,876	0	0
Dunmore, Hornsey	1,806	0	0
W. & A. Wood, Forest Gate	1,774	0	0
Neel & Co., Wandsworth	1,774	0	0
Wilson, Walthamstow	1,744	0	0
Bloomfield, Tottenham	1,739	12	8
N. & S. Wood, Walthamstow	1,725	0	0
Nicholls, Wood Green	1,725	0	0
Pizzey, Hornsey	1,630	0	0
Peal & Son, Bromley, Kent	1,624	0	0
Peal & Son, Peasmarsh, Kent	1,660	0	0
Jackson, Stratford	1,660	0	0
Kent, Bermondsey (accepted)	1,487	0	0

HEMEL HEMPSTEAD.—For constructing a new iron bridge, 3 ft. span, and 20 ft. wide, near Beckmore Wharf, Hemel Hempstead, for the Highway Board. Mr. W. A. Fisher, surveyor, Hemel Hempstead:—

W. W. Cranstone, Hemel Hempstead.....	£187	0	0
C. Chonk, Two Waters, Hemel Hempstead .....	135	0	0
W. Sear, Hemel Hempstead.....	85	0	0
Westwood, Baillie, & Co., Poplar.....	72	0	0

\* Accepted.  
+ Ironwork only.

LONDON. — For alterations at the Northumberland			
rooms public-house, Charing Cross, for Mr. W. Showell.			
J. J. G. Brooks, architect : —			
H. G. Cook .....	£1,050	0	0
H. W. Downs .....	1,045	0	0
N. G. Bartley .....	882	0	0
W. & F. Croaker .....	805	0	0
Burman & Sons .....	825	0	0
Royal & Co. ....	890	0	0
A. Garratt & Son (accepted).....	850	0	0

PENGE.—For erecting shops on forecourts of 117 and 119, Maple-road, for Mr. W. J. Bigwood. Mr. J. W. Croaker, architect:—

W. & F. Croaker .....	£280	0	0
E. Smith .....	237	10	0
Eustace .....	331	9	0
G. J. Kick (accepted) .....	230	0	0

NEW CROSS.—For alterations to forecourt, and new  
 es and railing, Wesleyan Chapel, New Cross-road, for  
 Trustees. Mr. John James Downes, architect, 193,  
 wisham High-road, S.E. :—

Oldman .....	£127 0 0
Leng .....	127 0 0
Holloway .....	115 0 0
Rest (accepted) .....	129 15 0



**PUTNEY.**—For new cemetery works, for the Burial Board of the Parish of Putney. Mr. J. C. Radford, C.E., surveyor:—

Geo. Belle .....	£10,280 0 0
Wilson & Wain .....	10,000 0 0
A. Sclief .....	9,376 0 0
A. H. Lissaman .....	8,100 0 0
T. Grant .....	8,800 0 0
Richard Mayo .....	8,740 0 0
W. R. Williams .....	8,650 0 0
G. Osenton .....	8,443 0 0
G. Neal .....	8,100 0 0
J. O. B. Marshall .....	8,000 0 0
Tomes & Wimpey .....	7,786 0 0
Nowell & Robson .....	7,725 0 0
W. Blackmore .....	7,700 0 0
J. Mears .....	7,286 0 0
Chas. Killingback .....	6,980 0 0
A. Lucas (accepted) .....	6,829 10 0
MacKenzie (withdrawn) .....	5,965 0 0
S. Saunders (withdrawn) .....	5,952 4 0

**SOUTHBOROUGH.**—For the enlargement of Christ Church, Southborough. Mr. Theodore K. Green, architect:—

Strange & Sons .....	£1,938 0 0
Gallard & Sons .....	1,793 0 0
J. Jarvis .....	1,695 0 0
Wallis .....	1,412 0 0
Canty .....	1,363 0 0
Pennett & Sons .....	1,287 0 0

**SOUTHEAST.**—For the works required in the erection and completion of barracks buildings, for the Salvation Army, in Clarence-road, Southeast. Mr. E. J. Sherwood, architect, 101, Queen Victoria-street, E.C. Quantities by the architect:—

Schieren & Co., Chelsea .....	£1,638 0 0
W. Watson, Ilford .....	1,615 0 0
Baker & Wiseman, Southeast .....	1,429 0 0
J. Munday, Wimbledon .....	1,420 0 0
E. Darke & Son, Southeast .....	1,380 0 0
F. E. Woodhams, Southeast .....	1,360 0 0
Newton & Lide, Clapham Common .....	1,349 0 0
J. W. Steward, Southeast .....	1,330 0 0
G. Stephenson, Bishopsgate-street .....	1,324 0 0
Wm. Fout, Hendon .....	1,310 0 0
Multon & Wallis, Gravesend .....	1,243 0 0
E. Jarvis, Bury .....	1,195 0 0
F. J. Coates, Leytonstone .....	1,140 0 0

**SOUTHWARK.**—For alterations at No. 184, High-street, Borough, S.E., for Mr. E. Leftwich. Mr. J. W. Brooker, architect:—

Jackson .....	£550 0 0
T. Gilbert .....	484 0 0

**WALLWORTH.**—For repairs and decoration at the Cottage of Content public-house, for Mr. L. Rehm. Mr. J. W. Brooker, architect, 13, Railway Approach, London Bridge, S.E.:—

Jackson & Todd .....	£238 0 0
A. Tompkins .....	235 0 0
T. G. Bert (accepted) .....	230 0 0
J. O. Richardson .....	168 0 0

**WANDSWORTH.**—For pumps, &c., at the new work-house of the Wandsworth and Clapham Union. Mr. T. W. Aldwinckle, architect, 2, East India-avenue, Leadenhall-street:—

Wentworth & Co. ....	£1,205 0 0
Hayward Tyler & Co. ....	850 0 0
Shand, Mason, & Co. ....	670 0 0
S. Owens & Co. ....	610 0 0

**WINCHMORE HILL.**—For building five huts and nurses' home at the Northern Hospital, Winchmore Hill, for the Metropolitan Asylums Board. Messrs. Pennington & Bridges, architects:—

Ward & Lambie .....	£5,755 0 0
Grover & Son .....	5,938 0 0
Lambie .....	5,649 0 0
Scrivener .....	5,493 0 0
Deering & Son .....	5,484 0 0
Wall Bros. ....	5,289 0 0
Johnson .....	5,360 0 0
Lascelles .....	4,036 0 0
Norris & Luke .....	3,877 0 0

[Architects' estimate, £5,250.]

**\* \* SPECIAL NOTICE.**—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than 12 Noon on THURSDAYS.

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GLASGOW:

Petershill-road.

# The Builder.

VOL. LIII. No. 2338.

SATURDAY, DECEMBER 3, 1897.

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### Architectural Drawing.



HIS delightful subject has been treated in a most practical manner in the beautifully illustrated work\* by Mr. Phéné Spiers, who, as Master of the Architectural School at the Royal Academy, has a kind of special and official call to deal with this subject as a teacher; not, however, that there is anything "academic," in the restrictive sense of the word, in Mr. Spiers's book. We do not in England, fortunately, take that one-sided view of architectural training which in the French and German schools leads, as the author observes, to the study being limited to a full acquaintance with the accepted forms of Classical architecture; and their accurate and correct delineation; and Mr. Spiers's book is catholicity itself in this respect, the illustrations offered (mostly reproduced from the drawings of eminent architects) ranging from the most formally correct of Classic elevations to one of the most picturesque of Mr. Ernest George's tinted sketches, and including a considerable number of fine reproductions of pencil perspective drawings of Mediæval work. The book is, therefore, in no way limited to the drawing-board and T-square class of drawings, though the consideration of these, under the subject of "Office Work," naturally forms an important section of the book.

Architectural drawing occupies a peculiar position among the various forms of draughtsmanship, owing to the fact that in architecture the drawing itself is not the ultimate end and object; the drawing is not the work, but only the representation of the work. This is most emphatically the case, of course, in regard to geometrical working drawings, which are hardly drawing in the usual sense, and the object of which is to show the facts of the building to be produced in such a way that other persons who have to work under the architect can assimilate them; and even a perspective drawing of a proposed building, though it may be so executed as to have considerable artistic effect and interest, is still not an end in itself. It is this in great measure which renders the architectural room at an exhibition so comparatively uninteresting to the majority of spectators; in the pictures, they have been looking at the artists' real work: in the architectural drawings they are only

looking at the shadow, as it were, of the actual work. And for this as well as other reasons, architectural drawing becomes to the outsider a kind of mystery of which he has not the clue; while to the architect it is a "mystery" in the old sense, a special professional accomplishment with a method and an interest of its own, appealing to the trained eye alone. It is one curious result from this, that a very practised artist in figure-drawing or landscape very often cannot delineate buildings correctly; that you will see perhaps in the work of a landscape painter of genius, who can draw and model the contours of a mountain with great exactitude, a column of a proportion and design such as no column ever had; and that a master of figure drawing cannot get a portico and its columns into perspective without having a model made of it. On the other hand, to the architect there is a special pleasure and interest in his methods of delineating his work, which often gives rise to a style of drawing specially architectural in its basis and feeling, even when it is not employed upon strictly architectural subjects. Mr. Spiers quotes an excellent remark on this point from Professor Ware, of Boston,—“Architectural drawing lies between mechanical and artistic draughtsmanship, partaking of the nature of both, but using a different intellectual method from either; I mean that an architect not only does a great deal of free-hand work when working with his instruments in a way which an engineer would consider very unworkmanlike, but that he uses a great deal of geometry in his free-hand work, in a way that an artist would find impossible. He employs, when sketching, the same intellectual processes as if he had in hand his compasses and set-square, instead of pencil and brush, correcting and justifying his judgment by purely architectural considerations.” This is very well put, and rather novel. As an example of the truth of it, we might refer especially to the sketches of two architects, Burgess and Viollet-le-Duc; the latter especially. Every thing he drew, even figures as adjuncts to his drawings, or the sketch designs for animals and foliage to be carved as decorations on some château he was restoring, took naturally and insensibly an architectural precision of line, and a tendency to such an outline as would fill up a geometrical space.

Architectural drawing groups itself naturally, it would seem to us, into three classes: drawings made to show what a building is to be; drawings made as a record of what it was, and to gain information; and drawings made with the object of realising on paper the picturesque qualities of a building, making a picture of it, in short. We are not including in this category the usual run of architectural per-

spectives, the main object of which is really to show what the building is like to those who do not understand the geometrical drawings, and which, to say truth, do not very often rise to the level of really artistic works of the higher order; it may, perhaps, be said that they could not do so without losing the clearness of definition of every portion which is their main practical object. We refer to such works as etchings of architectural subjects; works in which the knowledge of the architect is combined with the feeling of the artist, but which aim at giving what may be called the poetic effect of buildings rather than their architectural detail. This class of work, beautiful and fascinating as it is, does not, however, come properly within the scope of an essentially didactic treatise like that of Mr. Spiers; and his threefold division is into “Students’ Work,” “Office Work,” and “Outdoor Work.” As far as the latter section includes the measuring and drawing of ancient buildings, it might also be called “students’ work,” as its main object is study; but the “students’ work” in Mr. Spiers’s division of the subject means the elementary study of drawing and design, which every student has to go through before he can take any useful part in the second section of the subject,—that of office work. In his preface Mr. Spiers comments on the fact that in England the student is expected to assist in making working drawings almost as soon as he enters an office, and that thus the regular course of study in drawing which the pupil goes through in foreign schools he must in England go through only in a hap-hazard manner. Mr. Spiers accepts the fact without expressing any decided conclusion in regard to the respective merits of the foreign and home system, or, rather, of the foreign system and our own no-system. Some practical recommendations are given in regard to paper and drawing instruments, and the first section of this part of the work is devoted to draughtsmanship. Free-hand drawing from the round is recommended as a necessary part of the student’s work. In regard to outline drawing, there are some remarks which we should be disposed to query; among others, that quoted from Mr. Burgess, *re* the question of thick or thin lines:—“If the draughtsman uses thick lines, he will be induced to make his design massive and simple, and not give way to the vanities of crockets and pinnacles, because he will find that he has hardly got space to put them in.” Surely this is putting the cart before the horse; the designer’s intention should govern the drawing, not the drawing the intention. Then two or three habits in regard to line drawing are referred to which we are inclined to think are really more a matter of fashion than is sometimes sup-

\* Architectural Drawing. By R. Phéné Spiers, F.S.A., architect, London, Paris, New York, and Melbourne: H & Co. 1897.



posed. The practice of "black-lining" Mr. Spiers dismisses with costs, as all the artistic draughtsmen do dismiss it now; we do not defend it, and we agree that it is mechanical; but it has its practical use in defining the meaning of the lines in a geometrical elevation. What the author says, however, about it leading to inaccuracy by affording a means of covering defects, is partially true. The same objection would apply, however, to Mr. Stannus's system of "mass-lining," illustrated in an elevation in which the portions which come forward nearest to the eye are drawn uniformly with a blacker line, leaving the rear portions in a thinner line; we also observe that he draws a black line down both angles of a projecting wing which is in the middle plane of the elevation; this seems to us as "mechanical" as black lining on one side only, and not so effective. Mr. Spiers refers to the brilliancy given to a drawing by carrying through only two or three of the lines of a moulding, leaving the others visible only at the junctions or mitres; this is a modern method which has its merits, but which is getting rather abused just now, and it seems to be thought necessary to leave out half the lines in a drawing sometimes, to give it a sunlit effect. It is pretty, but it is a little bit tricky, and people will tire of it presently. Only a little while ago the young draughtsmen of the day settled that it was nefarious for an artistic architect to use a ruler in any perspective drawing, and all lines were to be drawn by hand. Now this is revoked, and some of the cleverest of the younger draughtsmen of the day, who certainly consider that they know all about it, send us perspectives with all the leading lines, vertical at any rate, religiously ruled. Which is right? We incline to the non-ruled side; and presently we shall probably find the fashion has gone round to that again.

Mr. Spiers devotes some space to the description of the French method of tinting elevations with shadows geometrically set out at an angle of 45°, so that the shadow really gives the extent of the projection. We agree with him that the effect of this method of getting up an elevation is charming when it is well done, but doing it well is a long business; and for practical purposes it may be a question whether the game is worth the candle. The builder who carried out the building would, after all, look to the plan and section for the projection, and not to the shadowing. Some very useful hints are given on the prosaic operation of laying on flat colours; and we also particularly agree with the recommendation that colours used on plans to distinguish material should, as far as possible, be arranged with some degree of harmony, partly on the ground (not an imaginary one, that constant gazing on crude combinations of gaudy colours has a tendency to blunt the student's sense of colour. The heated reds and Indian yellows with which some people get up their walls and floors and woodwork are enough to give one ophthalmia.

In the chapter on perspective the author rightly puts first, as the object of perspective, to assure the designer of the correctness of his design, and in another section he dwells on the importance of sketching designs in perspective. "There are some students who, when making elevational or sectional drawings, see, as it were, all round their designs; there are others to whom the drawing is merely a plane surface covered with various lines." There are some, we may add, who are nominally out of the student class, of whom this may be said. The author describes the use of the centroline, and also of what he truly calls the "complicated instrument" invented by a Frankfurt architect for mechanically producing a perspective from a plan and section. A drawing and description of this was sent to us some time ago for notice, but we thought it, though clever, too unpractical to be worth wasting space over. Mr. Spiers admits that the outline made by it "must be finished by an artist"; and our opinion is that a draughtsman who could not make an outline perspective from plan and sections better and in less time than this cumbrous apparatus

would enable him to do it, had better retire from perspective business. These "perspective-made-easy" contrivances are of no use except for dunces, and the less they draw the better. There is another paragraph in the chapter on perspective which gives us pause, and which we must quote entire, lest, peradventure, we misrepresent the author:—

"The distortion to which we have referred in paragraph 49 [the distortion of near objects in a perspective including too large an angle] is most apparent in spherical and cylindrical objects, such as domes, corbices of circular towers, columns, &c. A round ball, for instance, can only be rightly represented when its centre lies actually on the point of sight; at any other point on the drawing it becomes elliptical. This can be easily proved by supposing the ball to be enclosed in a cone, the apex of which is on the point of sight. The lateral section of this cone by the plane of the picture will only be a circle when the axis of the cone is at right angles to the plane [the italics are the author's], and the only point where this occurs is on the horizontal line through the point of sight; in any other position the section is an ellipse."

We certainly opened the eyes of astonishment when we read this. That the intersection of a cone is not a circle save when the intersection is at right angles with the axis most people probably know, and that all other transverse sections of it are ellipses is also well known; but that there is any way of sectioning a sphere so as to make an ellipse out of it is certainly a novelty. Does Mr. Spiers seriously mean to affirm that there is any possible point of view from which the apparent bounding outline of a sphere ceases to be spherical? If so, we should be glad to have that demonstrated; if not, the author had better revise that passage in the next edition, and say what he does mean. At all events, it is quite impossible that the outline of a sphere can be distorted when viewed from any position, for the simple reason that all the points on such outline are necessarily at the same distance from the eye, the usual rays from which form an imaginary cone which encloses the sphere from whatever direction we look at it. Possibly Mr. Spiers may mean something different from what his words seem to convey; but, if they mean what they seem to mean, we have seen no passage in an educational book on perspective so extraordinary since the late Mr. Borchett attempted to demonstrate that a circle in perspective was not an ellipse, because the real diameter line of the circle was not the apparent diameter line or longer axis of the ellipse! Mr. Spiers seems in some odd way to have confounded spherical superficies with spherical section. Of course he is quite right about the distortion of spherical sections, such as the bases of domes which we see crawling down the walls vertically in so many interior perspectives, and the circular capitals and neckings of columns in the foregrounds of interiors, which we frequently see absurdly distorted in architects' drawings. But we defy Mr. Spiers, or all the Royal Academy, to distort the outline of a sphere.

In the section on design, Mr. Spiers seems to include "the copying of the Orders" as an essential part of the matter, though we are glad to see that he does put in an apologetic footnote to the effect that the Greek Doric and Ionic may be substituted for the Tuscan and the Composite. We are glad to get that recommendation, at all events. The object suggested in copying "the Orders" is the training of the eye to a recognition of proportion and scale. There could be no better study for this purpose than Greek architecture, certainly, and, if that were all, we would say well and good; but the conventional Roman Orders are things which somehow it is difficult for any one to touch without having his higher taste and his fancy injured thereby, and it is really time that kind of architectural baggage were thrown overboard.\*


With almost all that is said on working drawings we are entirely in accordance, and may congratulate Mr. Spiers on having been able to obtain such excellent examples of clear,

finished, and well-annotated drawings as those by Mr. Waterhouse and Mr. Rowland Plunbe which he has given as examples. This class of drawing is the plain prose of architectural drawing; its object is only the clear statement of facts,—required, as the author observes, to be more clear than ever now, because in these days of elaborate quantity-taking the contractor hardly looks at the drawings, and consequently never properly understands, as "workman" in the true sense ought, what he has to do, but only what he has to pay for and provide. Prosaic as are the working drawings, however, we should say that any architect who is worth anything has, or should have, a pride in getting them up not only clearly, but in a good and workmanlike, and even in a more or less effective style.

We have not space to go into the chapter on out-door work, further than to say that its recommendations appear to us all very good, and that it is illustrated by reproductions of some very beautiful drawings. In describing Mr. Street's manner of sketching, giving the leading lines and then just the commencement of the detail of each portion (a method which will be found illustrated in two sketches of his published in the *Builder* for November 12th, as well as in some previous numbers), the author mentions what we did not know before, that Mr. Street discarded the use of india-rubber altogether. It is very good practice to do so at times, and also to try sketching right off with a pen, taking careful note of proportions before beginning; this latter method, too, has inherent merits of its own, giving a very clear outline and detail which will not rub out. Among the sketches of Gothic subjects given are some excellent ones by the late F. P. Cockerell, whose hand we have only known as that of a Classic draughtsman; but the best of all the examples of this class are those of Mr. Gerald Horsley, which are unsurpassable of their kind. In Mr. George's tinted sketch (plate 13) before referred to, we do not quite like the way of accentuating the re-entering angles by dark black marks; this is hardly a pure water-colour effect, and represents something which does not exist in natural light and shadow effects. Mr. Allom's tinted drawing for the Liverpool Exchange competition is given in a tinted reproduction; we remember that and his Manchester Town-hall drawings very well; the reproduction hardly gives an idea of the brilliant and bright effect which he used to obtain by these rapidly-executed sepia drawings; a part of the effectiveness of them arose from the bold manner of leaving almost absolutely white spaces for the higher lights, never entirely covering the paper, giving a great look of freedom and transparency to the whole.

Mr. Spiers's book is got up, we may add, in a manner worthy of the subject, and many of the drawings are so charming in themselves that the book may well have an attraction for general readers, while it is full of useful information and suggestion to the younger readers within the ranks of the profession. But we should like, for all that, to know the meaning of that mysterious passage about the sphere in perspective.

#### GYMNASIA.

 FREEDOM from the bonds of tradition places our American cousins in positions for taking wide surveys and appropriating the best parts of different systems of physical education which we do not possess, but may well envy, as we gather from a "Circular of Information" on physical training in American colleges and universities, issued some little time since by the Bureau of Education.

Of the various ideals of manly excellence which have prevailed at different times,—the ancient Greek, which was an embodiment of the beauty and harmony of the body, and a joyous sense of living; the Mediæval, with its monkish asceticism and contempt of the body on the one hand, and the military and aristocratic appreciation of bodily strength and skill in the camp and the field, on the other; and

\* Of course, the student must acquaint himself with the Roman Orders as matters of architectural history and development; but that is different from making them the basis of study in design.



the modern sanitary ideal, with its doctrine of a healthy mind in a healthy body,—we in England are still largely in bondage to the Mediaeval traditions of extremes,—of clerical indifference to bodily health and strength on the one hand, and exaggerated notions of its importance on the other,—while we have a very imperfect appreciation of the necessity which exists for their modification to meet the requirements of modern life, especially as it exists in

best way of removing it will be to give some idea of the construction and uses of gymnasia as displayed in the Report before us.

The American gymnasia are largely based on the German system, which is acknowledged to be the most perfect in Europe, but it is reasonable to expect that an ingenious and inventive people like the Americans would carry their system and apparatus beyond, or outside their models, and adapt it to their own

and domestic offices. The main floor, fig. 2 (for ground plan, fig. 3, see next page), contains the gymnastic apparatus, dressing-rooms, and bath-rooms,—the latter consisting of warm, cold, vapour, needle, shower, and douche baths. On the second floor there is a room "for the exhibition of trophies," and a rowing-room containing sixteen rowing-machines. The apparatus is arranged in a progressive series. "It is possible for a person to pass from the simplest movement in calisthenics up to the most difficult gymnastic feat without experiencing lameness for a day. Easy adaptation to the capacity of the individual and facility of application for remedying local defects and weaknesses are the distinguishing characteristics of the apparatus."

The Americans have not lost sight of the physical requirements of girls. The Bryn Mawr gymnasium was constructed with due regard for economy. In one basement are bowling-alleys, bath-rooms, and dressing-rooms. On the main floor is the large hall,—apparently without apparatus,—and a smaller room fitted with special apparatus. It is probable that calisthenics and "light" gymnastics (dumb-bells, clubs, &c.) are chiefly taught to girls, and when entertaining and varied, they are quite sufficient, all form of "heavy" exercise being objectionable alike from a physical and moral aspect.

In all the newer gymnasia the chief feature is their tendency to approach to those of ancient Greece in character, great facilities being afforded for social intercourse, for bathing, and for amusements. Elaborate anthropometric observations are carried out in all the best institutions, which serve as a guide to the director in apportioning the exercises of the several pupils, and afford also interesting scientific results.

The most ambitious and complete gymnasium with which we are acquainted is the building of the New York Athletic Club, which, indeed, is not a gymnasium only, but a fully-equipped club-house. The basement contains six bowling-alleys and a rifle range. In the first story there are facilities for Turkish and Russian bathing, and a swimming-bath 66 ft. long by 20 ft. wide. The second story contains a reception-hall, parlour, reading-room, billiard-room, and a restaurant. On the third floor are a thousand lockers, a lavatory, douche-room, reception-room, and a sparring-room. The entire area of the fourth floor is occupied by the gymnasium; it is 22 ft. high, light and airy. Around this hall, 12 ft. from the ground, extends a track for the use of runners; twenty-two laps of it make a mile. The cost of the building was about £50,000. The club is in a flourishing condition, with 1,500 members and many persons waiting for admission. The admission is 50 dols., and the annual subscription 30 dollars.

#### NOTES.

THE scheme of the Oxford and Cambridge Schools Examination Board for commercial certificates will, it is to be hoped, cause more attention to be paid in the higher schools of this country to practical education. It should also be the means of ascertaining the soundness of the education given in the lower middle-class schools. No one will under-rate the advantages of a knowledge of Classical literature, but having regard to the fact that the majority of youths have to earn their own living, nothing can be more preposterous than that an ordinary boy should leave school without a sound knowledge of a single modern language. The great advantages of a knowledge of modern languages in the case of an architect, for example, are very obvious, and yet we have no doubt that there are numbers of youths destined for the architectural profession who are spending the greater part of their school time over Latin and Greek; and not only over Latin and Greek, but over the study of these languages simply as languages, and not of the literature and the society of ancient Rome and Greece. In how many schools is Greek art adverted to in the Greek curriculum, in which hours are spent over



Fig. 1.—Hemenway Gymnasium, Harvard University, U.S. America.

large towns. However excellent may be the results of athletic sports,—and we are second to none in acknowledging their great value,—they are only obtainable by a very small portion of our population on account of the difficulty and expense of providing playgrounds, and we are compelled, therefore, to look to gymnastic training, which can be carried out in a limited space and at many different places, as a substitute, and also to attract those who are dis-

ideas and wants. The Hemenway gymnasium attached to Harvard of which we give several illustrations, is considered the most complete institution of the kind in America, and it is closely followed by the newer, but less expensive, Pratt gymnasium at Amhurst, which, through its energetic director, Dr. E. Hitchcock, is best known in England. The cost of the construction of the former was about £22,000, and of the latter about

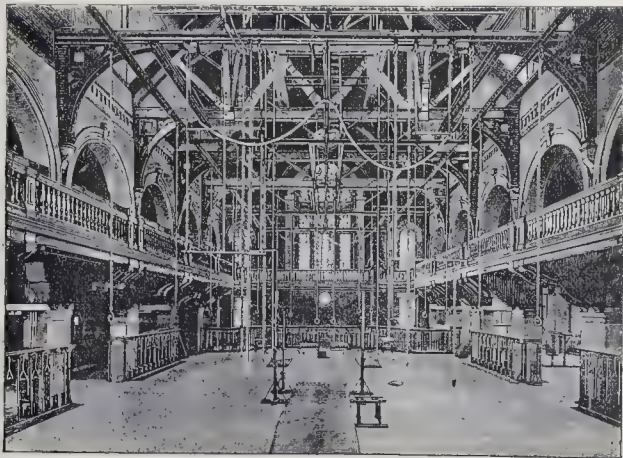


Fig. 2.—Main Floor of the Hemenway Gymnasium.

posed to neglect physical training altogether on the assumption that it is unnecessary or inconsistent with intellectual pursuits. It is not alone to our traditional taste for athletic sports, but also to a common belief that gymnastics are a sort of mountebankery which are suitable only to the circus or the stage, and, therefore, are attainable by few, and, in any case, not deserving the labour and attention of serious men and women. This is a very foolish prejudice on our part, and, perhaps, the

£13,000, while the furnishing cost 4,000 and 4,463 dollars respectively. The Hemenway gymnasium is under the direction of Dr. D. A. Sargent, who has invented much of the apparatus employed in this and other American gymnasia. The building is 125 ft. long by 113 ft. wide, and consists of a basement and two floors. In the basement there are rooms for base-ball, lacrosse, tennis, fencing, and sparring; eight bowling-alleys; lavatories, many hundreds of lockers,



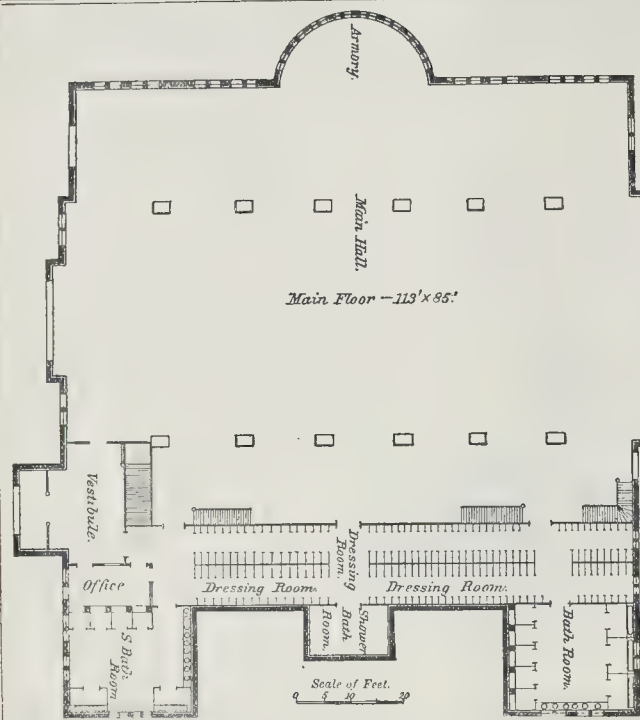


Fig. 3.—Ground Plan of the Hemenway Gynnasium, Harvard University, Cambridge, Mass.

the manufacture of iambics, while not a moment is given to the ideas of the Greeks, expressed in sculpture or architecture! It is always surprising, indeed, that the Institute have not, by some memorial, directed the attention of school-masters to the desirability of bringing into greater prominence in boys' studies the art of Greece and the constructive works of the Romans.

THE Roman Municipal Council have recently effected what amounts to a *coup d'état* in favour of architects. Some years ago the Council gave notice that all building applications must be accompanied by the name of an architect who would be responsible for the due execution of the works. Finding that this regulation was evaded by the nomination of unqualified persons as architects, the Council lately called attention to the regulation, and intimated that, with a view to the protection of the public, in the future only such persons would be accepted as architects who could show that they were legally entitled to adopt that designation. The Council appointed a Commission to inquire into this question, and opened a register for the inscription of the names of duly qualified persons who should be so certified by the Commission. The Commission, in a report to the Council, which is printed in the Transactions of the Italian Architects' &c. Society (Anno. II., 1887, fas. 3), submit that out of 166 candidates who presented themselves for registration, 125 satisfied the Committee as to their training and proficiency, which appears to be a high percentage,—the failures being only about 18 per cent.—and gives a favourable impression of the condition of public education in Italy. The standard is high, and involves the taking of a degree in physics and mathematics in the University of Rome or Bologna, a residence of three years in a technical school, and a course of instruction in a school of art.

LORD HENNIKER, writing to a contemporary last week, draws attention to a some-

what remarkable railway rates case. It appears from his lordship's remarks that Mr. J. D. Kempson, of Birmingham, has recently declined to pay certain charges made by the London and North-Western and Great Western Railway Companies for conveyance of undamageable iron, on the ground that they were in excess of the Companies' statutory rates. The companies thereupon refused to carry the traffic without payment of their charges. Mr. Kempson eventually paying, under protest, and suing both companies in the county court to recover the excess. This, we are told, amounted in one case to fifty-one per cent. of the rate charged; and in the other to no less than sixty-four per cent. (the distances being, in each case, very short), and in both actions the amount has been paid into court. Lord Henniker, as Chairman of the Railway Rates Committee, considers that the fact of two of the leading companies preferring to take such a course rather than contest the cases has an important bearing upon the railway rates question. The first thing naturally suggested by reading these statements is, that if these companies have been overcharging Mr. Kempson to such an enormous extent, and have persisted in this course so far as to decline to convey the traffic at lower rates until the cases were taken into court, it may be taken for granted that this is anything but an isolated case, and that less energetic and determined traders are still being considerably overcharged. Another consideration is, that if rates so much in excess of the legal ones are really in force, and liable, when tested, to such sweeping reductions as those to which Lord Henniker draws attention, an all-round adjustment would result either in reduced dividends, or in long-distance rates,—which are frequently below the statutory maximum,—being forced up in order to avert such an effect. His lordship treats the case as turning upon the question of "terminals," though we should have imagined, from the wide difference between the amounts originally charged and the reduced

rates, that it was a matter of inaccurate classification,—that the traffic had been placed in the first instance in the wrong class, and that the Companies were eventually compelled to own that it had been improperly dealt with. In any case it was evidently a question that they did not care to discuss in court. They were doubtless unwilling to encounter Mr. Kempson again in the law courts, for in a previous case,—which *did* turn upon the right of the railway companies to charge for terminals,—that gentleman elicited a deal of information as to the services and accommodation for which charges were made in addition to those for conveyance, which considerably opened the eyes of the public, and to which we have ourselves from time to time had occasion to refer.

WE have received particulars of what may turn out to be a very important enterprise in Ireland, and perhaps do something to encourage Irish industries in a more practical manner than has been evinced in some other schemes that have been preached by philanthropists. This is, the lease by a Liverpool engineer, Mr. Spargo, of the whole of the Marquis of Conyngham's estate in the Rosses, amounting to about 70 square miles, for the purpose of working it as a quarrying and mining district. The site appears to be a great granite deposit, and the report of Professor Hull, the Director-General of the Geological Survey of Ireland, is very favourable in regard to the quality and variety of the granite to be obtained here. According to Professor Hull, there are granites of many shades of colour, red, black, pink, and rose, and capable, he affirms, of receiving a polish not to be surpassed by granites from any other source. We should be very glad to hear of the success of the enterprise, especially if it will serve the double end of giving us more and cheaper granite and of finding remunerative employment for Irish labour. We shall be glad to see some specimens of the granite in due time.

THE lighting of private buildings by electricity is, though it may be slowly, yet surely progressing. Some of the houses in Kensington Court are already lighted in this manner, and the electric current has now been extended to some houses in the neighbourhood of Palace Gate. The dull, dim light given by the gas supplied to London is inferior to that given by good mineral oil, and we shall be surprised if in a few years an enormous change in the domestic lighting of our large cities is not seen. It is contrary to all experience that when Bond-street shops and Kensington houses enjoy a bright, clear light, shops and houses elsewhere should be satisfied with an inferior light, which adds to the household expenses by the way in which it dirties the interior of buildings.

WE mentioned a few weeks back a very complete and, indeed, exhaustive monograph by Dr. Mayer on the representations of Giants and Titans in Greek art. A similar work on a subject more widely popular has just been published by Dr. Oscar Bie, of Berlin, on the "Muses in Ancient Art" (*Die Musen in der Antiken Kunst*). Dr. Bie makes a careful catalogue of not only all actually extant examples, but also of works noted in literature, but which have since perished. He devotes a special chapter to the three most important sets of Hellenistic reliefs, i.e., the vases of Halicarnassus, the relief of Archelaos of Priene (in the British Museum), and the Pacca and Medici sarcophagi. A work such as this is of the greatest use for reference, even if its issue is no new discovery or interpretation. Dr. Bie, however, arrives at some not unimportant conclusions. The Muses were at first vague, both in personality and number, rather attributes of Apollo than distinct individuals; then they became three; later, under the influence of the Theogony, nine,—but still with common attributes; last, and only in late days, these functions are separate and stereotyped. The monograph is illustrated with woodcuts.



THE London world is, perhaps, just a little tired of Greek plays,—the fashion is over and passed,—but at Cambridge a settled and scholarly enthusiasm still maintains itself, nor is it at all likely to be a mere passing mode. The performance of the "Edipus Tyrannus," or, rather, the series of seven performances, was a fitting crown to a now goodly sequence of representations. Of course, in a tragedy so profound and so complex the main interest is human and dramatic; when Fate is weaving a web so terrible and so tangled it seems to matter little whether she set up her loom in a desert or a barn. Still, so harmonious was the picture presented to the eye at the rising of the curtain that a few words may be given to it. It may be noted in passing that the drop scene was the same as that used for the "Eumenides," nor could it be improved. The Delphic oracle is still the keynote of the piece, and we could have no better outlook than the view from Apollo's temple, the two reverend guardian eagles, the xoana at the portals, and the fountain of Castalia. The curtain drew up to disclose the palace of Edipus. The massive Doric columns were richly toned, the two lower drums a deep yellow, the third and upper one a creamy white. To the architrave were affixed gold shields. The metopes were decorated with a series of designs in relief, of Oriental character. Two butting bulls faced each other in the two centre metopes, followed each,—we must confess to our considerable surprise,—by two sphinxes in the next pair of metopes. It seems to us in the last degree improbable that Edipus would have decorated his palace with the effigy of the monster he had just slain. The slaying of the sphinx was in his days historical, not mythical, and if the scene were to be represented at all, not her decorative image alone, but the scene of her slaying, as seen e.g. on the recently acquired lekythos of the British Museum, might be chosen. The front of the palace was all ablaze with colour and hung with wreaths of flowers. When the four splendid young guards of Edipus took up their position in front the effect was most impressive. It was a pity that, as citizens of a plague-stricken city, these young guards were unable to conceal their amusement at the novelty of their situation. The scene at the opening, when the suppliants are assembled, was too crowded; but, later, when Jocasta offers incense, the grouping and colour were perfect. To dwell on details of acting would be here out of place, but it is impossible to leave unnoted the fine impersonation of Mr. Randolph. Probably most of those who knew the play dreaded the last scene, when Edipus returns with blinded eyes, crazed with sorrow, broken by fate. No one who saw it but felt their fears were groundless. The blind hands feeling along the palace wall, the stricken face, the sense of sudden physical as well as moral shock, the utter humility that only the sensitive *ὀφθαλμοὶ* could know, the hungry tenderness of the father, and yet the king through all,—all these, yet never a touch of over-statement,—made up a conception such as the modern Greek stage has certainly never seen before. It is saying much that, for this last act, finely suggestive though Mr. Stanford's music was, one wished it silent. Fate was too manifest to need a "Fate-motif."

THE collection of pictures, or rather sketches, on the Seine and Marne, by Mr. Aubrey Hunt, which is on view at the Goupil Gallery, shows their author to have a strong perception of effect in landscape, especially in the treatment of clouds, with an apparently ostentatious indifference to detail. Many of the small paintings are really smudges as far as everything but the general effect at a distance is concerned. There is a great deal of force and ability in many of them, as far as they go; but the whole impression produced is an unsatisfactory one, as if we were looking at a number of unfinished attempts which show great promise and never arrive at performance.

MESSRS. HOWELL & JAMES have had on view this week a valuable collection of

laces and embroidery, chiefly antique, which ought to be seen by those who care for such things. The work is, for the most part, in unusually good preservation, and it is especially noticeable how little the colours of most of the Italian embroideries are faded, compared with what one is accustomed to see in private collections. The exhibits consist of Italian and Persian embroideries on silk, Turkish embroideries on the usual coarse linen cloth, and Italian, Sicilian, Greek, and Spanish laces. The Italian work is naturally chiefly ecclesiastical; among it we noticed, especially, two fine altar frontals on white, and a chasuble and stole on a delicate pink ground, the whole of which is worked over in a solid pattern. There are several very beautiful Persian embroideries on the rare light blue ground, and a curious piece of Turkish work with figures that look rather like the Noah and his sons that we knew in our childhood. The laces, as laces, are, without doubt, very good and valuable, but as specimens of art workmanship, except for the general lightness and delicacy that lace has, we cannot say that we cared very much about them.

THE Exhibition of the Institute of Painters in Oil Colours, though, as usual, too large, and including a good many things that no one cares for (a point which, after all, it has in common with the Academy), contains a larger number than usual of paintings that are of considerable interest and originality. The President's one contribution is an exquisite head and bust of a very beautiful lady seen in profile, under the title "Henriette" (310). Mr. F. D. Millet, in his "Piping Times of Peace" (454) seems to have been aiming at an imitation of Sir James Linton's technique and style of subject; the result is not very interesting. Mr. Dendy Sadler's "The Private Secretary" (383), where a pompous ass is dictating to a secretary who evidently has his measure, is one of the best pieces of humorous characterisation he has ever given us, quite as good as any of his monks, and is worth noting as a picture which really delineates character, and not merely personages. Mr. Stock's "Satan Dead at the Foot of the Cross" (557) is a powerful thing in drawing, and in its ghastly effect of colour; he will find few admirers for this class of work, but he is to be respected as an artist who is striving after the ideal in these realistic days. Among things that we noted specially, we may mention "Early Morning off Penzance" (13), one of Mr. Henry Moore's dark, cold, "wobbling" seas, which suggest disagreeable ideas about death by drowning in that ominous-looking depth of water; "A May Morning" (18), by Mr. Tom Lloyd; "Salisbury after the Floods" (103), by Mr. Jas. Webb, a rather too obvious attempt at the manner of Turner in treating such a subject, but a fine thing; "Your Little Bill, Sir" (123), by Mr. Frank Dadd, a clever study of manner and physiognomy; "A Priestess of Bacchus" (125), so-called, by Mr. John Collier,—no, Mr. Collier, she is nothing of the kind, she is a fine-looking lady of modern life who is amusing herself by a masquerade in a leopard skin; "Miss Nelly Tate as Alice in Wonderland" (143), by Mr. J. R. Reid, a remarkable piece of colour well worth attention as something out of the way in portraiture, though the face itself is unpleasing in colour and wants transparency; "Autumn" (181), by Mr. R. W. Allan, a finely built-up and solemn landscape; "Santa Maria della Salute" (201), Mr. Arthur Severn—architectural details very scrabbly; "Lengthening Shadows" (281), by Mr. Henry Gore, an exquisite little work with a remarkable effect of light in middle distance, and two small very-well studied figures in the foreground; "An Amusing Story" (283), by Mr. Seymour Lucas; "Hampton Court" (300), by Mr. Fulleylove, which does not accord with our notion of the prevailing colour of the scene; "Girgenti" (352), by Mr. Elgood, a fine representation of the old Doric ruin; "One of the Last Old Citizens" (360), by Mr. Arthur Severn, an old steamer on the Thames at Westminster, a variation on the theme

of Turner's *Temeraire*,—dangerous ground, but Mr. Severn has made something of it; "The Hill Side" (406), by Mr. Robert Carrick, an admirable bit of hill landscape, full of truth and careful study not obtruded; "The First Snow" (461), and "On the Marsh, near Bramber" (724), by Mr. Aumonier; "Old Batten's Farm" (588), Mr. J. R. Reid, a remarkable study of colour; "Autumn Sunshine" (637), by Mr. Ernest Parton; "Autumn" (650), by M. Keely Halswelle, a fine scene, and getting out of the author's too-long-followed mannerism; and a "Disused Lime Kiln" (702), by Mr. G. Marks. There are many other things worth looking at, if not remarkable paintings.

#### LETTER FROM PARIS.

BUILDING,—or rather builders,—have been mixed up in the recent political disputes which have been going through here; for the decorations conferred on the architect and contractors for the sumptuous residence for the chief of the State and his son-in-law have been among the matters commented upon in connexion with the recent scandal. It is, fortunately, out of our province to dwell on a subject which is not creditable to any one concerned; but we may contrast with this work, done at the expense of the State, the extensive work which the Duc d'Annume, though in exile, is still carrying on at Chantilly for the good of the public and at great expense to himself, in order to put this great private collection in the best possible condition before the Institut formally takes possession of its trust.

The political disturbance of the time has, however, no effect otherwise on the State building operations; the Exhibition works go on as if nothing unusual was the matter; and the Eiffel Tower continues to climb, and has passed its 40 metres of height.

The transformation of the Gardens of the Trocadéro for the exhibition of horticulture has been commenced, and in the Champ de Mars, around the new constructions, there are rising the plantations of the ornamental park which will extend to the entrance of the Pont de Jéna. In our last letter we described the fountain which M. de Saint-Vidal has designed for the portion of the garden situated under the arch of the Eiffel Tower. M. Contan is executing another fountain for the wide space comprised between the pavilions of the "Arts Libéraux," the "Beaux-Arts," and the "Expositions Diverses." This fountain has two large basins, one over the other, adorned with numerous sculptures. The lower basin is decorated with figures representing "L'Union," "La Vérité," "La Fortune," and "La Pensée." It receives a fall of water from the upper basin, two metres higher, from the centre of which will emerge the "ship" of Paris surrounded by a group of children. In the middle of the ship a monumental group, thirteen metres high, will be placed, symbolising the genius of Progress, with wings outspread and surrounded by statues representing Art, Science, Industry, and Agriculture. Before this group is a figure of Fame, with the orthodox trumpet, and at the helm will be seated the figure of the Republic. A statue holding a shield with the arms of the City of Paris will stand in the lower basin. Groups of children on dolphins will complete this large composition, the model of which is now finished.

It has been decided that during the Exhibition the Champ de Mars will be open to the public at night, and brilliantly illuminated with electric light.

In spite of M. Heredia's return with a new scheme, nothing is yet settled about the Metropolitan Railway.

A large street improvement project, the idea of which dates back to 1867, is to be executed shortly. This is the carrying of the Rue Cassini from the upper portion of the high ground in the 18th Arrondissement, by a steel viaduct across the Montmartre Cemetery. The bridge will have a gradual fall, and will be carried on twelve cast-iron columns placed in pairs, about 20 metres apart. As the surface of Montmartre is perforated by old quarries, it is necessary to execute some subterranean work in the way of consolidating the foundations for the columns.

The Direction des Beaux-Arts has been very energetic of late, especially in regard to the "Service de bâtiments civils." The works at the



Museum being nearly finished, and the new sculpture saloon soon about to be opened, the department has turned its attention to Versailles and to its projected repair and restoration. As already observed in these columns, the palace is in a lamentable state of decay, and M. Leclerc, the architect of the Museum of Versailles, has prepared a report and estimate for the work, which will require 440,000 francs for absolutely necessary work to obviate further decay.

The new Directeur des Beaux-Arts, M. Castagnary, has at once occupied himself with pushing on the work of decorating the Panthéon, which has been going very slowly; and it is understood that the artists who are in arrears with their work will be given the option of entering into an engagement to complete it by 1889 or of retiring. Up till now MM. Pavis de Chavannes, Cabanel, Henri Levy, J. P. Laurens, T. Maillot, and Joseph Blanc are the only painters who have completed their portion of the decoration. There remain still to be fixed in their places the canvases of MM. E. Delaunay, Leneveu (who has succeeded to Baudry's work), Humbert, and lastly Moissonnier, who, having regard to his usual style of work, seems singularly chosen as an artist to cover a portion of the great wall-spaces of a temple, and who has up to this date not given the least sign of life at the Panthéon.

An exhibition of the works of M. Pavis de Chavannes has been opened since the 18th of November in the galleries of M. Durand Ruel, Rue Lafitte. It includes a certain number of known pictures, as well as pastels, drawings, and works hitherto unknown. We have seen again here, with much pleasure, the admirable cartoons of the "Jeunesse de Sainte Geneviève," as well as the large compositions representing "Travail," "Repos," "Paix," and "La Guerre."

The Committee for the decoration of the Hôtel de Ville has been working hard for a month, and will in a short time submit to the Municipal Council a list of painters to receive commissions for the Salle des Fêtes, the principal salons, the Salle de Banquets, and the grand staircases. One of the staircases was to have been decorated by Baudry; M. E. Delaunay is to replace him, and probably no one can better do so. It is to be hoped that M. Pavis de Chavannes will have a considerable part in the decoration of the Municipal Palace. We do not know what will be the decision of the Council, but the idea of the Committee is that all the leading artists of France, without distinction of school or style, should take a part in the decoration, so that it should form for future generations a complete *résumé* of the art of painting in France at the latter part of the nineteenth century. As we have before observed, a considerable part of the work will be reserved for competition, in order to give a chance for the discovery of unknown talent.

The Municipal Council, which, in spite of its reputation as a *Maconas*, has iconoclastic tendencies for everything which recalls monarchy, is insisting anew on the destruction of the expiatory chapel raised in 1826 on the place where Louis XVI. and Marie Antoinette were buried. It is the work of Percier and Fontaine, who gave it the form of an antique sepulchre. On either side are two galleries, imitating a series of tombs in the same style. The chapel, situated in the interior court, is surmounted with a dome, and decorated with a Doric order and pediment. The interior, which is on the plan of a cross, encloses a fine group in white marble, by Bosio, representing Louis XVI. supported by an angel, and a statue of Marie Antoinette, by Cortot. The erection, the decorative effect of which may be questioned, is, however, an interesting specimen of French architectural design of its period. As the work is the property of the State, however, it is not likely that the municipal authorities will get their way, and they will have to look elsewhere for a site for the statue to Danton which they wished to place here. Statues to Robespierre and Marat [?] are also talked of; also one to General Desaix, whose bust for some time surmounted a fountain constructed by Percier for the centre of the Place Dauphine, and which was demolished in consequence of the clearance in connexion with the Palais de Justice.

This "statue mania," which is spreading everywhere, and in some places creating a considerable obstacle to traffic, is extending also beyond Paris. Bernard Palissy has his statue at Boulogne-sur-Seine, Laplace and Condorcet their busts at Arcueil-Cachan;

Parmentier, the agricultural law reformer, is to have one at Neuilly; and one to François Millet, at first intended for Paris, and commissioned from M. Chapu, is now to be placed at Cherbourg.

Lyons wishes to have its monument to the Revolution, following suit with Paris; a competition has been opened for it, and M. Blavette, an able architect, has obtained the premium. The sculptural portion will be executed by M. Peynot.

Two interesting exhibitions have been opened during the last month; one of the charcoal and other drawings of M. Léon Lhermitte, and one of the marine paintings of Emile Vernier, who died about six months ago. This last included 200 pictures and fifty water-colours and drawings, and some fine etchings. M. Lhermitte's exhibition shows him as an admirable interpreter of nature and of peasant life, in regard to which latter he somewhat recalls Millet.

The "Envois de Rome" of the Villa Medici students of this year are so poor and commonplace that the less said about them the better. No better success has attended the Chaudesaignes competition, in which thirty-two competitors (architectural students) took part, and which was thought so unsatisfactory by the judges that the prize was not awarded.

The Chamber is about to decree "la liberté des funérailles": this important enactment, which will considerably modify funeral usages, will have, as its first effect, to hasten the completion of the crematorium, before referred to, as cremation will then be a matter of choice, and in all probability there will be practical necessity for completing the crematorium.

The subject of lighting Paris by electricity is to come under the special consideration of the Municipal Council, Paris being considered to be at present behind several of the leading provincial towns in this walk of improvement. The idea of the Council is to establish a municipal electric power in the basement of the Halles Centrales, which will light that establishment and the neighbouring Place du Châtelet, the Avenue Victoria, and the Place Hôtel de Ville. Six companies have asked for concessions for the electric lighting of different quarters of the city.

In connexion with this subject we may mention a curious instance of the indifference and carelessness of the Paris administration. Though gas was the first cause of the burning of the Opéra Comique, though the company who suffered so much through this catastrophe are now occupying a theatre which is a municipal property, and though severe police regulations for safety have been imposed and insisted on in other theatres, the "Théâtre des Nations," provisionally the home of the Opéra Comique Company, is the only Paris theatre which is not lighted by electricity!

#### A FEW NOTES ABOUT MARYLEBONE MANOR AND PARK.

A VALUABLE and interesting series of prints, drawings, music scores, old advertisements, and the like, was exhibited last week at the "Old Mary-bone Gardens" bazaar in Portman Rooms, Baker-street. Mr. Harris's collection easily divides itself into two parts,—illustrating the two areas which lie respectively north and south of Marylebone-road. Southwards is the Portland estate, to which we will advert presently; northwards extends Regent's Park, once chosen as the site of a palace for George IV. when Regent, to be approached by Regent-street and Portland-place.

The largest parish in London derives its title from the little village church of St. Mary-by-the-bourne,\*—the stream being the Aye brook or Tyburn,—which was built far away in the fields by Bishop Braybrooke in 1400 A.D., upon the removal of the St. John the Evangelist's Chapel that stood close by the site of the now Court-house in Marylebone-lane. The Lane, together with part of High-street, marks the banks of the stream after it skirted the western slopes of Barrow and Primrose Hills in its course through Ossulton hundred from the Shepherds' Well in the Conduit Fields

(Fitzjohn - avenue) at Hampstead. The Teoburne of Badgar's charter to West Minster gave name to the oftentimes shifted gallows. From time immemorial it had been held of the king by the abbots of St. Mary Barking. It was valued in Badward's day at 100, but stands at 52 shillings in the Conqueror's survey.

Some time in the twelfth century Tyburn Church was appropriated to St. Lawrence de Blakemore priory in Essex; and passage of Wolsey's request, to his foundation at Ipswich, was ultimately taken, on the Cardinal's fall, by the Crown. In 1552, however, it was granted to George Cotton and Thomas Reeve, and did not return to the sovereign until its purchase, in 1821, of the Duke of Portland. Meanwhile the manor passed, in various portions, through various hands, and could count among its owners such noble houses as those of De Vere, Fitzalan, Stanley, and Howard. Towards the end of the fifteenth century it belonged, as a whole, to one Thomas Hobson, who, in virtue of an estate stretching between Tottenham Court and Edgware roads to Cricklewood and Hampstead, would at this day be, as Mr. Loftie observes in his History of London (1884), one of the richest subjects in Europe. The manor, exchanged by Hobson to Henry VIII., in 1544, was let by Queen Elizabeth for the yearly sum of 16*l.* 11*s.* 8*d.*; and, in 1591, to John Dixon for a term of thirty-one years. In 1611 her successor sold the property for 829*l.* 3*s.* 4*d.*, with a reservation of the park, to Edward Forset, whose name is commemorated by the verse which Hogarth has copied into his picture of the church, and which is preserved in the new parish chapel:—

"These pews enserud and tane in svdrir  
In stone thers graven what is vader:  
To wit a valt for berial there is  
Which Edward Forset made for him and his."

A Forset's daughter and heir, Arabella, brought the property in marriage to Thomas Austen. In 1710 their son, Sir John Austen, sold it to John Holles, Duke of Newcastle, for 17,500*l.*, the rental being computed at 900*l.* a year. His Grace's only daughter and heir married Edward Harley, second Earl of Oxford and Mortimer; and Harley's only daughter and heir, the Lady Margaret Cavendish, married, in 1734, William Bentinck, second Duke of Portland. Some seventy years ago the fourth duke of that house exchanged the manor to the crown for certain lands in Sherwood Forest, valued at 40,000*l.* We may here add that the Messrs. Tibbury's offices in High-street, always known as Oxford House, are reputed to have been the storehouse,—adapted from a girls' school,—of the celebrated library and MSS. collected by Robert and Edward Harley, the first and second Earls of Oxford, and which was secured by the nation for no more than 10,000*l.* It is very doubtful whether the Harleys ever inhabited the Manor-house, which subsequently became famous as Mr. de la Place's (in 1703), and his successor, Mr. Fountayne's, school for boys. It was demolished in 1791, and Devonshire-mews indicates its site.

The views of the Manor-house comprise two coloured drawings after Rooker (1790), and J. T. Smith's tinted plate (1807) copied from Gosselin's "long view," showing the garden, park, and environs as they appeared in the year 1700. This Manor-house is believed to have been built for the use of Henry VIII. when hunting over Marylebone Park; and to have been occupied by Queens Mary and Elizabeth. Here, on 3 February, 1600, Elizabeth feasted the Russian ambassador, who hunted in the Great Black Forest of Marylebone. The chase, with its preserves of "hare, partridge, pheasant, and heron . . . in and about the honour of his palace of Westminster" is that which is cited in Henry's proclamation of July, 1536, against hunting or hawking in the region "from the palace of Westminster [Whitehall] to St. Giles's-in-the-Fields, and from thence to Islington, to our Lady of the Oak, to Highgate, to Hornsey Park, and to Hampstead Heath." We have made numerous *excerpts* from the Reports of the Historical Commission and Kalendar of State Papers (Domestic and other Series) in connexion with these lands. One of the earliest is under date July 14, 1530. It relates to the Commission of Inquiry in different counties concerning possessions held by Thomas, cardinal archbishop of York. Herein mention is made of the rectories of Blakemore, Guigemar, and Maryborne as royal properties devoted to the endowment of Wolsey's college at Ipswich.

\* The interior forms the scene of the marriage in Hogarth's *Rake's Progress*, 1735 (now in the House Museum), and the churchyard is depicted in his *Industry and Idleness*, 1747. Rebuilt in 1741 it is the existing parish chapel at the northern end of High-street.



Under date September 27, 1532, we read that the advowsons of Tyburn and Marybone manors, together with their tithes, formed part of a grant by the sovereign to one of the dean and canons of St. George's Chapel, Windsor.

In the indentment of Sir Nicholas Throgmorton, Sir Henry leley, and Sir Thomas Wyatt, the route of the rebels' march is set forth as from Kent to Southwark, thence by Brentford and Marylebone Park into London.\* Cunningham cites from the Board of Works Accounts of 1582 a payment for "making of two new standings in Marebone and Hido Parkes for the Queenes Majestie and the noblemen of Fraunce to see the huntinge"; the noblemen, by the way, being the Duke of Anjou, Elizabeth's suitor, and his court. Reverting to the State Papers we find a warrant, dated 25th January, 1612, awarding 100*l.* to William Stacey, under-keeper, for his great charge in keeping deer there for his Majesty's recreation in hunting. There are several later warrants to the like purport, and others which demonstrate that the Carey family for a while enjoyed the hereditary keepership of Hyde and Marylebone Parks. Thus, the royal sign manual to a warrant, dated 27th July, 1614, to Sir H. Carey (Lord Hunsdon) for 25*l.* 13*s.* 6*d.* on account of repairs and the building of six new bridges; on 27th February, 1615, Sir Philip Carey is made keeper of Marylebone Park for his life; on 29th September, 1620, Robert Kerr, bed-chamber groom, is given a prospective grant of the keepership, with 8*d.* per diem in reversion to Sir Philip and his son John Carey. In August, 1660, John Carey, master of the back-houses, is vested with custody of the Park as long held by his ancestors. The due care of the game sometimes inconvenienced those who did not profit by its custody, for under date 12th May, 1631, is a petition by the burgesses of Westminster against the drawing off, for the deer in the two parks, of the water "which rises from the springs and wastes of the park of Marybone and Tyburn." There is a warrant of 9th October, 1649, for the despatch of boat timber from the park to the yards to build the frigates. In the Molyneux MSS. will be found a certificate of Sir Thomas Cawarden, Knt., master of the tents and revells, of charges in his office. One charge is of 6*cd.* for the Bankers' houses and other charges at Hyde and Marybone Parks prepared against the Marshall Seynte Andrews conynge thether,—of date 8th December, 1552. We will finish these extracts by quoting the following items from Robert Read's account of disbursements to Secretary Windebankes, 5th January, 1539-40:—"the porters, for whipping the footman, 5*s.*; the smith, for making a key of Marrowbone Park, 2*s.* 6*d.*; the man that brought it, 2*s.*"

At the beginning of his troubles Charles I. mortgaged this demesne, for 4,000*l.*, to John Wandesford and Sir John Strode, Commissioners for the King's Artillery. Their successors in title, Sir Nicholas Strode and John Wandesford, make petition to Charles II., in 1662. They set forth how, in exchange for this grant, munition of war, including powder and artillery trains, to the value of 18,000*l.*, had been supplied, and urge that Sir John forfeited both life and estate, and Wandesford suffered robbery and exile in the Royal cause; for it would seem that Cromwell had nullified the king's conveyance; and it is stated, settled the Park on Colonel Harrison's dragons for their pay. After King Charles's execution, indeed, one of the first Acts of Parliament was to ordain that all royal parks and houses should be maintained for the benefit of the Commonwealth, and thrown open to the public. On Saturday, November 27th, 1552, a resolution passed for the sale of every royal park. Peter Cunningham records that Marylebone Park was sold to one John Spencer for 13,215*l.* 6*s.* 8*d.*, including 130*l.* for the deer (124 in number, and of various kinds), with 1,774*l.* 8*s.* for timber, exclusive of 2,976 tons reserved for the dockyards. He goes on to say that at the Restoration Charles's assignment was held to be good, and the park re-assigned to the original grantees for such term as should discharge the incumbrance thereon. A warrant of May 11th, 1664, responds to Sir Henry Bennet's petition, by granting to him a lease of "a moiety of Great Saint John's Wood, Marylebone, at a rent of 13*l.* 9*s.*; a quarter of said Wood, with Chalcoat's Lane [Chalk Farm], 6*l.* 17*s.* 2*d.*;

\* Addenda Dom. S.-r. 1547-1565. Paper of April 17, 1564.

and Marylebone Park, at a fitting rent." Sir Henry Bennet was elevated Earl of Arlington, March 14th, 1663, with remainder to his only child, Isabella, who married Henry Fitzroy, first duke of Grafton. On November 22nd, 1675, Lord Arlington assigns to his elder brother, John, elevated Baron Ossulston, of Ossulston, co. Middlesex, on November 24th, 1682, and ancestor of the now Earls of Tankerville, the remainder, thirty-eight years, of his lease, as held at an aggregate rent of 36*l.* 14*s.* 6*d.*\* Numerous crown leases and sub-leases succeeded; yet of these it will be enough to say that the name of one lessee, circa 1750, is still preserved in the title of Hinde-street, Manchester-square. Upon the falling in, in 1811, of a lease to the Duke of Portland, the sites of Allsop's Farm, Kendal's Farm, Welland's Farm, Park Farm and Fields, the Jew's Harp, Queen's Head and Artichoke, with other holdings, were laid out by James Morgan after John Nash's designs. The first idea was to build a royal palace on the acclivity occupied by Jenkins' nursery, and now the Botanical Gardens. But other counsels prevailed, and the several terraces, with the villas they surround, were planned and built by Nash and the two Burtons. The open area, into which the public were denied access until fifty years ago, extends over about 470 acres.

Of other places represented in this unique collection, we should mention two views (1822) of the parish church over against York Gate, built by Thomas Hardwick, 1813-17, and of which the front elevation was afterwards amplified to its present proportions. In our columns of the 31st of January, 1885, we gave an account of the extensive and costly alterations within, which have been carried out at Mr. Harris's hands. There is a view of the Marylebone Basin, showing people bathing in the pool. It was constructed in 1668 for the supply of water to Covent Garden and St. Martin's-lane. This became the site of the Portland, now St. Paul's Episcopal, Chapel, in Great Portland-street. There are, besides, water-colour drawings of Primrose Hill and the fields beyond; of the old Sick House (1803), now incorporated in the Workhouse, facing Marylebone-road, and pencil drawings (1866) of certain portions of the premises which were pulled down for the new buildings along the western side of Northumberland-street. An old joke is revived by the now scarce caricature showing Nash balancing himself upon the apex of his spire at All Souls' Church, Langham-place. A Pugin's drawing of the illumination of L. G. Otto, the French Ambassador's house, in Portman-square, on the night of the 29th of April, 1802, in celebration of the Peace of Amiens, is noteworthy in that it shows the "Concord" which the mob, reading as "Conquered" demolished entirely. Peter Cunningham (second edition, 1850) places this episode in Portland-place, an apparent error that subsequent writers have not been slow to follow.

#### ANTIQUITIES IN BRITANNY.

This was the subject of a paper read at a recent meeting of the Royal Archaeological Institute, by Mr. Herbert Jones, Mr. T. H. Baylis, Q.C., in the chair.

Mr. Jones, in the course of his paper, said that the first object to meet the eye of the traveller arriving at Carnac in Brittany is the large tumulus of Mont St. Michel, crowned by a chapel dedicated to that saint. This tumulus, oval in plan, is built up of small loose stones most difficult to dig into, its dimensions as given by M. R. Galles being about 377 ft. long, 190 ft. broad, and 33 ft. high. It was opened at great expense by the Société Polymathique in 1862, under the direction of M. René Galles, and M. de Freminville, by mining a tunnel into it from the end; but though they penetrated nearly half way through the mound, this search led to no result, though afterwards, by sinking a shaft from the top in front of the chapel, the chamber was reached. This was formed of comparatively small stones, and contained eleven celts of jade and jadeite, one of which was broken; twenty-six of fibrolite, and two of other stones: a magnificent necklace of 101 beads and nine pendants, many of a sort of turquoise called by the French *calais*; and a small necklace of beads, apparently of bone, less than one-tenth of an inch in diameter.

The interment was found between the floor of the chamber and the rock below, the remains being incinerated. It is very probable that other chambers still remain unexplored in Mont St. Michel, but any attempt to reach them would be very difficult. The lower surface of the cap-stone had cup markings in it. These excavations are described in the Bulletin du Société Polymathique du Morbihan, ann. 1862. The next tumulus in size in the neighbourhood is that called Le Moustoir, some distance from Carnac. This is also elliptical in plan, and is formed of a core of loose stones covered with earth. It is surmounted by a menhir or upright stone at one end of no great size. It was also opened by M. R. Galles in 1863, and is described in the Bulletin du Société Polymathique, 1864. At the base are traces of a Roman station. Three interments were found in this tumulus: in the centre, a cist containing a vase of peculiar shape; on the west a large dolmen; and at the east two small chambers. One axe only, perforated at the end, was found, but there were several fine flint flakes of the Pressigny class. None of the stones had markings on them. A very interesting tumulus, almost in its original state, covering a dolmen with the *allée couverte* or passage to it perfect, is in the grounds of the Château of Kercado, about three miles from the village of Carnac. Some of the stones are sculptured, the cap-stone bearing the figure of an axe similar to the well-known one on the Table des Marchands at Lockmariaer. It was opened in 1863, when two stone celts were found, as well as a necklace of beads and pendants, many of which were of *calais*. It is also described in the Bulletin du Société Polymathique. The well-known tumulus of Gavv Innis, that of Mané er Hroec near Lockmariaer, and the Barre de Tumiac, which stands on the point of land facing Lockmariaer and Gavv Innis, are all claims of loose stones, like Mont St. Michel. The present owner of the island of Gavv Innis, Dr. De Closmadeuc, the well-known antiquary of Vannes, has lately searched the tumulus there in hope of discovering a second chamber, but without result. It had been opened previously, in 1832, when the sculptured stones were discovered, and nothing then found has been preserved; the other two mounds yielded rich treasures. In the Mané er Hroec, explored in 1863 by M. René Galles and M. Lefebvre, more than 100 celts were found, and a splendid pendant of *calais* as large as a hen's egg. One of the axes of jadeite was nearly 16 in. long, and one of chloromelanite over 18 in. The jade and jadeite axes were all broken when found. Some of the stones were sculptured. The Butte de Tumiac was opened in 1853, but the chamber is now inaccessible. Sculptured stones were also found here, with many celts, &c. All the objects brought to light by the explorations of the Société Polymathique are preserved in their museum at Vannes, where they are excellently shown, the results of each excavation being kept together. The author could not deal in his paper with the other antiquities at Carnac and the neighbourhood, but he called attention to the fact that there are there two rectangular enclosures of stones, one with alignments commencing from it, and the fourth side of which is formed of a long low barrow. The other is unconnected with any alignments. Many visitors to Carnac, Mr. Jones said, will be sorry to hear that the chapel which has so long crowned Mont St. Michel is about to be replaced by a new one.

In the discussion which followed the reading of the paper, Mr. Josh. Brown, Q.C., made some remarks on the alignments of Carnac, and upon our ignorance of their object and date. He considered some of the theories which have been advanced to account for them satisfactory. Mr. Lewis mentioned the double circle of stones on the Island of Er Lanic, close to Gavv Innis, part of which is now under water, and called attention to the probable subsidence of the land in the Department of the Morbihan and in the coast of Brittany.

The Rev. Prebendary Scarth and the Chairman also made some remarks.

#### The Liverpool Exhibition Buildings.—

It is stated that a company is being formed to obtain possession of these buildings with the view of converting them to the purposes of a winter-garden and place of amusement.



## THE HENLEY SEWAGE WORKS.

AFTER the applications at Southampton, Eastbourne, and the Houses of Parliament, it is interesting to note the gradual spread of the Shone system of drainage. There are now twenty-two examples in operation. The difficulties which beset the disposal of the sewage at Henley were very severe, and three designs, based on the ordinary gravitation water-carriage plans of modern engineers, were consecutively rejected by the Corporation, as the Urban Sanitary Authority, not so much on account of the cost, although this was heavy, the engineer's estimates varying from 18,000l. to 20,000l., but because, on the one hand, it was not possible to drain into the Thames, the Conservancy Board resolutely refusing to have the river polluted; while, on the other hand, the levels of the proposed sewers did not permit of an outfall at any but a short distance from the mass of the town. One such scheme discharged the sewage close to the railway station on the east, and was consequently vigorously opposed. Another, the best of the three, was designed to take the sewage to a piece of land contiguous to the western borders of the town, where a pumping-station was to lift it 41 ft. to a reservoir, with filter beds and an effluent channel of 700 yards long, to the Thames. The gradients for the sewers in this case varied from 1 in 150 to 1 in 1,000, the main drain being 54 in. in diameter. This site, however, was close to the Mountfield-villas, the tenants of which were by no means pleased with this proximity of the discharge; whilst the landowners commenced legal proceedings to prevent their properties being damaged in value for building purposes.

Such was the condition of affairs when Mr. Shone was called upon to apply his hydro-pneumatic system. The main iron sewer-pipe, or, as it is technically termed, "the c. i. sealed outfall main," varying in size from 5 in. to 8 in. in diameter, commences at the eastern extremity of the town in the Reading-road, passing under Bell-street to a distance of three quarters of a mile beyond the extreme westerly limits of the town, and more than a mile beyond the outfall of the gravitation scheme, near the White Horse Inn, to the solitary site of Lambridge Wood, where the discharging station is situated at an elevation of 116 ft. above the level of the Thames as it bounds the Street of Henley. There are erected the receiving tanks, the engine, and the air-compressors. The compressed air is conveyed in a smaller iron pipe of 3 in. diameter, laid parallel with the iron sewer, but running, of course, in an opposite direction. From all parts of the town gravitation sewers feed the sewage into the pneumatic ejectors, which are placed in four stations at nearly equal distances apart. As often as these ejectors are filled the compressed air is automatically admitted and the sewage driven forward in the closed iron pipe without any gases escaping at all, as is the case with the ordinary sewers which have ventilators at every two hundred yards. At the receiving station the sewage is perfectly filtered in the tanks, and the effluent water is discharged into the soil and the chalk strata beneath, whilst the sewage solids, compressed and dried, sell freely for manure. Provision has been made for 6,000 inhabitants, the census of the town being at this time about 5,000. All litigation has been avoided, and the total cost of the completed works has been under 15,000l. The works have been already some nine months in operation.

## THE OFFICE OF CITY ARCHITECT.

In addition to Messrs. Charles Barry, W. H. Crossland, and Alexander Peebles, whose names have already been mentioned by us, we see that Mr. Francis Chambers and Mr. Goymour Cuthbert are candidates for this appointment. The *Daily News* says that Mr. H. H. Bridgman, C.C., having been solicited by several of his colleagues of the Court of Common Council to become a candidate for the appointment, has announced that, in the event of the Court deciding to suspend a standing order, it is his intention to present himself for that position. The *City Press* of Wednesday says that at the Court of Common Council to be held on Thursday, Mr. Sly was to present a report of the Officers and Clerks' Committee, submitting for the approval of the Court, in accordance with the reference of the 17th ult., draft duties of the office of Archi-

tect and Surveyor, and recommending that the age of candidates for the office should not exceed fifty years on the day of election. The same committee would report on the following references, viz.:—On letter of the late Sir Horace Jones, City Architect, for a reconsideration of the terms of his appointment, and the arrangement of his staff. To consider whether the appointment of Vacant Lands Officer should be continued, and generally with reference to the same. And recommending the following increases of salaries to the undermentioned assistants in the Architect's Department from Lady Day last, viz.: Mr. Andrew Murray, principal assistant, from 600l. to 800l. per annum; Mr. Thomas Baker, officer for surveying the City lands and Bridge House estates, from 530l. to 550l. per annum; Mr. Alfred L. Gosling, second assistant (by annual increments of 10l.) from 400l. to 450l. per annum; Mr. Frederick Henry Williams, third assistant (by annual increments of 20l.) from 300l. to 400l. per annum; and further recommending that the appointment of vacant lands officer should not be filled up, but that its duties should revert to the Architect's department; also recommending that the allowance for office expenses and stationery should be increased from not exceeding 100l. to not exceeding 150l. per annum. Up to the time of going to press we had not learned whether this report was adopted.

## DISCOVERIES AT ROME.

WE take the following from the Roman correspondence of the *Kölnische Zeitung*, which states that "two discoveries of importance for the topography of ancient Rome in the earlier imperial times have just been made. During the works now in progress on the left bank of the Tiber, parallel to the Via Gialla, behind the church of St. Biagio della Pagnotta, a tufa slab was brought to light. It is one of the series of slabs, 5 ft. 3 in. by 2 ft. 6 in., with which the Romans marked the line of the shore, and was distant 40 ft. from the present bank of the Tiber. As it was found with the inscription downwards, the workmen did not take care of it, and broke it to pieces. Fortunately, it has been possible to collect the inscription, which is as follows:—*Paulus Fabius Periscus | C. Eggius Marullus | L. Sergius Paulus | C. Obellius Ra. . . | L. Scribonius | curatores riparum et alvei Tiberis ex auctoritate Ti. Claudi Caesaris Aug. Germanici Principis S. C. ripam cippiis positiss terminaverunt a Trigario ad pontem Agrippae.*" In the first place, it enumerates four hitherto unknown senators to whom was entrusted the care of the banks and the bed of the Tiber; it also shows that the collegium appointed under Tiberius, in the year 15 A.D., for superintending riparian works (to which, under the presidency of a Consul, four senators belonged, whose tenancy of office was for one year), was still in existence under Claudius. Paulus Fabius Periscus is the Consul for the year 34. The stone, at present the only proof of riparian works under Claudius, exactly defines the sketch of shore from Trigarium to the Agrippa Bridge. There are various records in existence regarding the Trigarium, situated in the ninth region, and which was apparently a racecourse. The slab now found proves that the Trigarium was situated here on the Tiber, at the western boundary of the ninth region. The statement in the inscription, "*Ad pontem Agrippae*," is a novel topographical determination. We receive the first intimation of this bridge, which connected the fourth and fourth regions. The place where the inscription has been found is almost midway between two bridges. The upper, 'Ponte Sisto,' appears sometimes as 'pons Aurelius,' sometimes as 'pons Antoninus,' and also as 'pons Janicularis,' and was probably built by Aurelius Antoninus Caracalla. Later it was restored by Valentinian and Valens, and towards the side of the Champ de Mars adorned with a triumphal arch. The other bridge was first called 'pons Neronianus,' and, later, 'Triumphalis,' and traces of it are still left (near S. Spirito). The stone containing the inscription was distant from the latter 1,508 ft.; from the former, 2,165 ft. (in the line of the river). As the existence of a third bridge between the two mentioned was not known, it was assumed that one of the latter bore Agrippa's name; but a new dis-

covery settled all disputes. The unknown bridge was found. During some works at the river bank antique masonry was observed, 525 ft. below the Ponte Sisto, opposite the present Vicolo del Polverone. It was the abutment of a bridge, consisting of large tufa blocks, and bound together by iron clamps imbedded in lead. Afterwards a pier 22 ft. wide, and still three courses of masonry high, was discovered in the river bed, consisting, like the abutment on the bank, of blocks 4 ft. high, the clamps of which measure up to 1 ft. 4 in. This is the solid and handsome construction of the Augustan age. In these remains the Agrippa bridge may be recognised, and as Caracalla constructed a bridge only 525 ft. higher up, the former must have been unfit for use during Caracalla's reign, or it did no longer meet the requirements of his time."

The *Tablet* reproduces the following item from a Roman correspondent of the *Frankfurter Zeitung*: "Some time since, owing to the exertions of the Passionist monk, Father Germanus, two chambers of a Roman house of the fourth century were discovered under the high altar of the church of SS. John and Paul, on the Cosian Hill. Quite lately another large chamber has been discovered beneath the nave of the church, which seems to have been the *tabularium* of the house. The traces, very well preserved, are visible of what must have been valuable paintings representing wild beasts, sea-horses, and other decorations. Especially remarkable are two pictures of unquestionable Christian character. One represents the patriarch Moses in the act of removing his shoes before approaching the burning bush, a subject which is also represented in one of the pictures in the catacomb of Calistus. The other represents a man praying: she is clad in a tunic, with a veil on her head, a necklace of pearls, and arms outstretched. This is believed to be the first specimen of a Roman house in which scenes of a Christian character have been found represented. Such subjects have hitherto been found only in the catacombs."

## ARCHITECTURAL SOCIETIES.

*Birmingham Architectural Association.*—The second ordinary meeting of this Association for the current session was held at Queen's College on Tuesday evening last. Mr. W. Doubleday (Vice-President) in the chair. The following gentlemen were elected members of the Association:—Messrs. S. Harris, J. Goode, G. Cox, B. Walker, H. Wigley, C. Lea, G. Ward, H. Bewlay, John Ward, A. Harrison, and T. Keys. A paper on "German Romanesque" was read by Mr. A. Reading. A vote of thanks, proposed by Mr. H. H. McConnal, and supported by Messrs. Newton and Victor Scruton (hon. sec.), was unanimously accorded to Mr. Reading for his interesting lecture; and after a response from that gentleman the meeting terminated.

*Edinburgh Architectural Association.*—The usual fortnightly meeting of this Association was held on the 24th ult. in the Architectural Hall, 42, George-street. Mr. Hippolyte J. Blanc, President, occupied the chair. After the usual preliminary business was disposed of, Mr. David MacGibbon, architect, read a paper entitled "The Architecture of the South of France: Gothic Period." After referring to the characteristics of the Early Romanesque architecture of Provence, it was pointed out how those were superseded in the fourteenth century by the introduction of Gothic details from the North, which were gradually engrafted on the native style, while in many cases designs in Northern Gothic were imported wholesale. These changes were illustrated with sketches from most of the towns of Southern France. Attention was then drawn to the important specimens of Mediaeval military architecture still preserved in the towns of Carcassonne and Aiguas-Mortes, the walls and gates of which remain unchanged from the thirteenth century. The peculiar keep towers of the Riviera, similar in many respects to those of our own country, were described and illustrated. The lecture concluded with a description of the island and fortified monastery of St. Honorat, in the Bay of Cannes, a place of great interest from its containing examples of every period of Provencal art. At the close of the lecture a vote of thanks was awarded to Mr. MacGibbon for his paper.

*Glasgow Architectural Association.*—The third





Deerhurst Church: Capitals in Nave, illustrating the Development of Gothic Foliage.

Drawn by Mr. R. W. Collier.

Cripplegate, in which capacity he acted as architect to the Industrial Dwellings built with parochial trust funds in Nile-street, Hoxton, which were frequently referred to in the *Builder* at the time of their erection, and which were opened by the Prince and Princess of Wales.

#### BUILDERS' BENEVOLENT INSTITUTION. ELECTION OF PENSIONERS.

An election of two pensioners on the funds of this Institution was held at Willis's Rooms, St. James's, on Thursday, November 24th, Mr. Herbert H. Bartlett, the President, in the chair.

There were four candidates for the two vacancies, viz., three men and one woman. The poll was open from two to four p.m. Shortly after the close of the poll the scrutineers, Messrs. Thomas Stirling and T. F. Rider, announced the results of the polling to be as follows, viz.—James Pickings, 25, Shillington-street, Clapham Junction, aged 61, builder (fourth application), 1,018 votes; George N. Cott, 12, Mordaunt-street, Brixton, aged 69, builder (third application), 1,497 votes; John B. Axford, 2, Brosley-terrace, Stroud Green, aged 63, builder (first application), 2,306 votes (including 300 added in respect of former contributions); and Ann Winter, 47, Maygrove-road, Brondesbury, aged 62, widow of Benjamin Winter, builder (second application), 1,235 votes (including 210 votes added for her late husband's contributions). The successful candidates were therefore declared to be G. N. Cott, and John B. Axford.

Among the friends of the Institution (other than those already named) who took part in the proceedings were Messrs. G. Plucknett, J. P. (treasurer), C. Bussell, J. T. Bocking, W. Scrivener, R. Perkins, G. B. New, T. G. Smith, and R. Richardson.

A vote of thanks to the Chairman closed the proceedings.

**Robert Boyle & Son (Limited).**—The second annual meeting of the shareholders in Robert Boyle & Son (Limited), was held on Wednesday, November 23rd, at Cannon-street Hotel, when a dividend of twelve per cent. for the year was declared on the ordinary shares of the Company, free of income-tax, one-sixth of the profits being also placed to the reserve fund, and a balance carried forward to next year. The Chairman, Mr. Gilbert Wood, in moving the adoption of the report and accounts, congratulated the shareholders on the prosperous state of the business, and upon being again able to declare a dividend of twelve per cent., which he considered was due, not only to the recognised merit of their ventilating appliances, but to the very able management of Mr. Robert Boyle, the managing director, who was untiring in his efforts in the interests of the Company, and also of sanitary science.—The Managing Director, in the course of his remarks, stated that there was a highly satisfactory increase in the business, which he attributed to not only the improved form of the air-pump ventilator they were now making, but to the fact that they had also tried as much as possible to meet the requirements of their clients with regard to cost, and the quality of the articles supplied, the present form of the air-pump ventilator, though much more efficient, being now sold at about fifty per cent. less than previous and inferior forms, besides being made of a more ornamental character, of the best rolled-steel plates, galvanised, while the workmanship was of the highest class. He also stated that the foreign agencies were developing in a very satisfactory manner, and yielding good results, the air-pump ventilator and other appliances having been introduced with considerable success to a large number of important public buildings in Germany, France, Belgium, Holland, Spain, America, the Colonies, and other countries, the Danish Government having also adopted the ventilators on their new ironclads, whilst the German Government had in contemplation the adoption of the air-pump ventilator on the whole of the railway-carriages on the German lines. Agencies were also being established in Norway and Sweden, from which orders had already been received. The election of directors and auditors and a vote of thanks to the Chairman brought the proceedings to a close.

#### CAPITALS, DEERHURST CHURCH.

These capitals, drawn by Mr. R. W. Collier, furnish a very curious example of the experimental transition from the Norman to the foliated type of capital. We do not suppose that they represent the process by which Early English foliage was evolved; probably the mason who carved them was a little behind the times, and inserted bits of carved foliage, such as he had seen elsewhere, into the scalloped capital, which he could not bring himself entirely to part from; but they are not the less interesting.

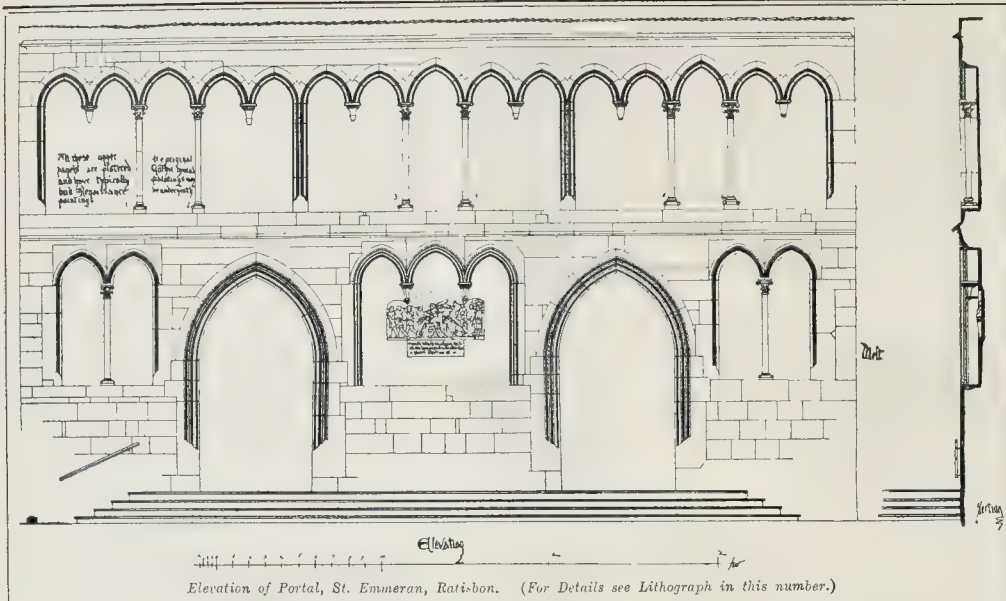
#### OBITUARY.

**Mr. Edmund Woodthorpe.**—We announce with much regret that Mr. Edmund Woodthorpe died suddenly, on Saturday last, at Hornsey (while staying with friends), aged 74 years. He was the son of a former Town Clerk of London, and was elected an Associate of the Royal Institute of British Architects as far back as 1839, becoming a Fellow in 1846. For nearly half a century he was District Surveyor for Limehouse (this district including the parish of St. Anne, Limehouse, St. John, Wapping, the Precinct of St. Katherine, and the Hamlet of Ratcliff), receiving this appointment in 1839. He was also District Surveyor for the Northern Division of the City of London. The gross receipts, according to the last return furnished by the Metropolitan Board of Works from the District of Limehouse were 519l. 4s. 10d., and for the Northern Division of the City 885l. 15s. 11d. Mr. Woodthorpe was also Surveyor to the Girdlers' Company and to the parish of St. Giles's,

of the present series of lectures in connexion with this Association was delivered on the 22nd ult. by Mr. G. Washington Browne, architect, Edinburgh, his subject being "The Monastic Orders and Buildings in Scotland," the honorary president, Mr. T. L. Watson, occupying the chair. The importance to the architectural student of a knowledge of the origin and development of the monastic system was not, the lecturer feared, sufficiently recognised. That, in studying its architecture, the interest of knowing what causes, social and religious, led to the results everyone admires, might be deepened, a brief history was given of the rise of the various orders, their spread over Europe,—and in Scotland specially,—the routine life of the monks, and the canonical rules they professed, particularly as these affected either the arrangements or decorations of their religious house. By a comparison of numerous examples of the abbays and priories of the different orders in Scotland it was shown that considerable latitude was taken in their interpretation of these rules. Thus Melrose, a Cistercian foundation, violated the prohibition against figure sculpture. This and other variations were caused by artistic feeling and practical exigencies, resulting in a character peculiar to Scotch monastic buildings.

**Manchester Society of Architects.**—The prize of the Manchester Society of Architects for the best essay descriptive of the Architecture of the Manchester Town-hall, has been awarded to Mr. Percy Scott Worthington, B.A. of Corpus Christi College, Oxford, son of Mr. Thomas Worthington, of Manchester. The prize is the gift of Mr. Margatroyd, the President of the Society.





### Illustrations.

#### NOTRE DAME, CHALONS-SUR-MARNE.

**N**O architect travelling in the North of France should omit visiting this delightful example of twelfth-century Gothic. The town of Chalons-sur-Marne is in itself sleepy and uninteresting, the military element alone giving it any appearance of life, and but for the two churches the traveller would find little to detain him. The cathedral is a large unfinished medley of styles, possessing some features of much beauty, but so overpowered by the great ugly Renaissance additions that the visitor turns his back upon it with a sigh of relief, feeling that he may give his undivided attention to its humbler neighbour, the Church of Notre Dame.

This building was consecrated in the year 1183, and, fortunately, has been maintained in a very fine state of preservation. That it merits careful study is amply proved by the numerous references to it to be found in the dictionary of M. Viollet-le-Duc, and the drawings of it made by the late Mr. Burges.

The Cathedral consists of a nave and aisles, with two western towers,—these being crowned by wooden spires of very skilful construction covered with lead,—north and south transepts, choir, with chevet, and two eastern towers which have been left unfinished; the height of the nave is just under 70 ft., and the width nearly 30 ft. The groining throughout is of the simplest character, with boldly-projecting ribs, which in nearly all cases are carried down to the ground by means of shafts. The carving is curious and of several dates; that at the west end of the nave appears to be the oldest, and has a decidedly Romanesque character; the caps to the pillars in the choir are, perhaps, the latest examples in the church, and have ordinary knob-like leaves, as is usual in this date of work.

It is impossible, however, to give a concise description of this building, as its beauties and ingenuities can only be learnt by close and personal examination. The illustration will, in some small measure, indicate the general design; what is wanted is a monograph completely illustrating the building. This would be a great labour, but there can be little doubt that it would be well repaid. A.B.M.

#### INTERIOR, HOLCOMBE, KENT.

The illustration is an interior view of the drawing-room at Holcombe, recently erected for Mr. George Winch, from the designs of Mr. John Belcher.

The chimney-piece is of marble and alabaster, with a carved frieze. The ceiling of the ingle

nook is groined, and the walls are covered with decorated leather. The front is treated in colour, and the columns are of a bright red mahogany with carved and gilt caps.

The work has been carried out by Messrs. Foster & Dicksee, of Rugby, and the carving by Messrs. Farmer & Brindley.

The drawing was in the recent Royal Academy exhibition.

#### THE TOWER, CHURCH OF ST. JEAN, MAESTRICHT.

This church is a somewhat neglected treasure. It is one of the nine less-important ecclesiastical edifices of which Maestricht boasts, beside its Cathedral of St. Servais and its other Romanesque Church of Notre Dame. Our illustration is reproduced from drawings made by Mr. John B. Gass, A.R.I.B.A., of Bolton.

#### ADDITIONS TO "THE LITTLE HOUSE," WARGRAVE, HENLEY-ON-THAMES.

Our drawing of "The Little House," at Wargrave, near Henley-on-Thames, for Sir Morell Mackenzie, M.D., shows the new additions recently carried out. The gable shown as fronting towards the street is the end of the old house, but remodelled to correspond with the new parts. Red bricks have been used for the walls of the ground-floor, the upper parts being timbered, and the panels are filled in with rough-cast work, coloured yellow ochre. Messrs. Silver & Sons have carried out the work. Mr. Arthur Ardron is the architect.

#### A DOCTOR'S HOUSE AND STABLES AT SWINTON, MANCHESTER.

As the ground-floor arrangements of this house are shown by the small plan accompanying the sketches, it is only necessary to state, as regards the house, that the drawing-room is on the first floor, and is L-shaped, being placed over the consulting-room and surgery. The bath, w.c., and linen-room are over the waiting-room and passage. There are six bedrooms. The washhouse and larder are in the basement, the whole of which is utilised.

The material used is red pressed brick for facing, and red tiles for the roof. For internal joinery, where not exposed to rough wear, Californian red pine has been employed, and has been found to stand well after a test of two years. The house has been substantially built throughout, at a cost of under 1,150*l.*, including all fittings. Messrs. Gerrard & Sons, of Swinton, were the contractors.

The stables provide accommodation for two horses, and have hay-loft and pigeon-cote over. The material for outside work is similar to that of the house, the total cost being under

3,00*l.* Mr. Edward Wood, of Manchester, was the contractor; and the architect is Mr. J. Langham.

#### THE CARLSBRÜCKE, PRAGUE.

This massive stone bridge over the Moldau was begun in the reign of Charles IV., 1357, and finished 1503. It measures 1,572 German feet, and is ornamented on each side with twenty-eight statues of saints. According to the Popish legend, St. John Nepomok, the patron of bridges, was thrown from this bridge, 1383, by order of Wenceslaus IV., because he refused to divulge the secret confided to him by the Queen in confession. The illustration is from a sketch by Mr. W. A. Fife.

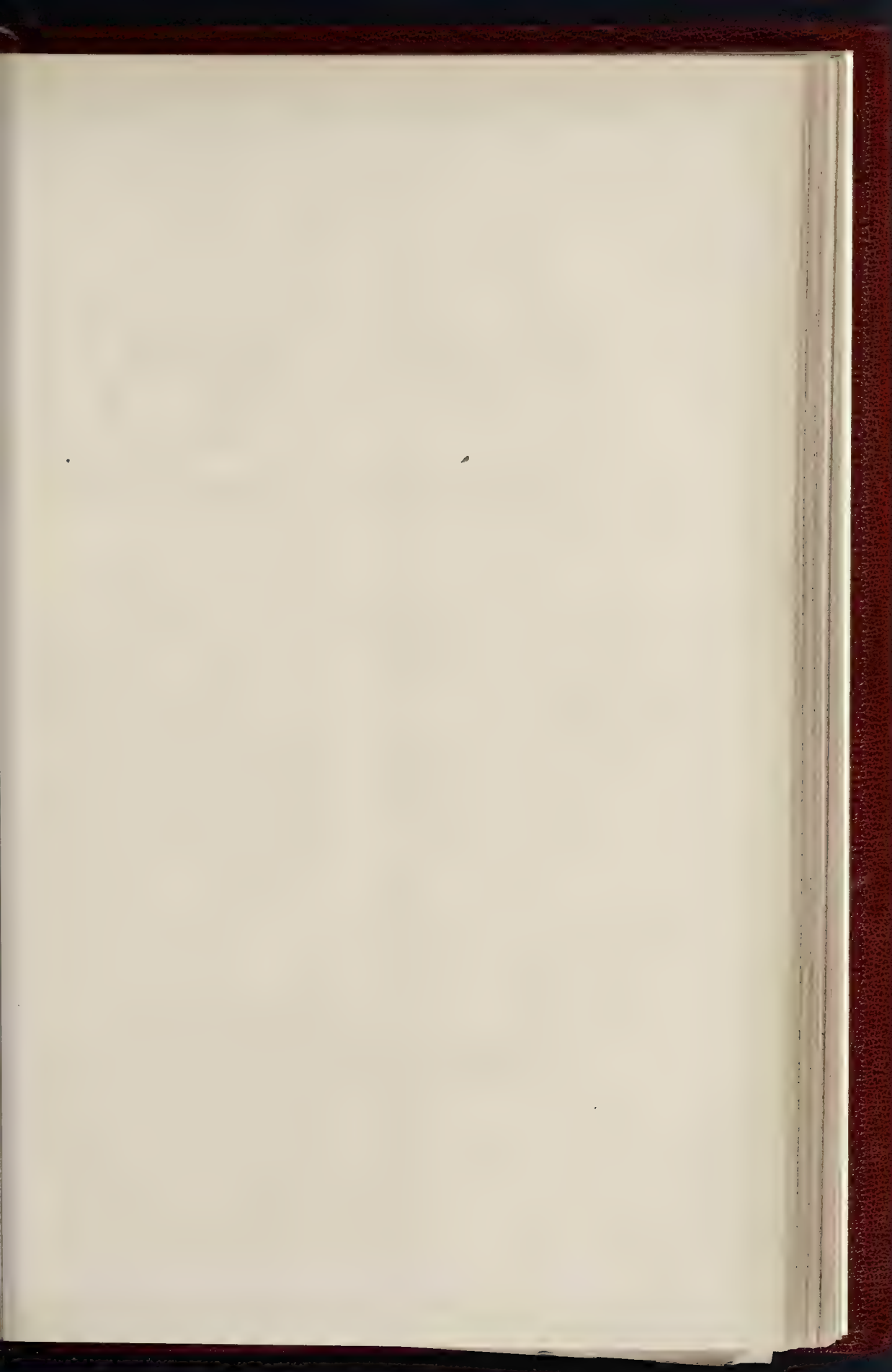
#### ATRIUM PORTAL, ST. EMMERAN'S ABBEY, RATISBON.

This very unique screen-wall and portal to the Abbey Church of St. Emmeran, Ratisbon, possesses much that is interesting and original in its details. It faces an open "platz," and the entrances give access across the enclosure behind to the twelfth-century Paradise-porch of the Abbey.

The screen is composed of two stories, the lower one having two large entrance archways with arcaded recesses between and on either side. The upper story is divided into three bays of five arches each, the centre ones being slightly larger, and carried on detached columns with boldly-carved capitals; the wall at the back of these recesses is plastered, and covered with debased eighteenth-century frescoes, probably concealing others contemporary with the design.

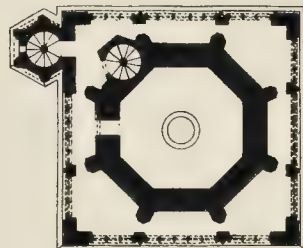
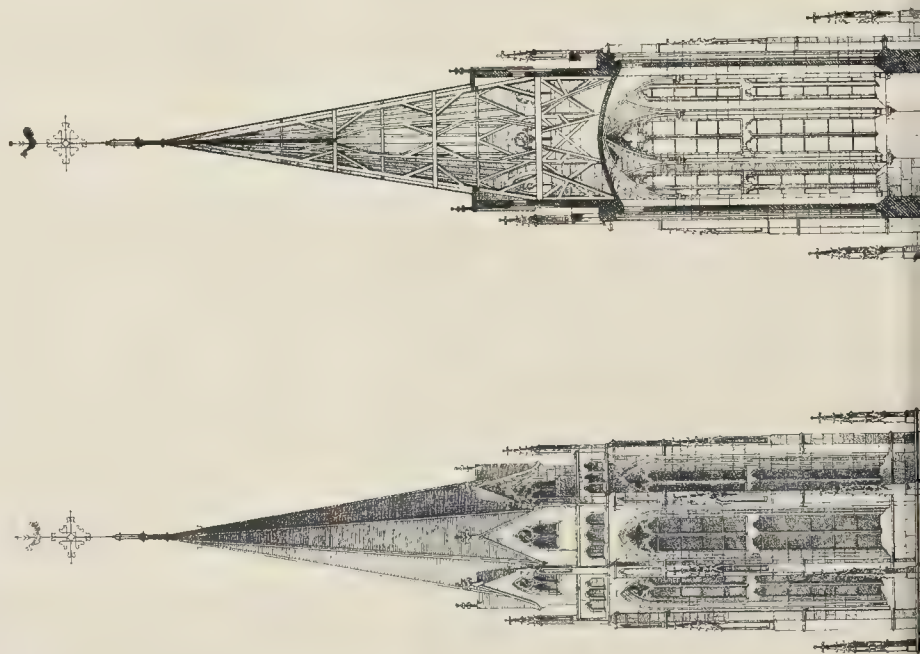
The bas-relief in the centre recess of the lower story is a good example of German sixteenth-century sculpture, and was, doubtless, obtained from a series of stations of the Cross; the arched doorway has specially-devised corbels for its accommodation. From the variation of the mouldings and the peculiar jointing it would appear that this central recess with its panel was an afterthought, and formed no part of the original design, though probably the work of the same designer. The arch-mould to the recesses on either side of the entrances returns in an ingenious manner above the abacus of the column, and it should also be observed that apparently these arches are cut out of one single stone, as no joints can be discerned, though the other arches are jointed in the usual manner.

**Stanningley.**—A window has lately been placed at the eastern end of St. Paul's Church, Stanningley, near Leeds. The subject is the "Ascension," and the window is by Messrs. Mayer & Co., of Munich and London.

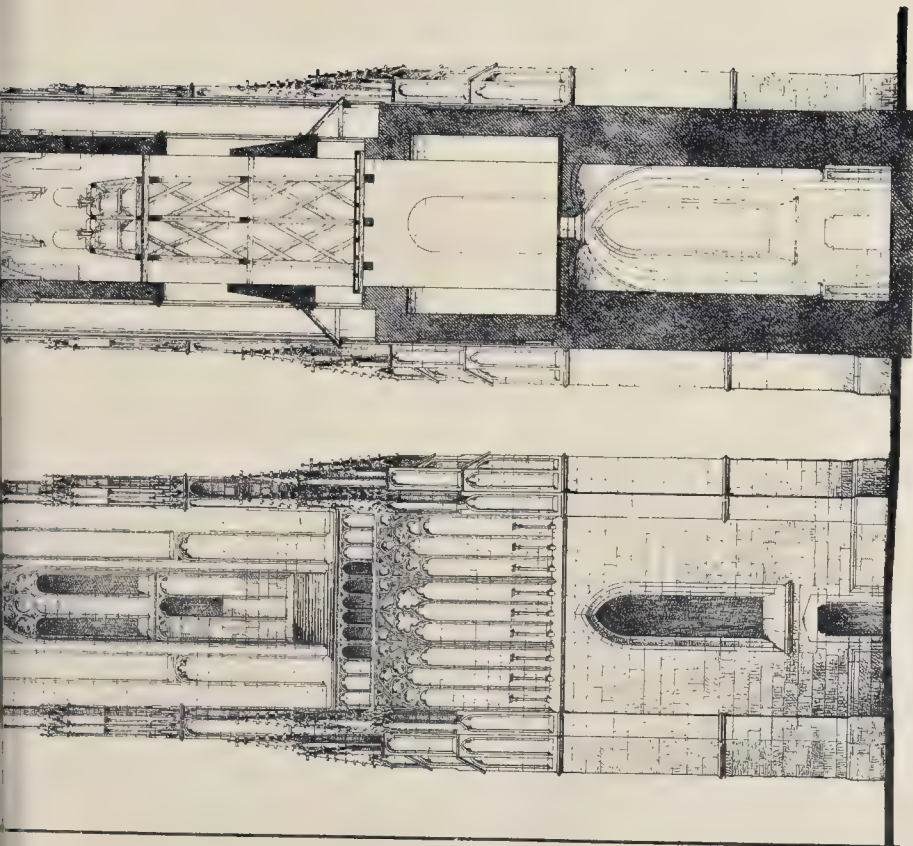




THE BUILDER, DECEMBER 3, 1887.



PLAN AT UPPER STAGE



ELEVATION

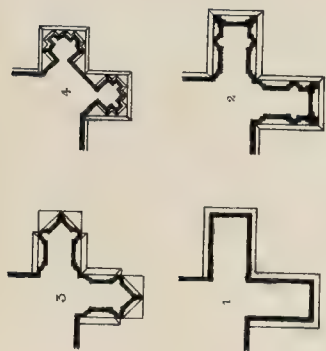
SCALE OF FEET

SECTION

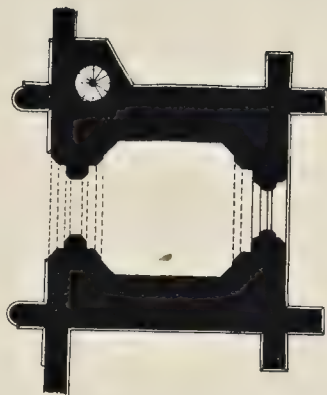
THE TOWER • CHURCH SAINT JEAN • MAESTRICT

For Kell Photo Lith & Engraving

JOHN B. CASE, 1884



ENLARGED PLANS • ANGLE BUTTRESSES

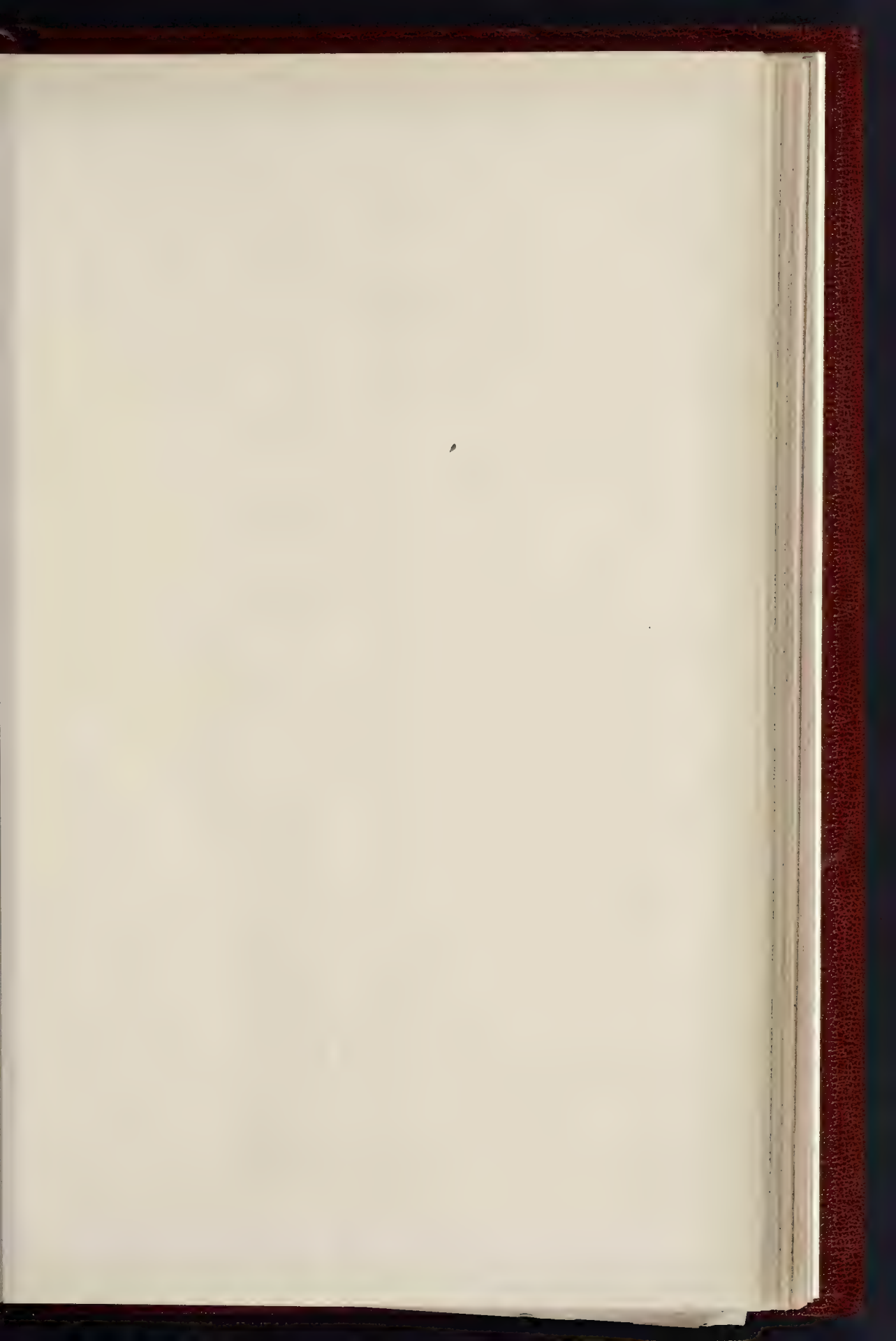


PLAN AT LOWER STAGE

8, Furnival St. Holborn Lond. W. 1. 3





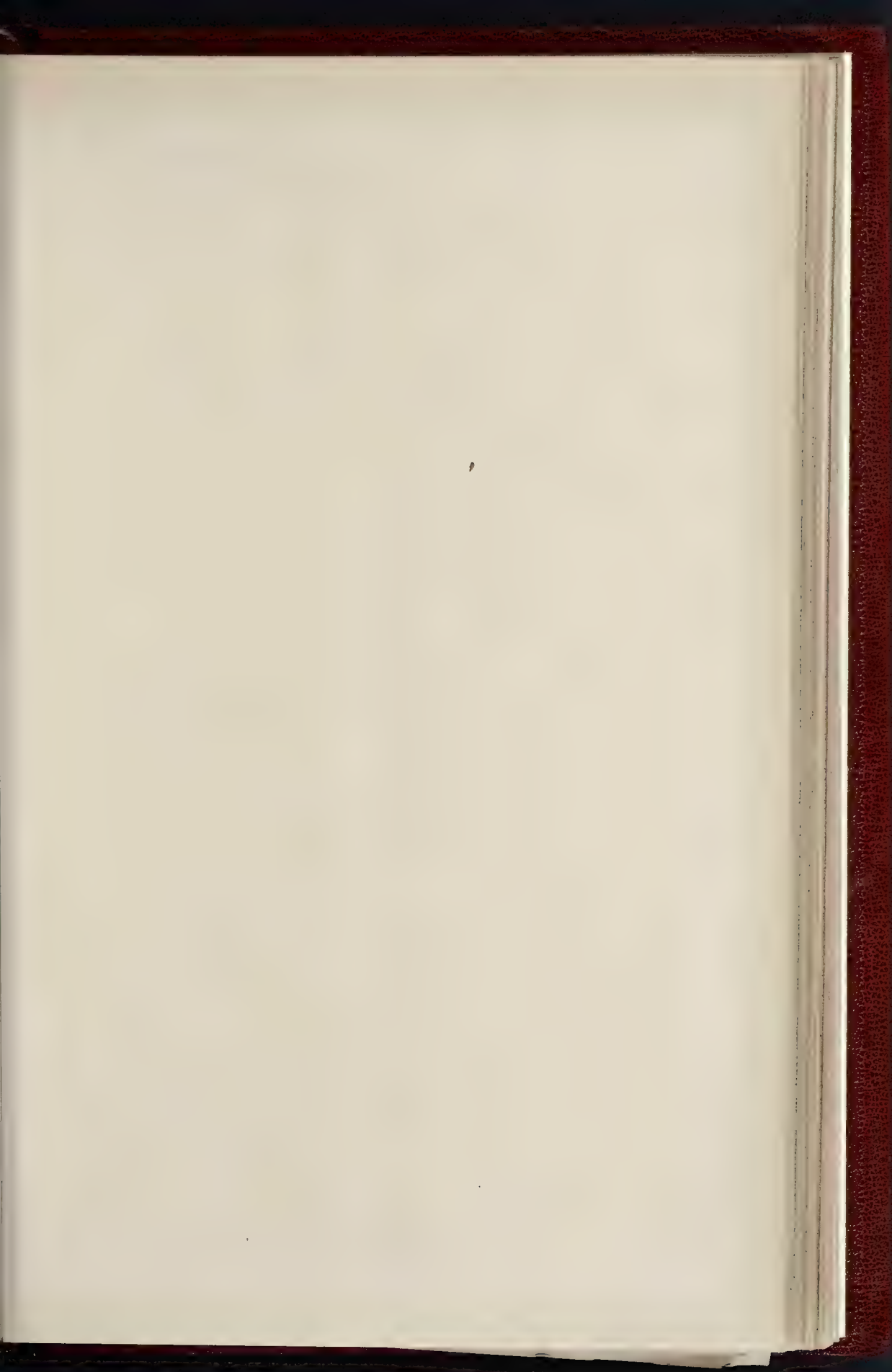




THE BUILDER, DECEMBER 3, 1887



THE CARLSBRÜCKE, PRAGUE.—FROM A SKETCH BY MR. Wm. A. PITE.



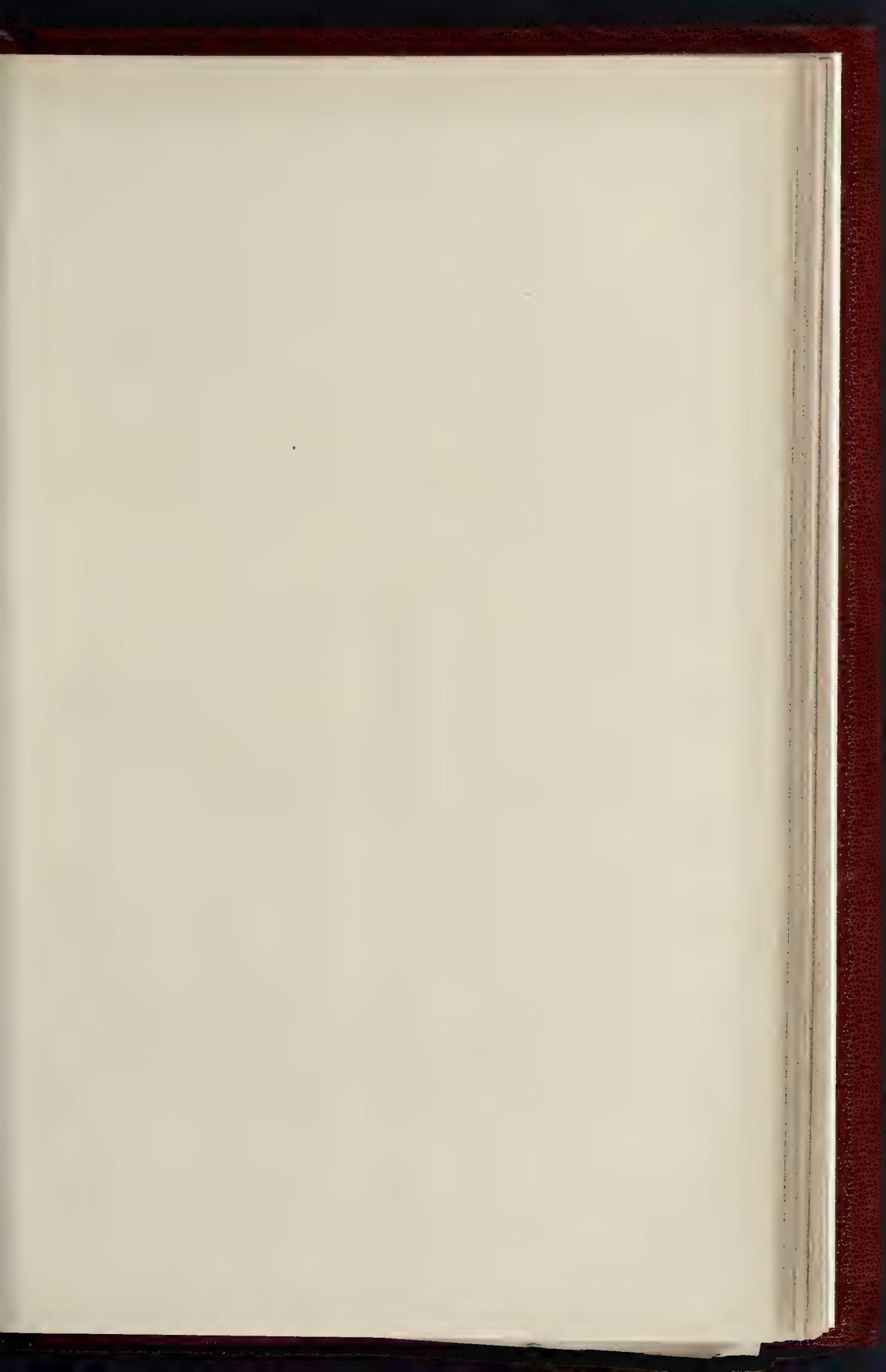


THE BUILDER, DECEMBER 3, 1887.

THE LITTLE HOUSE  
: WARGRAVE - BERKS : FOR  
SIR MORELL MACKENZIE, MD.  
: ARTHUR ARDMAN, ARCHT.

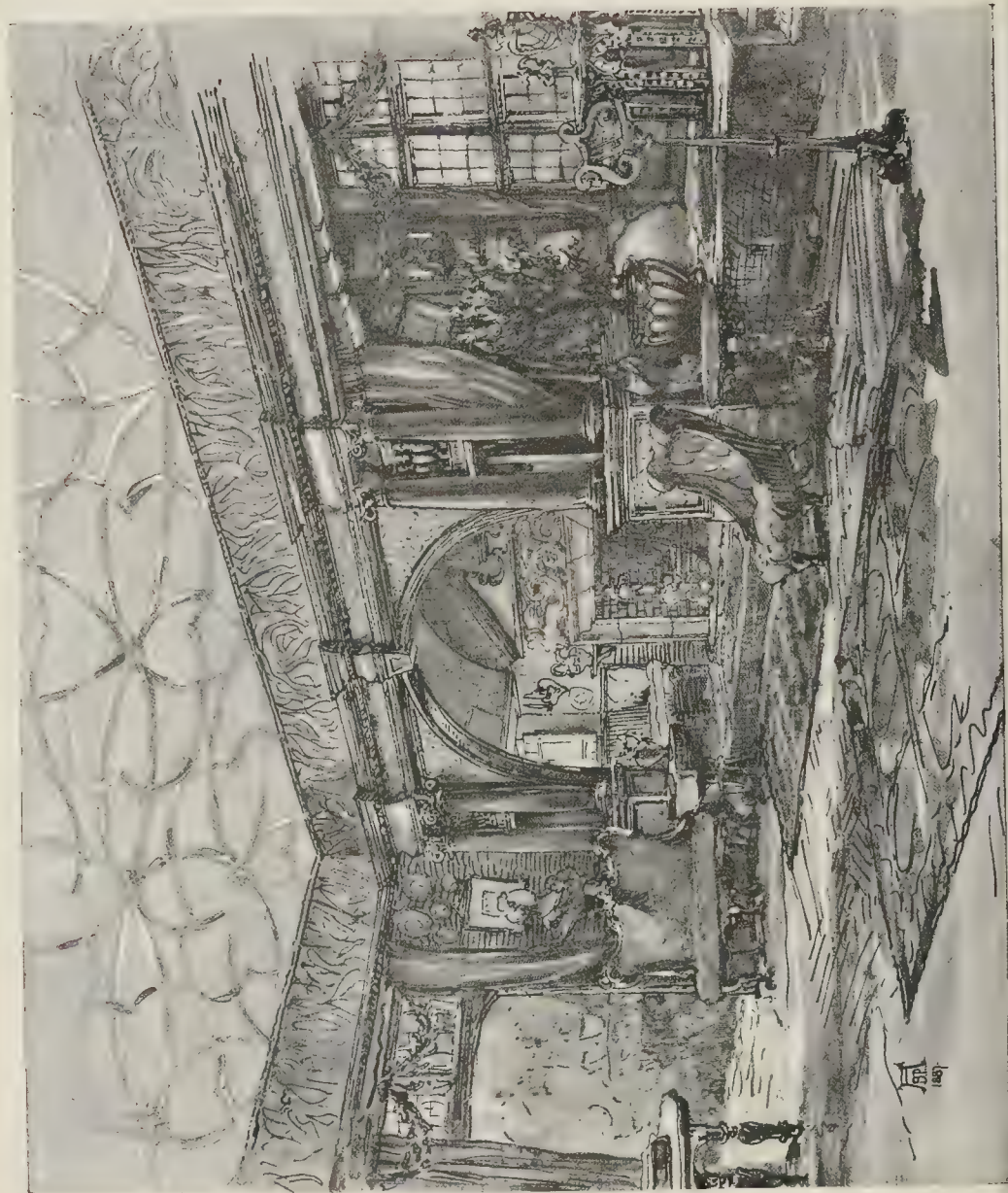


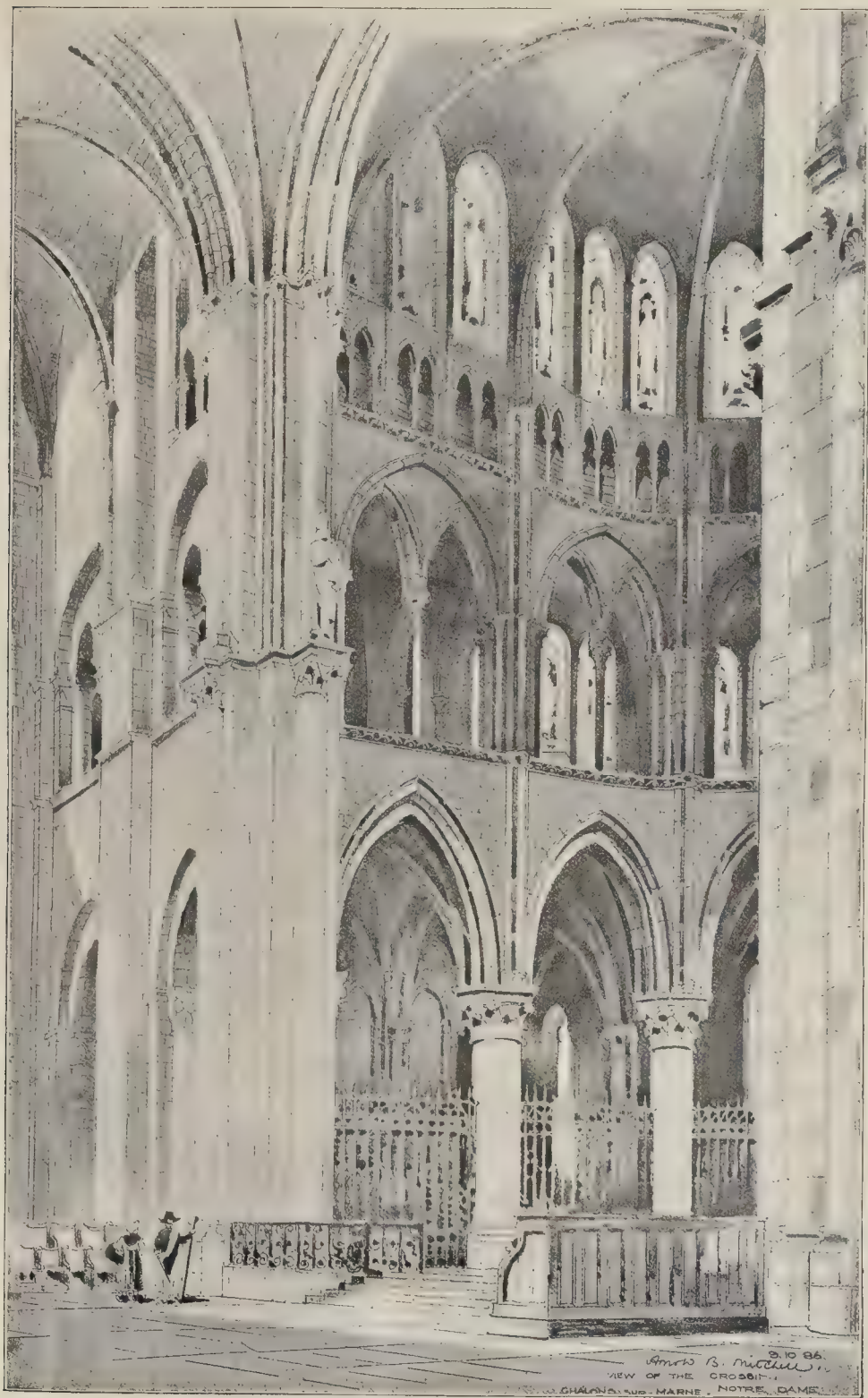
WARGRAVE - BERKS - ARCHT. - L.





THE BUILDER, DECEMBER 3, 1887.





NOTRE DAME, CHALONS-SUR-MARNE. FROM A DRAWING BY MR. ARNOLD B. MITCHELL, A.R.I.B.A.





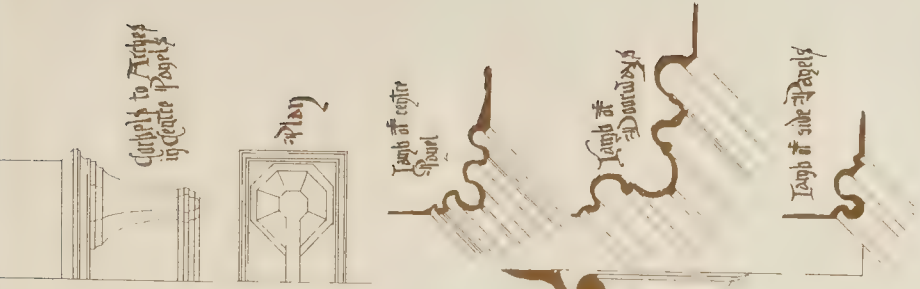
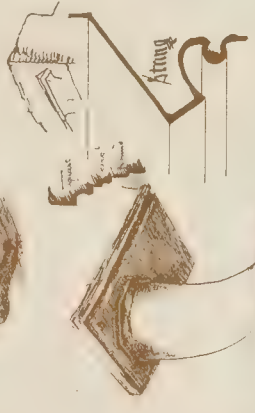
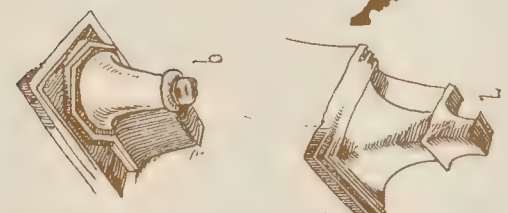
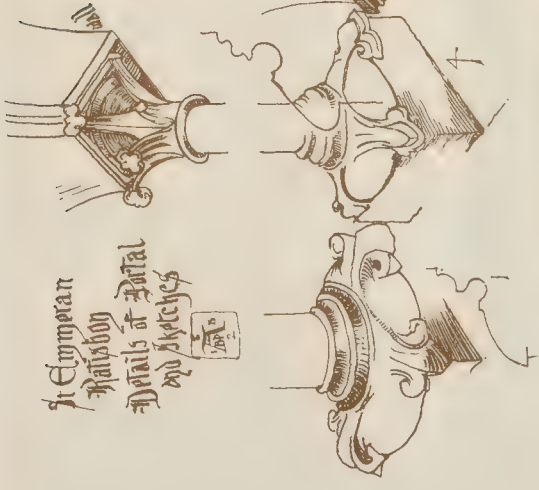
A DOCTOR'S HOUSE and STABLES  
AT SWINTON *J. Langham Architect*



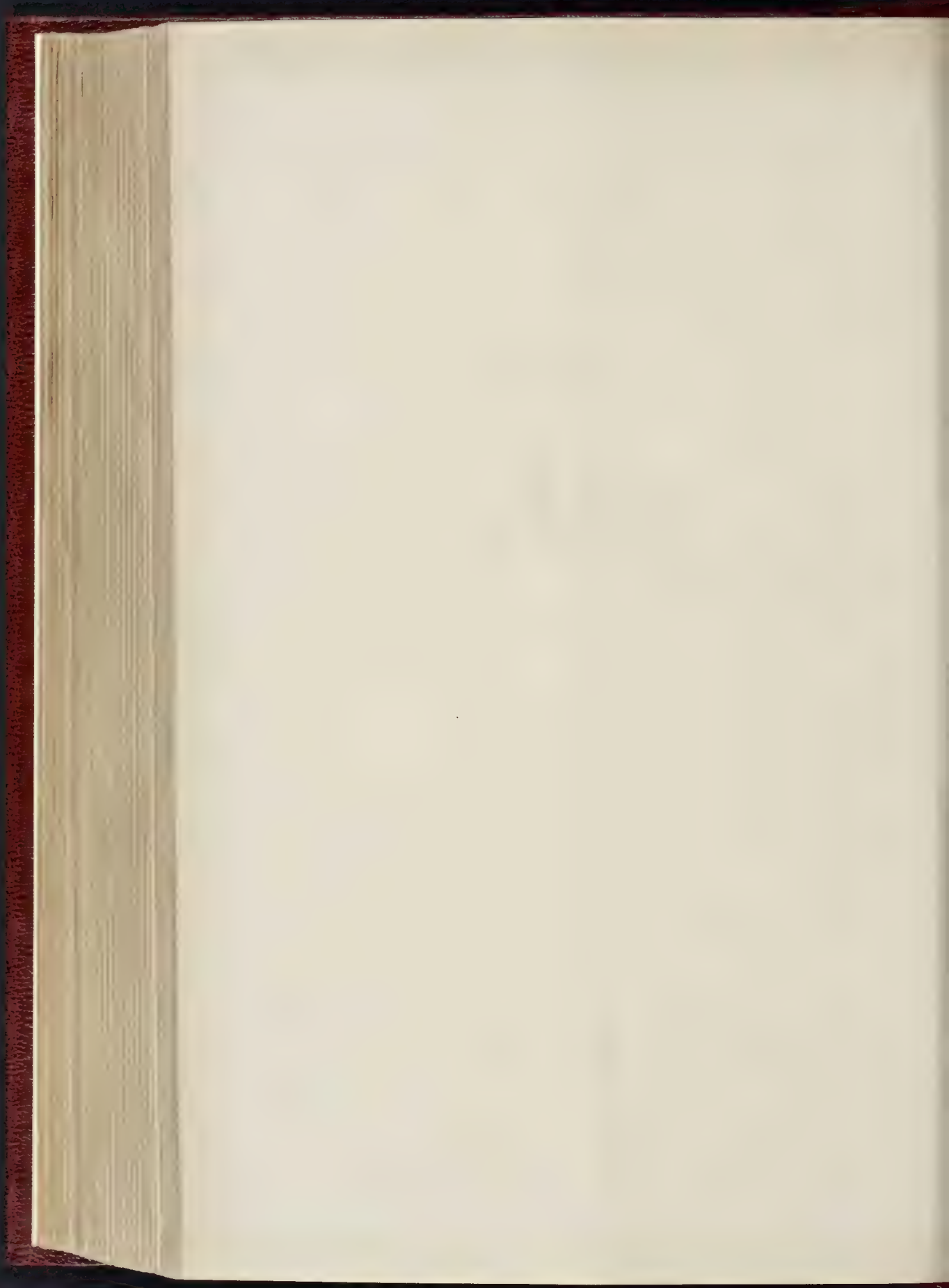




In Egyptian  
Halls  
Details of Portal  
and Skerches







## WATER SUPPLY.

*Crail (N.B.).*—The new water supply for Crail was turned on on the 22nd ult. for the first time by Provost Peattie. The scheme consists in abstracting a portion of the Lochton Burn above the farm steading of Toldrie, above where there is no chance of pollution by sewage, and conveying the water by means of a fire-clay pipe, 10 inches in diameter and 1,920 yards in length, to filters and a service reservoir constructed on the town's land near Ribbonsfield. A strong spring entering the burn about 680 yards from the filters has been intercepted and taken into the reservoir. The two filters are 15 ft. by 14 ft. each in area, and are capable of passing a supply of 21,000 gallons per day. The service reservoir is 30 ft. by 14 ft., and 10 ft. deep, and holds 25,425 gallons. To keep the sun from acting on the filtered water a galvanised wrought-iron roof has been constructed over it. The medium of filtration is sand, which is laid on in layers commencing at the top with 18 in. of fine sand, 3 in. of gravel the size of peas, 3 in. of gravel the size of hazel nuts, and ends with 15 in. of broken metal, in which the drain-pipes leading away the filtered water to the service reservoir are laid. The main pipes to the town are 4 in. diameter, and 2,100 yards long, while there are 1,800 yards of distributing pipes. The engineers were Messrs. Leslie & Reid, Edinburgh, and the contractor Mr. R. B. Stewart, Glasgow. The total cost of the scheme has been 1,800l., and the domestic rate has been fixed at 1s. 2d. per 11.—*Glasgow Herald.*

*Leeds.*—A special meeting of the Leeds Town Council was held on the 18th ult. to consider the water question. Mr. Alderman Woodhouse, Chairman of the Waterworks Committee, moved the following:—

That, in accordance with the recommendation of the Waterworks Committee, the Council resolve as follows:—  
1. That notwithstanding that the Corporation of Leeds have always regarded the valleys of the Nidd, Laver, and Burn, as the watersheds to which they would have recourse for any future extension of their works, in consideration of the Corporation of Bradford withdrawing their proposed application to Parliament for the Burn water, and in further consideration of that Corporation undertaking not to either directly or indirectly oppose the Corporation of Leeds when they shall, in the future, seek Parliamentary powers to appropriate the waters of the Burn and the Laver, the Corporation of Leeds shall undertake neither directly nor indirectly to oppose the Corporation of Bradford in any application which that Corporation may hereafter make to Parliament for the watershed of the river Nidd.

2. That the Council further undertake (for the considerations aforesaid), if requested by Bradford, to supply water at cost price to so much of the out-townships within the limits of the Bradford area of supply as are contiguous to Leeds, such temporary supply in no way to prejudice the rights of Bradford over such out-townships, and such supply to cease when requested by Bradford; if being further agreed that, in the event of excessive drought, or other unforeseen or unavoidable cause, the Corporation of Leeds shall in the first instance supply their own water, before being liable to supply any water consumers within the Bradford area. The Corporation of Leeds shall further not be responsible for any accidental stoppage of the supply, nor for any defect in the quality of the water, and the water to be made between the Leeds and Bradford Corporations shall be subject to and not extend beyond the duties and liabilities of the Corporation of Leeds as contained in their existing Waterworks Acts, and the rights of all persons entitled to a supply of water under the same.

This was unanimously agreed to.

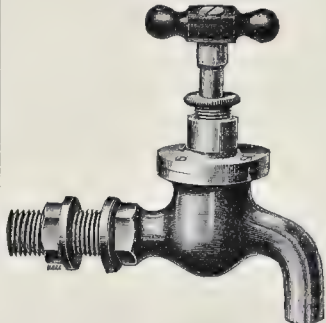
*Liverpool.*—Rear-Admiral Sir George Nares, on behalf of the Board of Trade, has been holding an inquiry of which the object was to determine the depth at which the pipe-line of the Wyrnwy water supply should be laid under the river Mersey, and the manner in which it should be laid. The case on behalf of the Liverpool Corporation was to the effect that the pipes should be laid beneath the bed of the river at Fidler's Ferry, and sunk 5 ft. or 6 ft. below the bed of the river, and it was contended that no risk either from dredging or from the possible sinking of vessels or the dragging of anchors would be involved. The scheme suggested on behalf of the Manchester Ship Canal was that of a tunnel at a considerable distance below the bed of the river, through which the pipes should be laid, and this was strongly objected to by the Liverpool Corporation, on the ground, as it was put by Sir F. Bramwell in his evidence, that it would be "putting a cruel and idle expenditure on the Liverpool Corporation for the sake of a chimney." Mr. Leader-Williams, the engineer of the Manchester Ship Canal, gave evidence on behalf of that undertaking.

*Yendon.*—The shareholders of the Yendon Waterworks Company, at a meeting held on the 24th ult., took into consideration a new scheme for the supply of the company's district with

water. This new proposal is to bring the water from Rombold's Moor, a distance of six or seven miles from Yendon. The water will be collected in a reservoir, which will be constructed on the moor. This reservoir will have a capacity for 33,000,000 gallons of water, and will give a daily supply of 111,000 gallons to the consumers. The meeting unanimously decided to adopt this scheme, which, it was stated, would not cost more than 15,000l.

## LAMBERT'S GUN METAL GLOBULAR BIB VALVES.

Messrs. Thomas Lambert & Sons, of Short-street, Lambeth, have sent us one of their new registered gun-metal globular high-pressure bib-valves for hot or cold water. These valves have been constructed especially for durability under hard usage; they are of superior finish, and are said to be capable of withstanding heat longer than any other valve at present in use.



Lambert's Globular Bib-Valve.

The spindle, which revolves only in its position, being held fast by a collar in the valve cover, has a strong square thread on which the disc works. The seating attached to this is removable for repairs, and it is guided by two wings cast upon it, sliding freely between those cast in the casing. The screws in the flanges are sunk flush with the surface to admit of valve being kept polished, and it is fitted either with a horn knob, or with a horn crutch handle, as shown in the engraving, such handles being non-conductors of heat.

**The Proposed Lock and Weir at Richmond.**—An important step has been taken by the Richmond and Twickenham authorities promoting the movement for the erection of a lock and weir at Isleworth Ferry with the view of ameliorating the condition of the Thames in these parishes. An influential conference of all parties interested has been held at the offices of the Board of Trade. In addition to deputations from the Richmond and Twickenham authorities, there were present Sir Frederick Nicholson, Chairman of the Thames Conservancy; Sir Digby Murray, a Conservator; Mr. Labouchere, M.P.; Sir J. Whitaker Ellis, Bart., M.P.; Mr. Digwood, M.P.; and Mr. J. B. Hilditch, Engineer to the Thames Conservancy. Mr. Calcraft presided, and intimated that the Board of Trade had no statutory power over the Conservancy, but he would make the suggestion that the Board of Trade name some eminent engineer who should report to them on the whole question of the condition and improvements of the river on the upper district. All parties in the room agreed that the suggestion was one that should be accepted as a solution. It is understood that there is reason to believe that the Board of Trade will agree to this suggestion. Already the Richmond and Twickenham authorities are taking steps to appoint an engineer to represent their interests at the inquiry in connexion with the preparation of the report, and it is understood that the Thames Conservancy will also appoint an engineer to represent their interests in the matter. The cost of these proceedings is to be borne equally by the Thames Conservancy Board and the Richmond and Twickenham authorities. Sir Whitaker Ellis, Bart., M.P., has given 50l. towards these expenses. It is expected, therefore, that the whole question will be settled by means of a friendly arrangement, and that a Royal Commission will be unnecessary.

## SHORLAND'S IMPROVED MANCHESTER GRATE.

This grate is very simple in construction, and, as will be seen by the accompanying section, consists of a warm-air chamber placed at the back of the fire, between which and the fire is a fire tile, with openings for the passage of flame and smoke. The flame and smoke pass through these openings, and down between the fire tile warm-air chamber, then up back of the warm-air chamber into the smoke-flue, in their passage warming the air-chamber. The door over the fire is perforated to allow of the escape of smoke. The ashpan or regulating air-box is provided with a sliding grid, which regulates the draught of the fire. This ashpan is loose, and can be removed, and the ashes cleared out. Cold air is brought from the outside to the warm-air chamber, and is there heated by the waste heat of the fire, and is then conveyed by pipes, and delivered into the same room, or to any contiguous apartment.

The advantages of the grate, as summed up by its maker, Mr. E. H. Shorland, of Manchester, are—1, It will burn coke, anthracite, or common coal equally well; 2, Consumes its own smoke; 3, Cures smoky chimneys, by the ample supply of warm air into the room, by the draughts created in the neck of the chimney, and by the special construction of the fire-box; 4, Great economy of fuel by making use of the spare heat, which otherwise would all pass up the chimney, and ensuring by its construction more complete combustion and increased radiating power; 5, Ventilates the room in which the fire is situated; 6, Maintains a uniform temperature in all parts of the room, and prevents draughts; 7, Warms additional room or rooms by pure warm air.

## COMPENSATION CASE.

## BURNES V. GREAT EASTERN RAILWAY CO.

MR. UNDER-SHERIFF GIFF and a special jury sat at the Royal Hotel, Southend, last week, to hear the compensation case of *Burness v. Great Eastern Railway Company*. The company had acquired, under compulsory powers, land belonging to the trustees of Mr. James Burness for the purposes of the extension of their line from Shenfield Junction to Southend. The claim was for the land taken and damage by severance to the remainder. The principal question in the case was as to whether compensation should be allowed for sand and gravel removed by the Company from their cutting through the land taken. The claimants contended that they were entitled to remuneration for the sand and gravel to the full amount of what was removed, at the ordinary market value. The Company, on the other hand, submitted that no additional compensation should be awarded, as the claimants could not, the Company held, have sold the sand and gravel supposing that they had dug it. Argument took place also upon the question whether the land possessed prospective value beyond its mere agricultural value, on account of its being near to Southend.

The jury, after consultation, returned a verdict of 3,060l.

## DILAPIDATIONS.

## BATTAM V. KNIGHT.

This case was heard before the Official Referee on the 25th ult. The plaintiff claimed 108l. The defendant paid into Court 15l.

The counsel engaged were Messrs. Messrs. J. V. Austin and R. M. Bray.

The surveyors for the plaintiff were Messrs. King-well Cole, Battam, and Delissa Joseph; for the defendant, Messrs. H. J. Thurgood, E. H. P. Eason, and Banister Fletcher.

Verdict for the defendant, with costs.



### ALLEGED NEGLIGENCE BY CONTRACTORS.

COX V. WADDELL AND SON.

THE plaintiff in this action (tried in the Queen's Bench Division of the High Court of Justice last week, before Mr. Justice Manisty) was a land agent, and about seven o'clock in the evening of the 27th of January last he took a cab at Putney Bridge Station to go to his residence at Fulham. The night was foggy, and in the High-street, Fulham, the cab ran upon a heap of earth, and was overturned. This heap had been placed there by the servants of the defendants, who were employed to remove some pipes which were in the road. The case for the plaintiff was that the heap was unlighted, and that he himself was much hurt.

The jury gave a verdict for the plaintiff, damages 150*l*.

### ST. AUGUSTINE AT ST. ALBAN'S ABBEY.

SIR.—Those of your readers who are passing interest in this saint, of whom the Venerable Bede speaks as "the beloved of God," and whom Capgrave describes minutely as "very tall by stature, of a dark complexion, his face beautiful, but withal, majestic," were probably a little surprised to hear that Mr. H. Littlehales had to say about him in your issue for the 11th Nov. [p. 687].

Referring to that communication and the use made of Mr. Surtees as an authority, Mr. Henry Hicks Gibbs,—at whose sole cost the work I have for the last four years been engaged upon in renovating the high altar screen at St. Alban's Abbey, is being executed,—says, in a letter received a few days ago—

"One does not know what other arguments Mr. Surtees may have adduced, but those which Mr. Littlehales gives are far from being conclusive, or, indeed, from even raising a presumption. They amount simply to this, that Wheatly, writing in the last century, said what was quite true, that Pope Gregory sent Austin the monk to England (obviously Austin was not then canonised) and that in his calendar of saints he gives the birth and parentage of the greater St. Augustine. Mr. Surtees does not (in this extract) tell us what Wheatly says of him of Canterbury under the date of May 26th. The argument from the Prayer Book would prove also, and quite as well, that St. Margaret and St. Edward the Confessor were not canonised and that St. Anne was."

St. Augustine still stands in my studio. Perhaps, ere he takes his departure for the niche prepared in the days of Abbot William of Wallingford,—i.e., just about the selfsame time that the art of printing was just brought into England by Caxton,—Mr. Littlehales will have had opportunities for looking up his subject a little closer, and be able to explain, clearer why he considers the "Apostle of England" has no right to a nimbus?

HARRY HENS.

Exeter, Nov. 25th.

### SALT-WATER FOR ROAD-WATERING.

SIR,—In the "Notes" in your issue of last week [p. 728] you allude to the use of sea-water, and state that for the "... watering of streets it is invaluable." May I mention that there is one (at least) detrimental point with reference to this, as observed from the experience of some ten years of street watering with sea-water in this island, viz., that immediately foggy or other damp weather sets in the roads are in a terrible plight through the heaving of the salt, which, after a whole summer's watering, has completely soaked the roads to a good depth, thus (in the case of macadamised roads) creating a vast amount of mud, which would not be so much the case after the use of fresh-water only. Further, after a considerable amount of "soaking rain," the salt, heaving, seems to disintegrate the roads, rendering them loose (under heavy traffic, at least, such as we have with our stone), and they are soon spilt. And further, should a heavy frost follow and then a thaw (rapid), the roads are fearfully cut up by the "faking" that takes place.

After a thaw too, preceded by a fall of snow, a similar experience occurs, and the gathering of mud on one's shoes, which at every tread lifts a cake of this thawed road, is unpleasant to the last degree.

Intending users of sea-water for this purpose should, therefore, well consider its results "all round," and my experience in this neighbourhood may be interesting to your readers who take an interest in this question.

Ile of Portland.

F. J. BARNES.

### STATUS OF SANITARY INSPECTORS.

SIR,—The excellent and timely address of the Chief Sanitary Inspector of Shoreditch, as reported in your paper of Nov. 26th [p. 753], contains words spoken in season, and words that should be carefully read over, not only by local authorities, but by all persons who hold and seek the position of sanitary inspector. I have for some time thought that the certificate of the Sanitary Institute, as at present

granted, was not a sufficient safeguard for local bodies to work upon, and, as Mr. Alexander puts it, there is no provision made for testing the candidate's knowledge of what a building should be. As far as local authorities are concerned this shortcoming can be remedied if in their advertisements for chief inspectors they required them to hold not only the certificate of the Sanitary Institute, but also, at least, the "advanced certificate" for Building Construction from the Science and Art Department; preference should also be given those candidates who had served say three or four years as assistants. Until some such restrictions are made the status of the sanitary inspector will never rise higher than the present level.

With regard to the holding of the certificate of the Sanitary Institute, it stands to reason that one who has sat and passed the examination must know more of his work than one who has sat and failed. Take, for example, the late examination: there were 8 surveyors, 5 failed, 3 passed; 54 as inspectors, 31 passed, 23 failed; surely the 3 and 31 were more up to their work or qualified for it than the 5 and 23.

Why does not the Sanitary Institute set to work and get the Charter granted them as laid down in Section I. of their Constitution? I believe more members and assistants would be induced to come forward than heretofore.

I may add that great complaints were made by the provincial candidates at the recent examinations, that five of the examiners had been giving preparatory lectures on the subjects which the candidates were to be examined in, thus heavily, but not intentionally, handicapping the candidates who did not reside in or near London. I think if this were discontinued in the future, better grace will be shown, and a more satisfied feeling will prevail in the minds of provincial candidates.

Plymouth.

W. J. ADDISCOTT.

### SIZE OF FRESH-AIR INLETS FOR DRAINS.

SIR,—On p. 718, in the *Builder* for November 19, Mr. R. E. Middleton would make it appear that the indication of 400 ft. per minute through the fresh-air inlet being reduced to 24-in. diameter was wrong, because the 6-in. diameter inlet only showed 80 ft. per minute, and he says the small inlet shows 16.5 ft. per minute, while the large one only shows it 15.7. Now, when the motive power is the wind, Mr. Middleton need not expect it to be as mathematically exact during one minute as another, although it sometimes comes remarkably near it. However, in this case, my 24-in. hole was possibly barely that, while the thickness of the rim of the anemometer would reduce the area in the smaller opening in greater proportion than in the larger one. The 24-in. hole was out in a piece of sheet-lead so that friction in the small hole was about nil. The experiment proved that in making the openings in the fresh-air inlet grating larger than the outlet-pipe would be no advantage; while reducing its size, as stated, simply caused the air to blow in more quickly at the inlet-plate.

Glasgow.

W. P. BUCHAN.

### SCOTCH NEWS.

Edinburgh.—The *Scottsman* reports that a meeting of the Joint Committee of the Corporations of Edinburgh and Leith was held on the 23rd ult., to consider the report recently issued by the Burgh Engineers of both towns as to the pollution of the water of Leith in the harbour. The Committee agreed to recommend to the Corporations to proceed with a Bill in the next session of Parliament for powers to execute a scheme on the lines of the report of the engineers; also craving a remit to prepare plans and estimates for giving effect to the same, to be submitted to the Corporations for their approval. The scheme recommended by the engineers proposes to establish a new intercepting sewer, beginning at the Black Rock, in the Frith of Forth, passing along the east end of the Edinburgh Dock, through the Leith Links, along Duke-street, Leith, intercepting the Greenside sewer in Leith Walk, thence, through Springfield, on to Broughton Burn sewer, and stopping at Coltbridge, at an estimated cost of 47,000*l*. The Lord Provost's Committee of the Edinburgh Town Council have since approved of this scheme.

Kilmarnock.—The new Conservative Club here is nearly completed. The buildings are situated in Sturrock-street. The total cost will be about 1,200*l*. On the ground-floor are a reading-room, a billiard-room, and a recreation-room. On the second floor is a large hall, capable of accommodating from 400 to 500 persons, with adjoining retiring-rooms, &c. The buildings are erected of Giffnock stone in the Italian style of architecture. The architect is Mr. R. S. Ingram. The following are the contractors:—Mason work, Mr.

James Wallace; joiner work, Mr. William Hamilton; slater work, Mr. John Ford; plumber work, Mr. William Murchland; iron railing, &c., work, Mr. Robert Paton; painter work, Messrs. R. C. Robertson & Son.

### PROVINCIAL NEWS.

Bolton.—The Blair Convalescent Hospital, which has been erected as a result of the munificence of the late Mr. Stephen Blair, formerly M.P. for Bolton, at Bromley Cross, near Bolton, is now practically completed, and will shortly be opened for the free admission of convalescents "without limit of domicile."

The late Mr. Stephen Blair died in 1870, and by his will he bequeathed 30,000*l*, 20,000*l* of which was to be devoted to the erection of the building, and 10,000*l* for endowment purposes, on condition that within three years of his death a suitable site was given. The late Mr. James Knowles, J.P., of Eagley, near Bolton, generously gave the site of five acres, on which the building is erected. The commission for the new building, &c., was placed in the hands of Mr. Medland Taylor, architect, of Manchester. According to the *Manchester Courier* the hospital is divided into three portions. The central block contains the matron's rooms, the administrative offices, the dining-room, the library, &c., whilst the male quarters are to the east, and those for the females and children on the west. In each case there are fine day-rooms, the children being in a separate room, and the men have also a smoke-room. The sleeping arrangements are most carefully planned, individual privacy being attended to. The frontage, which extends 240 ft., is Gothic in style, courses of red brick with terra cotta ornamentation being alternated with the coursed stone of which the hospital is built.

Dewsbury.—On the 24th ult. a meeting of the Queen's Jubilee Executive Committee of Dewsbury took place at the Borough Offices, under the presidency of Alderman T. B. Fox, ex-mayor, who was re-elected chairman. The Secretary (the Town Clerk) reported that arrangements had been made with the Vicar of Dewsbury for the purchase of a portion of the vicarage grounds, near the District Infirmary, as a site for the technical school, at the price of 1,000*l*; and, after some discussion on the report of a sub-committee, the requirements as to floor-space were agreed to. It was decided that the sub-committee should prepare instructions for architects, and that those carrying on their profession within the municipal borough should be invited to send in plans in a competition.

Newcastle-on-Tyne.—The Throat and Ear Hospital, at present temporarily located at the corner of Blakett-street and Clayton-street-east, is to have a permanent building commenced very shortly. Plans for it have been prepared by Mr. James C. Parsons, architect. The estimated outlay is 2,000*l*, exclusive of site and furniture.

Newton Abbot (Devon).—The memorial stones of the new Mid-Devon Constitutional Club were laid on the 17th ult. The site is on the property of the Earl of Devon in Union-street, a new thoroughfare opening out of the main street, Cutenay-street. Messrs. J. W. Rowell & Son, of Newton Abbot, are the architects, and Mr. F. A. Stacey, of Newton Abbot, is the contractor. The external facings of the wall are of buff pressed bricks from the Great Western Potteries, relieved with red brick and stone dressings.

### CHURCH-BUILDING NEWS.

Burston.—A reredos has just been erected in the ancient parish church of Burston, near Horley, Surrey, from the designs of Mr. B. Edmund Ferrey, F.S.A. The lower part of the composition, up to a height of about 3 ft. 6 in., is quite plain, and principally of Forest of Dean stone; the material used above is Corse Hill stone. The central portion of the reredos is higher than the "wings," and is surmounted by a rich cresting. The only subject is the Agnus Dei, in high relief, contained in a cinquefoil-headed arched recess, and this is flanked by rich oblong and square cusped and carved panels. The "wings" are each divided into three shouldered and cusped arched panels. The work was executed by Messrs. White & Sons, of Vauxhall Bridge-road.

Falmouth.—The Prince of Wales recently



laid the foundation-stone of the new parish church of All Saints, Falmouth. It is being erected on a site given by the Earl of Kimberley, situate at the top of Killigrew-road. The ground-floor is in the shape of a parallelogram, having nave and chancel of the same width throughout, and arcades of six bays on either side. The chancel opens on the north and south sides into shallow transepts. The width of the church is 50 ft., and the total length is 120 ft. It is to be built of Plymouth limestone, with dressings of Douling stone, and will accommodate 700 persons. The estimated cost is 6,000l. Mr. J. D. Sedding, of London, is the architect; and the contractors are Messrs. J. & G. Kelway.

**Gunneshbury.**—The new church of St. James, Gunneshbury, has lately been consecrated, the foundation-stone having been laid on April 19th. The building is Early English in style. The site, which has been given by the Rothschild family, faces the High-road, and is opposite the end of Cambridge-road. At the present time only the nave and aisles, with baptistery and entrances, are built, the funds not permitting of the church being completed. The nave and aisles, 71 ft. long by 69 ft. wide, will seat just over 500 persons, the end bay being utilised as a temporary chancel and vestry. The church is being built in Kentish rag stone, with Bath stone dressings. The west front shows a lofty gable, with broad buttresses and two double-tipped windows. The side aisles at the west end are flanked by buttresses finished with pabets. In this front is an octagonal baptistery flanked by the side porches with the tiled roofs. The aisle windows are arranged in triplets with lancet heads and between the buttresses, the clerestory windows being in two lights. The roof is boarded; the nave, arcade, arches, and dressings being in stone. The windows are set in deep splayed jambs and arches. The roofs are covered with Broseley tiles, and finished internally with boarding, stained and varnished. The floors of the entrances are tiled, and the aisles are finished with wood-block paving. The total cost will be about 5,300l. The architects are Messrs. T. Chaffield Clarke & Son, London; the builders being Messrs. Dorey Bros., of Brentford.

**Knottsgley.**—This church has been re-opened, having been closed for some months during restoration. It was one of the few remaining churches fitted with galleries, and in which the old fashioned high-backed pews were retained. These pews filled not only the nave but encroached into the chancel, the floor of which was on a level with the nave, and one-half of the congregation sat with their backs to the communion-table, facing the other half of the worshippers. The pews have during the recent restoration all been cleared away, and are being used to form a pannelled deal round the church. The nave has been entirely re-seated with framed pitch-pine seats, stained and polished. The floors, except the aisles and passages, which are tiled,—are laid with wood blocks. The roofs have been stripped, repaired, and re-laid with grey stone slates. New windows have been built on the north side and all the windows glazed with ornamental lead glazing. The east window has been filled with painted glass. The chancel has been enlarged, and a new stone pulpit, font, and lectern provided. The architects were Messrs. Demaine & Brierley. Mr. Woolston, of Stamford, was the contractor. The pulpit, font, and lectern were supplied by Messrs. Jones & Willis, of London; and the oak work in the choir was done by Messrs. John Hall, Thorpe, & Sons, of Leeds; while the brass work was done by Messrs. Guest & Chimes, of Otterham; and an embroidered altar cloth was worked by the East Grinstead sisters. The total cost of the repairs has been 2,100l.

**Knotty Ash.**—A new pulpit has just been placed in the Church of St. John the Divine at Knotty Ash, near Liverpool. The whole of the site is composed of Devonshire marble. The body of the pulpit is of oak, and of octagonal plan. It stands against the north wall, and on the five sides facing the congregation are recessed and groined niches, each flanked by a canted buttress, above which are pinnacles, diagonal on plan, and terminating with crockets and pinnacles which cut into the line of foliated tracery above. The niches are all ogee headed and groined, the statues standing upon fair pedestals. Mr. Harry Hems, of Exeter, has carried out the work, from designs by Messrs. Bridge & Deacon, of Liverpool.

**London.**—St. Peter's Church, Saffron-hill,

Holborn, is one of several built from the designs of the late Sir Charles Barry about fifty years ago, and in it, as in most of the churches built at that time, the problem was to obtain the greatest number of seats possible. In its original state it consisted of a centre and two side aisles, the former wide and filled with free seats. There was a very shallow communion enclosure at the east end, the rails returning north and south, and the space between the rail and walls fitted with pews. In front of the rail was the accustomed three-decker, north and south galleries, and two deep west galleries, in one of which was placed the organ. The church has recently undergone considerable alteration. The two west galleries have been removed entirely, and the proportions of the arcade, which was, to a great extent, marred by the former erections, have been shown to advantage. The large west window, which was formerly blocked up, has now been opened out, and the result is a large and imposing church. The whole of the ground-floor has been re-seated with open pews of pitch pine. A lobby has been formed at the west end; and a similar screen at the east end of the north aisle to enclose a choir-vestry. The north gallery has been shortened one bay, and the organ placed on the ground-floor. A chancel has been formed at the east end, approached by two steps, enclosed by an ornamental pierced oak dwarf-screen, and a prayer-desk and choir seats on each side, also of oak. The sacristy has been raised two additional steps and paved with encaustic tiles of an ornamental character. A dorsal has been placed at the back of the table, and ornamental coloured hangings along the east wall. The whole of the windows have been filled with coloured glass in ornamental designs, two of the windows being memorials. The church has been decorated throughout and embellished by the use of stencilling in string-courses, labels over the arches, and the window and wall at the east end. The old pulpit and lectern still remain, and are much out of character with the rest of the fittings; but it is hoped these will be speedily superseded by appropriate ones by the help of some generous donors. The warming has been improved by the substitution of three Gurney's stoves for the old ones. The gas-lighting has been entirely re-arranged, and consists of an ornamental brass corona suspended from a bracket over each arch of the arcade, giving light to the galleries as well as the nave. There are also two ornamental standards in the chancel. The general contractors for the works were Messrs. L. H. & R. Roberts, of Rheidol-terrace, Islington. The oak work in the chancel is by Messrs. Bennett, of Glasgow. The glazing is by Messrs. Harrold & Co.; the tile pavement by Messrs. Carter, Johnson, & Co.; the gas-fittings by Messrs. Hodges. The whole of the works have been carried out from the designs and under the superintendence of the architect, Mr. J. Douglas Mathews, F.R.I.B.A., at a total cost, including the heating and lighting, of about 1,500l.

**Pentney (Norfolk).**—On the 17th ult. the Bishop of Norwich re-opened the interesting church here, which has been closed for some time past for restoration. The works done consist in taking up the old flooring, and relaying a solid deal wood-block floor by Mr. Roger Lowe, of Farnworth-by-Bolton; setting back the chancel to its original line, and raising it one step above the nave floor; and re-seating with pitch-pine the whole of the nave and chancel, and putting a screen across the west end of the church to form a vestry, in the same position as the old deal one. The organ, formerly at the west end, has been placed in the chancel on the north side. The pulpit, reading desk, and lectern are in oak, and, together with the entire fittings of the church, have been designed in the characteristic Perpendicular style prevalent in this part of Norfolk. The fabric of the church has not been touched in any way beyond making it water-tight. The carving to the pulpit was done by Mr. J. E. Knox, of Doris-street, Lambeth. The works have been executed by the builder, Mr. W. H. Brown, of King's Lynn, from the designs and under the superintendence of Mr. E. Guy Dawber, architect, London.

**Peterborough.**—The new church of All Saints, situated in the Park-road, the foundation-stone of which was laid last year by the Bishop of the Diocese, has been opened for service. The building is in the Decorated style, and consists of a high tower of four stages surmounted by a

low spire, the body of the church consisting of nave, chancel, and north aisle. At present only the ground stage of the tower has been completed, and about two-thirds of the nave and aisle. The chancel is complete, and the nave is carried the length of two bays. Across the west end, and thus dividing the nave in the centre, a brick wall has been put up, which can be taken down, and the remainder of the nave added when sufficient funds are in hand. Sutton stone, with Clipham and Bath stone dressings, has been used for the exterior, and the interior stonework is of Bath stone and brick, flat pointed, and distempered for decoration. The total length of so much of the church as erected is 67 ft. from the east end to the temporary west wall; the width will be 40 ft. The roof of the nave and chancel is slated, the exterior being covered with tiles and the interior panelled and ribbed with deal. The roof to the aisle is covered with lead on the exterior, and in the interior it is panelled with deal. At the east end of the church there is a large five-light window; the windows in the south aisles have three lights each, and are square headed, while on the north side they have two lights, and are pointed. The floors are of wood blocks; deal in the nave and aisle, but oak in the chancel. The church will be seated with chairs. The room formed by the lower stage of the lower will be used as the vestry. The pulpit and communion-table are of oak, and the font is of red Runcorn stone. The building is heated by one of Musgrave's stoves. The total cost, as far as it has proceeded, is a little over 2,000l. The architect is Mr. T. L. Moore, of Hampstead, and the contract has been carried out by Alderman Thompson, of Peterborough.

**Putney.**—St. John's Church, Putney.—On the 9th ult. the dedication of the additions to St. John's Church took place, the Bishop of Rochester officiating. The works, which have been carried out under the direction of Messrs. Lee, Bros., & Pain, architects, Adelphi-terrace, comprise the new chancel and north chancel aisle. The architects' designs included the enlargement of the clergy and choir vestries, but the execution of this work has been deferred for the present. The builders were Messrs. Adamson & Sons, of Putney; the wrought iron chancel screen and gas-fittings were supplied by Messrs. Hart, Son, Peard, & Co.; the marble mosaic pavement of sacristy was executed by Messrs. Dispeker & Co.; the tile paving of chancel was supplied by Messrs. Minton & Co.; and the warming apparatus by Messrs. Perkins.

**Ullerskelf.**—The Church of St. Saviour's, a "chapel of ease" to Kirby Wharfe, has just been consecrated. The building is in a Late Gothic style of architecture, and will accommodate about 180 people. It consists of nave and chancel, 21 ft. wide and 68 ft. long; vestry, 14 ft. by 12 ft.; organ-chamber, porch, &c. The walls are built of brick, with moulded strings, &c., and stone traceried windows, and the roofs are slated. A bell-turret covered with lead, and containing a bell, marks the division between the nave and chancel. The inside walls are coloured, and the ceiling plastered under the rafters, and divided into panels without moulded ribs. The floors are of wood blocks under the seats, and the aisles are tiled. The seats, pulpit, &c., are of deal, and panelled, stained, and varnished. The warming is by Musgrave stoves. Messrs. Demaine & Brierley, of York, are the architects, and the work has been carried out by the following contractors:—Brickwork and plastering, Mr. Kidd; stonework, Mr. Flows; carpenter's and joiner's work, Mr. Bellerby; slating, Messrs. Wood & Co.; plumbing and glazing, Mr. Hodgson; painting, Mr. Pearson; ironwork, Mr. Varvill.

**Wedgebury.**—A new chapel has just been erected at St. James's Church, Wednesbury, in memory of the late Colonel J. N. Bagnall, the style being of the early fourteenth century. The new chapel, or north aisle, is 33 ft. long by 21 ft. wide, and will accommodate 110 worshippers. It is fitted up with an altar, piscina, &c. The exterior of the building is faced with ashlar stonework, from Codrall quarries, and the floors are laid with blocks. The nave has been painted and decorated by Mr. Simkin, of Wednesbury, and a new heating apparatus has been provided by Messrs. James Russell & Sons, of the Crown Tube Works. The architects were Messrs. Horton & Scott, of Wednesbury, and the work has been executed by Messrs. Bernard Clarke, Sons, & Co.



## SCHOOL-BUILDING NEWS.

**Cardiff.**—A new Board School has been opened at Cardiff. The school is in the Domestic Gothic style, and is divided into three departments, rooms for 360 girls being provided on the ground-floor, for 360 boys on the first floor, and for 515 infants on the ground-floor, adjoining the girls' school. Both the girls' and boys' departments are divided into one main and four class-rooms, each department having cloak and store-rooms and lavatories attached. A marching room and a gallery running the entire length of the boys' and girls' departments have been provided. The latrines are provided with Messrs. Bowes Scott & Read's patent trough closets, which are flushed by 100-gallon cisterns. The work was carried out under the supervision of Mr. A. Llewellyn Batchelor, of Cardiff, by Messrs. Stephens & Bastow, of Bristol. The cost has been about 12,800*l*.

**Fairlie.**—On the 22nd ult. the new school which has been erected for Fairlie by the Large School Board was formally opened by Mr. C. S. Parker, M.P. The building stands on the rising ground at the back of the Free Church, and cost, including access and a bridge over the burn, about 1,900*l*. Mr. Walker, Fairlie, being the architect. It will accommodate about 180 scholars.

**Guisborough.**—The foundation-stone of a new Grammar School at Guisborough has been laid by the Marquis of Ripon. Old scapelled ashlar of the former school and almshouses has been used for the external walls up to the window heads of the ground-floor, relieved with buff terra-cotta plinth, string courses, and mullioned windows. Above the ground-floor red pressed bricks, in Flemish bond, pointed with black ash mortar, are used, and relieved with terra-cotta dressings. There will be a bell turret on the roof, and the roofs will be slated. The master's house will consist of a study, drawing-room, butler's pantry, kitchen, &c. The first floor consists of five bedrooms, corridor, dressing-room, bath-room, &c., to the master's house, and two attics above. Over the school part of the building will be a class-room, master's room, and a dormitory the size of the school-room beneath. The buildings are being erected from plans prepared by Mr. Alfred Waterhouse, R.A. Mr. A. White, of Guisborough, is the contractor, and Mr. John Cook is clerk of the works.

**Leeds.**—The additions recently made to the Leeds Girls' High School have lately been inaugurated. A large cloak-room, 43 ft. by 20 ft., has been added, with two of Bradford & Co.'s drying-closets at one end, so that wet mantles may be dried in a short time. Adjoining this room is a new lavatory, 38 ft. by 15 ft., containing twenty-four basins. On the mezzanine floor above these rooms are provided three small class-rooms and three music-rooms, so that piano practice may not be heard. A new class-room, 38 ft. by 18 ft. has been placed on the first floor. The architects are Messrs. Chorley & Connon.

## STAINED GLASS.

**Edgbaston.**—The unveiling of a new east window at St. James's Church, Edgbaston, took place on the 19th ult. The treatment of the window is designed to show Our Lord as King and High Priest, crowned and holding the sceptre. Standing on either side are the figures of the four archangels, SS. Raphael, Michael, Gabriel, and Uriel. In the upper part of the lights are angels holding shields, and above, in the tracery, are three angels playing upon instruments of music. The rest of the window is filled in with foliage. The work has been executed by Messrs. John Lee & Co. of Birmingham, from designs by Mr. Wyndham Hughes.

**Manchester.**—The Dean and Churchwardens of Manchester Cathedral have accepted the offer of a well known citizen to place a stained-glass window in the Cathedral in memory of General Gordon. The window consists of five lights and tracery, and is in memory of Gordon's last days at Khartoum. Gordon is the central figure of the composition, and is surrounded by his fellow-sufferers, who look appealingly to him, whilst his own gaze is turned to the Desert and the Nile. Above and around are angels bearing palms and crowns. The window is the work of

Messrs. Wilson & Whitehouse, of Vernon-place, Bloomsbury-square, London.

## THE STUDENT'S COLUMN.

OWING to the necessity of some alteration in the scale of the illustrative diagrams, we are obliged to hold over this week's portion of the Student's Column, and will give it next week in a double chapter.

## RECENT PATENTS.

## ABSTRACTS OF SPECIFICATIONS.

13,352, Fire Escape from Buildings. J. B. Foulds.

In order to allow any one to save himself by the window, by this invention a small apparatus is made, slipping or sliding on a rope, provided with double friction and stop-clutches to control the descent.

15,011, Coating Water-pipes. D. J. Duncan and H. C. Mylne.

According to this invention, the pipes are placed in a tank in which a protective carry mixture is kept heated and liquid, and are rotated therein on frames specially made for the purpose.

15,678, Glazed Pavement Lights. H. Sulley. The object of this invention is to make the lights in such form that the noise of overhead traffic is reduced to a minimum. The cast-iron frames are so made as to admit of blocks or wedges of wood or packing of other suitable material being fixed between each pane of glass. The wooden wedges prevent the feet of passers-by touching the frame, or, in some cases, the glass, and the blocks are struck in by first being dried in a furnace and then fitted. The action of the air then makes them fast by reason of the moisture in it.

15,875, Preventing the Rattling of Windows and Doors. J. Copard.

This invention consists of a box or case in which is a spring. On the end of the spring is a wheel or roller. The spring in the case is bent in the form of a V, with the roller at the top end of one of the arms; when, therefore, it is placed in position, this roller is pressed against the frame, but assists in travelling up or down, and prevents the frame from rattling in the grooves in which it runs.

15,945, Grates and Fireplaces. C. Swindell. The idea embodied in this patent is to control the consumption of fuel and throw out more heat into the apartment, and to modify the draught at will. A movable panel works at the back of the stove grate, and is moved by chain or lever into different positions, according to the strength of the draught required. The fire-box is also movable, and may be placed higher or lower, backwards or forwards, as desired. Thus the heat is utilised to the greatest advantage in warming the apartment.

17,019, Building Hollow Walls. G. M. Henley.

Dovetailed or rebated bricks are used by the inventor to make the bond, so that the inner wall is perfectly bonded at the quoins and the reveals with the external wall without the use of wall ties, and in a manner which gives free space for ventilation throughout the building.

78, Automatic Door Holder. J. B. Gray.

By this invention a small ball or roller is held vertically downwards and urged down by a spring. The roller is also controlled by an adjustable break. It runs along when the door is opened by hand, but by a projection or shallow ledge it may be fixed so as to prevent the door being moved by the wind, and in a manner which gives free space for ventilation throughout the building.

9,099, Improved Wood Screw. T. R. Weston. The point of the screw which is the subject of this patent is fluted, and is to be driven in like a nail until the thread of the screw is reached, when it is turned and screwed home in the ordinary way.

## NEW APPLICATIONS FOR PATENTS.

Nov. 18.—15,806, J. Johnson, Chimney-top, &c.—15,814, J. Carr, Paper-hangings and Paints Combined Paste and Size.—15,868, R. Shaw, Drain-pipes, &c.

Nov. 19.—15,889, T. Grimbleby, Double Bar Lock Roofing Tile.—15,966, W. Thompson, Brick Machines.—15,926, O. Bowen, Portland Cement.

Nov. 21.—15,961, J. Eardon, Double Flush Water-Waste Preventing Valves.—15,996, W. Lake, Devices for Preventing the Slamming of Doors.

Nov. 22.—16,014, R. Hall and J. Tinline, Fastening and Adjusting Knobs for Doors, Drawers, &c.—16,025, E. Boynton, Saws.—16,048, T. Wilkins, Raising or Adjusting Window-sashes, &c.—16,061, R. Reeves, Ventilation of Soil-pipes, Drains, &c.—16,093, J. Beesley, Fixing and Holding Scaffold Poles, Ladders, &c.—16,070, H. Hadden, Ventilators, Blowers, &c.

Nov. 23.—16,092, J. Hewitt, Glazier's Wheel Glass Cutters.—16,119, G. Magalhães, Water-closets, &c.—16,137, R. Deacon, Stop and Catch for Doors and Windows.

Nov. 24.—16,147, H. Munslow, Nails.—16,165, B. Mossely, Pavements and Roads.—16,172, G. Vaughan and J. Westcott, Counters, Dressers, &c.

## PROVISIONAL SPECIFICATIONS ACCEPTED.

14,208, J. Ashworth and W. Kneon, Fireplaces.—14,331, B. Banks, Flushing Cisterns or Water-Waste Preventers.—14,421, E. and J. Verity and B. Banks, Automatic Casement Stay.—14,460, P. Davies, Sink Cones and Sink Traps and Casting them with Lead.—14,734, S. Carnaby, Opening or Closing Ventilators, Windows, &c.—15,071, J. Wright, Chimney Top and Ventilator.—1,294, T. Brown, Raising, Lowering, Balancing, and Holding, in Open or Closed Position, Sliding Window-sashes, 13,421, R. Burditt and G. Green, Lifting Latch and Bolt.—13,912, A. Osterberg, Fastening or Fixing Window-sashes, Shutters, &c.—14,851, F. Coulter, Stone Dressing Machinery.—15,372, J. Morris, Ventilator and Chimney Cowl.—15,476, E. Lofe, Ventilating.—15,509, R. Oakley, Warming and Ventilating Buildings.

## COMPLETE SPECIFICATIONS ACCEPTED.

## Open to Opposition for Two Months.

944, J. Stewart, Flushing Valve for Cisterns of Water-closets, &c.—1,188, E. Ellington, Hydraulic Lifts.—1,272, E. Gietart, Door Locks.—1,567, J. Guest, Ladders and Steps.—4,583, R. Biggs, Artificial Stone, &c.—9,245, H. Dodd, Flushing Apparatus.—14,859, S. Rhodes, Brick Machinery.—1,111, J. Coltran, Fireplaces.—1,740, J. Gets, Forming Watertight Joints for Doors and Windows.

## RECENT SALES OF PROPERTY.

## ESTATE EXCHANGE REPORT.

## NOVEMBER 17.

By WORSFOLD & HAYWARD.  
Ewell, near Dover—The Mill House, and three cottages, freehold, 10 years, ground-rent 6*l*. 425*l*  
Buckland, near Dover—5 and 6, Primrose-road, freehold, 27*l*  
Dover—108, High-street, Charl'co, freehold, 40*l*  
47, Bulwer-street, 41 years, ground-rent 6*l*. 310  
49, Limekiln-street, 45 years, ground-rent 4*l*. 170

## NOVEMBER 21.

By W. J. NEWELL.  
Bermondsey—1, Catlin-street, 69 years, ground-rent 8*l*. 280  
By E. WOOD.  
Peckham—176, St. George's-road, 76 years, ground-rent 5*l*. 380  
Brighton—19, Wakefield-road, freehold, 27*l*

## NOVEMBER 22.

By T. G. WHARTON.  
Dalston—77, Broke-road, 87 years, ground-rent 10*l*. 5*l*  
29, Marlborough-road, 57 years, ground-rent 10*l*. 160  
By ROBINSON & FURZE.  
Suffolk, near Redleigh—Potash Farm, and 30*ac*. 3*r*. 30*p*., freehold, 325  
By DENBHAM, TAYLOR, & CO.  
Clapham—9, The Pavement, 181 years, ground-rent 490  
Kentish Town—50, Fortess-road, 25 years, ground-rent 12*l*. 250  
Shepherd's Bush—37, The Lawn, 4 years, ground-rent 8*l*. 75

## By W. WINGHAM.

Southwark—12 to 17, Sturge-street, freehold, 1,400  
1, 2, and 3, Taylor's-place, 15 to 23, William-street, 1, 1*a*, and 2, Rodney-street, 191 years, ground-rent 17*l*. 475  
113, Union-road, 191 years, ground-rent 5*l*. 180

By CHENEY, GALEWORTH, & CO.  
Soho—75, Berwick-street, freehold, 1,250

By WALKER & RINTZ.  
Merton—1 to 5, Double-row, freehold, 255  
Stoke Newington—84, Rectory-road, 86 years, ground-rent 5*l*. 375

By A. RICHARDS.  
Holloway—185, 187, and 189, Isledon-road, 63 years, ground-rent 7*l*. 1,000  
189 to 201 odd, Isledon-road, 63 years, ground-rent 12*l*. 2,000  
185, Seven Sisters-road, freehold, 2,320

Drury-lane—20, 21, and 22, Short's-gardens, freehold, 2,000

Gray's Inn-road—No. 220, term 25 years, ground-rent 10*l*. 750

Islington—51, College-street, 28 years, ground-rent 8*l*. 10*l*  
Clerkenwell—1, Margaret-court, 12 years, ground-rent 23*l*. 125

Ball's Pond-road—13, King Henry's-walk, freehold, 410

By HARDS.  
Seven Dials—The lease of 22, Little Earl-street, term 3 years, 360  
Greenwich, Bridge-street—House and shop, freehold, 1,290  
3, Bridge-street, freehold, 600

7 to 10, Bridge-place, freehold, 680  
Tottenham—Ground-rents of 7*l*. 10*l*, reversion in 73 years, 160

6, Laurence-road, freehold, 160

## NOVEMBER 23.

By RUSHWORTH & STAVENS.  
Peckham, Howbury-road—Ground-rents of 27*l*, reversion in 88 years, 570  
Barset-road—Ground-rents of 38*l*, reversion in 88 years, 780

Macell-street—Ground-rents of 9*l*, reversion in 85 years, 180

By ROGERS, CHAPMAN, & THOMAS.  
Belgravia—164, Cambridge-street, 44 years, ground-rent 8*l*. 55  
23, Lupus street, 46 years, ground-rent 10*l*. 10*l*

By D. L. GOUGH.  
Bromley—Ground-rents of 32*l*, reversion in 80 years, 71



By J. M. KERNICK & Co.		
Shepherd's Bush—71, Blythe-road, 9½ years, ground-rent 13s.		£395
NOVEMBER 24.		
By C. C. & T. MOORE.		
Whitechapel-road—No. 188, freehold		970
St. George's-in-East—19, 18, 8, and 20, Philip-street, 12 years, ground-rent 5s.		140
Upper Clapton—Ground-rent of 40l., term 4½ years		65
St. George's-in-East—An improved ground-rent of 9l. 12s., term 12 years		85
An improved ground-rent of 18l. 10s., term 1½ years		125
Forest Gate—No. 2, Fowler-road, freehold		210
By T. G. LANDRICK.		
Hyde Park—1, Chilworth-street, 52 years, ground-rent 15s.		750
By T. SPINK.		
Marlebone—32, Hereford-street, 33 years, ground-rent 10l. 10s.		255
By E. STICKSON.		
Poplar—142, High-street, 57 years, ground-rent 4l. 10s. 6d. and 11 to 25 odd, 35 and 37, and 18 to 28 area, Holmbrook-street, 14 years, ground-rent 180l.		150
Orleton 104, Geneva-road, 79 years, ground-rent 6l.		493
Old Kent-road—25, 27, 33 and 35, Blackhorse-street, 73 years, ground-rent 19s.		290
17, Gleggall-road, 35 years, ground-rent 5s. 6d.		335
NOVEMBER 25.		
By R. KENNEDY.		
Drury Lane—9, Betterton-street, freehold		970
Pall Mall—Nos. 16 and 17, term 26 years, ground-rent 121l. 2s.		11,000
Nos. 129 and 131, Pall Mall, 83½ years, ground-rent 143l. 16s.		12,400
By G. BRINSLEY.		
Stratford—10, Idmiston-road, freehold		236
By E. BAKER & SONS.		
Stratford—110, Major-road, freehold		670
Bishop's Stortford—A plot of freehold land		325

MEETINGS.

SATURDAY, DECEMBER 3.	
Association of Public Sanitary Inspectors.—Dr. W. Hollingridge, M.A., on "The Duties of Port Inspectors of Nuisances." 6 p.m.	
MONDAY, DECEMBER 5.	
Royal Institute of British Architects.—Mr. Ralph Nevill, F.S.A., on "The Auditorium of a Theatre." 8 p.m.	
Society of Arts.—Mr. H. H. Statham on "The Elements of Architectural Design." II. 8 p.m.	
Surveyors' Institution.—(1) Mr. R. Rich on "Allotment Legislation." (2) Mr. J. Jeans on "Allotments and Small Holdings." 8 p.m.	
Society of Engineers.—Mr. E. C. Thripp on "A New Formula for the Flow of Water in Pipes and Open Channels." 8 p.m.	
Clerks of Works' Association (Carpenters' Hall, London Wall).—Mr. E. Moore on "Groined Vaulting." 8 p.m.	
TUESDAY, DECEMBER 6.	
Institution of Civil Engineers.—Mr. Edw. Hopkinson, F.A.S.C.E., on "Electrical Tramways: the Bessbrook and Newry Tramway." 8 p.m.	
Statistical Society.—The President, the Rt. Hon. G. J. Goschen, M.P., will deliver his inaugural address. 4½ p.m.	
Society of Biblical Archaeology.—8 p.m.	
WEDNESDAY, DECEMBER 7.	
Civil and Mechanical Engineers' Society.—The President, Mr. R. E. Middleton, will deliver the opening address (Town-hall, Westminster). 7 p.m.	
British Archaeological Association.—(1) Mr. H. Syer on "The Roman and Celtic Remains of the Romanesque in the East." (2) The Rev. Canon Collier, F.S.A., on "Discoveries near Andover." 8 p.m.	
Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting. 8.30 p.m.	
THURSDAY, DECEMBER 8.	
Society of Telegraph, Engineers and Electricians.—(1) Annual General Meeting for the reception of the Annual Report and the Election of Officers and Members for the year 1888. (2) Mr. A. C. Cockburn, F.R.S., on "Safety Fuses for Electric Light Circuits and on the Working points of various metals usually employed in their construction." 8 p.m.	
Society of Antiquaries.—8.30 p.m.	
Edinburgh Architectural Association.—Mr. J. Wallace on "Italian Monuments." 8 p.m.	

Miscellaneous.

**St. Mark's, Venice.**—Mr. Ambrose Poynter writes to say that his translation of the re-erecting architect's report, from which a quotation was given in the "Notes" in our last number, was not printed for private circulation, but was made for the Society for the Preservation of Ancient Buildings, by whom it is, as we understand, published. It gives the Society better "case" than they generally make.

**The New Railway Bridge in the Walworth-road.**—Messrs. Ball & Gammon, 15, Edward-street, York-road, Lambeth, and road, Kent, write to correct a mistake made the paragraph under the heading of "Engineering Feats" which appeared in last week's *BUILDER* (p. 758). It was there stated that Messrs. Young & Co., of Pimlico, are the contractors for the new bridge over the Walworth-road, near the Elephant and Castle; but it appears that Messrs. Young & Co. are merely the sub-contractors for the girders, the responsible contractors for the whole of the working Messrs. Ball & Gammon.

**A New Town-hall at Streatham.**—A new town-hall is at present in course of construction at Streatham by a company of proprietors. The site, which is close to the Streatham railway station, occupies an area of about 5,500 ft. The building has two main frontages, one in Glenelg-road, the other frontage having its approach from the railway station, with entrances to the hall from both frontages. The Glenelg-road frontage is nearly 120 ft. in length, and contains two lofty floors, the height to the cornice being 41 ft., and to the ridge of a high-pitched roof about 80 ft., surmounted by a central flèche, fitted with louvres. There are two principal entrances, at the north-east and south-west ends of the frontage. The lower portion of the elevation is faced with red brick, the upper part of the frontage being in rough-cast, the pediments and arches to the windows being in gauged brick. The frontage overlooking the railway approach has three floors, and is faced with red brick and stone dressings. The entrance to the hall from this frontage will be along a corridor 9 ft. in width. The large hall on the upper floor will be 85 ft. in length and 45 ft. in width, exclusive of a stage. Adjoining these are also ladies' and gentlemen's retiring-rooms, cloak-rooms, and crush-rooms. The hall will seat an audience of about 800 persons. The lower hall will be rather smaller than that just described, but will also have a stage or platform at the north-east end. This floor will also contain a committee-room, green-room, artists' room, and ladies' and gentlemen's retiring-rooms. In addition to the main entrances eight special exits from each hall will be provided. The building is in a forward state, and is expected to be ready for occupation in January next. Mr. W. J. Holland is the architect, and Messrs. A. M. Deacon & Co., of West Norwood and Hayward's Heath, are the contractors. Mr. Robert Sutcliffe, H.M. clerk of the works. The estimated cost of the building is about 8,000l.

**A Serviceable Cement.**—A good and serviceable cement may be prepared, according to the *American Manufacturer*, in the following manner:—Old paint, the skin forming on the top of paint, settlings from the bottom of paint pots, and, in fact, any refuse which contains oil, zinc, or any other mineral body, may be used for the purpose. This mass, especially if it is hardened by lengthened exposure to the air, is reduced to the consistency of cream by soaking in some cheap oil. Heating may be resorted to if hard paint cannot otherwise be softened. When the whole has become soft enough to be stirred into a homogeneous mass, more oil may be added, and the whole worked through a sieve and then run through an ordinary paint-sieve. A quantity of common whiting is next worked into the oil and paint, in much the same way as when putty is made. The consistency of this putty, as it may now be called, should not be as great as that of putty used for glazing. When the whiting has been thoroughly mixed in and the mass well worked over, a sufficient quantity of good Portland cement is added to bring the putty to a consistency which will enable it to be readily handled. When in this state the putty may be worked into cracks in brickwork or masonry, much in the same way as ordinary putty is used for filling up cracks in woodwork. After being allowed to set and harden it will become nearly as hard as iron, and impervious to moisture and unaffected by any reasonable degree of heat. The cement thus prepared may be used for factory walls, which frequently develop ugly gaps between window frames and the brickwork.

**Sculpture for the Glasgow International Exhibition, 1888.**—At a meeting of the Executive Council of this Exhibition, held last week, it was stated, in the minutes of the Fine Arts Committee, which were approved, that a grant of 1,500l. had been made to the Sculpture section, which was to be expended in the transit and insurance of fine pieces of sculpture from Great Britain and abroad. There was reasonable expectation, it was said, that this section would be a great feature of the Exhibition, and that probably the sculpture section, with the assistance now given, would be very fine.

**Fire Hydrants.**—Messrs. James Simpson & Co., Limited, of Grosvenor-road, Pimlico, have obtained the order from the Metropolitan Board of Works to supply the whole of the fire hydrants required by the various metropolitan water companies for the next three years ending December 31st, 1890.

**The Royal Exchange.**—"Dogberry" in the *City Press*, asks (and with much reason), "Cannot something be done to improve the appearance of the Royal Exchange,—I mean internally?" "The walls of the ambulatories," he continues, "are exceedingly dingy, the fresco-paintings (designed by Mr. Sang, and executed by a Munich house) are faded, and a visitor can hardly see now what they represent, though I think they consist of the Gresham, the City, and the National arms, together with those of many other countries. The ceilings of the ambulatories are in a better state of preservation. The pillars are covered with dust, except so much of them as can be reached with a broom, and the pavement in the centre looks as if it never had a flushing with water, which, I believe, is the case. What the iron-covered channels contain one can only guess,—probably some inches of dust or mud. The marble statue of the Queen in the centre is beyond redemption as regards colour, for the grime has thoroughly eaten into it, but possibly it might be improved a little by washing. Surely the chief commercial building in the chief commercial city of the world might be brightened up a little!" Seeing that we have so many dark days in this climate, and that some amount of what light is vouchsafed to us is shut out by the new roof over the courtyard, it has often struck us that the ambulatories might be effectively illuminated by incandescent electric lamps.

**Sale of the "West End Stock Exchange" and French Gallery.**—On Friday, the 25th ult., Mr. Robert Reid submitted to competition at the Auction Mart, before a large company of capitalists, two valuable properties at the West End. They consisted of Crown leases, one being the property in Pall-mall, opposite the Reform Club, known as the "West End Stock Exchange," and the other 120 and 121, Pall-mall, opposite her Majesty's Theatre, known as the French Gallery. The first property offered was the West End Stock Exchange. It was described as having a frontage to Pall-mall of 40 ft. in length, and a depth of 60 ft., extending to the residence of the Duke of Norfolk in St. James's-square, and covering an area of 2,413 square feet. It was stated to be held and under-leased for the residue of a term of 80 years from April, 1833, from the Commissioners of Woods and Forests, at a rental of 121l. per annum, and producing an annual improved rental of 1,092l. The auctioneer stated that the lease had twenty-six years to run. After some spirited bidding it was sold for 11,000l. The French Gallery was next offered, the particulars stating that it had a frontage to Pall-mall of 32 ft., with a mean depth of 95 ft., extending to Warwick-street, and occupying an area of 3,125 ft. It was stated to be held on a similar Crown lease to the property above described, and to consist of business premises and spacious rooms suitable for exhibition purposes. It was sold for 12,400l.

**Bridge Across the Channel.**—The *Monitor* states that the engineers of the great Crueset Steel Works are engaged in drawing out plans and estimates for the bridge across the Channel, advocated by Admiral Cloué, late Minister of Marine, and that the latter is supported in his scheme by several leading French engineers. It is proposed to rest the bridge on concrete piers. The height of it is to be 40 metres, thus enabling the largest vessels to pass under it, and it is to be built of iron from the above-named works. It is to start from Cran-aux-vaux, south of Cape Griznez, and run in a straight line across the Channel to Folkestone; this distance not being the smallest, but offering the least depth of water. It is maintained by the promoters of this scheme that the bridge, unlike the Channel Tunnel, will be of no strategical value in case of war, as the blowing-up of a few pillars at either end would deprive an enemy of its use. The journal named further states that M. Hérédia, the French Minister of Works, is in favour of Admiral Cloué's plan, and is already taking steps for inducing the English Government to assist in carrying out this gigantic scheme.

**Tenders for the Position of Clerk of the Works.**—We copy the following paragraph, *verbatim et literatim*, from the *Western Morning News* for November 24:—

"Brixham Local Board, at a special meeting on Tuesday evening, accepted the tender of Mr. W. George, for the office of clerk of works to superintend the laying down of iron pipes for carrying water to the high levels. His salary will be 16s. per week. There were four other offers, from 5s. to 11l. per week higher."



**The Atlantic-Mediterranean Canal.**—Two Government Commissioners in France having pronounced favourably upon the scheme for a canal from the Bay of Biscay to the Bay of Toulon, a company has been formed for carrying the undertaking out, and recently one of the promoters, M. Wickersheim, gave some particulars of the same before an influential meeting at Toulouse. It is decided that the canal shall start at Bordeaux and follow the left shore of the Garonne for a length of 85 kilometres. It will cross that river at Castelfarrain, and continue along the right shore to Toulouse, where a large harbour is to be constructed. Hence it runs to Narbonne, and then, trending towards the Mediterranean, to Gruissan, where another harbour is to be constructed similar to that at the mouth of the Amsterdam Canal. The entire length of the canal by this course will be 525 kilometres, and it will be fitted either with thirty-eight low or twenty-two high locks. The depth has provisionally been fixed at 25 ft.; but, if the French Government should desire it, it will be 30 ft., so as to allow of the passage of ironclads. Vessels passing through the canal will be towed by means of locomotives running on tracks alongside it, the rate of progress being about eighty miles an hour. The entire passage is computed to occupy from five to ten days, according to the size of the vessel. M. Wickersheim finally expressed the belief that, apart from the great commercial benefits to be derived from this canal, it would be of immense strategical value, whilst it would greatly reduce the importance of Gibraltar to England.

**"Protected" Fire Risks.**—The New York Board of Fire Underwriters has taken a new departure in the regulation of insurance policies. Twelve members of the Board have been appointed as a "Protective Committee," whose duty shall be to prescribe requirements on application for the proper construction or improvement and effectual protection of any mercantile or manufacturing risk, including provisions for automatic sprinklers and like approved appliances. When a property-owner has complied with the requirements of the committee in the construction and protection of any building, it will be classed as "protected," and the committee is authorised to fix a reduced rate of insurance. The committee is also empowered to modify or cancel all such contracts if deemed necessary or advisable. In the event of a claim for loss or damage to a protected risk issued under this plan, the committee will adjust the claim and apportion the amount for which each company is liable. The amount of insurance to be placed on any risk is to be distributed among all of the insurance companies entering the agreement. — *New York Times*.

**Messrs. Ashton & Green** have lately opened an iron foundry at Bow Bridge, E., where they will turn out a large variety of stoves, ranges, and other light castings. The works are very conveniently situate at the water side, and whilst the shops are light and spacious, every appliance is provided that will tend to expedite and economise production. Already about two tons of work is being turned out per day, and the *Ironmonger* pronounces the castings produced as equal to the best Scotch work. In stoves and grates the firm have a variety of new designs, and these include one constructed on Dr. Teale's principle, and fitted with firebrick sides and bottom.

**Proposed Improvements in the City.**—At the last meeting of the City Commission of Sewers, Mr. Under-Sheriff Rose-Innes moved, —

"That this Commission is of opinion that the approaches to the Tower Bridge, the completion of the widening of Ludgate-hill, and the widening or other alteration of the eastern end of Newgate-street, are matters of urgent importance, not only to the City of London but to the whole Metropolitan area, and that they are impeded solely by financial questions. It, therefore, refers these three necessary great public improvements to the Finance Committee, with instructions and power to confer with every necessary authority interested therein, and so soon as the Finance Committee is satisfied that they can be carried out, it, or overhauling the present ratepayers, the Finance Committee prepare a Bill, if possible, for the next Session of Parliament, in order to carry out its arrangements."

The motion was negatived by 38 to 15.

**Battersea Public Baths.** Mr. Rowland Plumbie writes to say that the designs for these, mentioned in our last, were not prepared by him solely, but in conjunction with Messrs. Horace T. Bonner and Charles Jones as joint architects.

### Civil and Mechanical Engineers' Society.

We have received the syllabus of meetings of this society for the session 1887-8. The meetings are to be held in the Townhall, Westminster, on Wednesday evenings, at 7 p.m. The following is the list:—Dec. 7, Opening Address by the President (Mr. R. E. Middleton, M.Inst. C.E., M.I.M.E.); Dec. 21, Paper on "The Roof of the National Agricultural Hall, Kensington," by Mr. A. T. Walmisley; Jan. 4, General Meeting for the presentation of accounts, and paper on "Salmon Passes," by Mr. A. Fairlie Bruce; Jan. 18, paper on "Steel Sleepers," by Mr. H. T. Munday; Feb. 1, paper on "The Use of Ammonia as a Refrigerating Agent," by Mr. T. B. Lightfoot; Feb. 15, paper on "Sea Water for Street-watering," by Mr. S. Harding Terry; Feb. 29, paper on "Our National Defences," by Mr. William C. Street; March 14, paper on "The Construction and Use of the Hopper Dredger," by Mr. A. C. Schönborg; March 28, paper on "The Development of Machinery in Relation to Hand Labour," by Mr. Ambrose A. Myall; April 11, paper on "Theatres and other Public Buildings," by Mr. Walter Emden; April 25, paper on "Railways for Rural and Undeveloped Districts," by Mr. James B. Walton; May 9, General Meeting for the presentation of report, election of Council, &c. Visits to various works in progress will be made during the session. The annual dinner will be held at the Holborn Restaurant, on May 23rd, 1888.

**London's Revenue.**—Some idea of the vast importance of the question of London government reform may be formed from an examination of the returns, issued yesterday, showing the income and expenditure of the various local authorities of the metropolis for 1886. The total receipts of the metropolitan vestries and district boards during the year amounted to over three millions and a half, of which the sum of 3,307,935l. was raised from the rates. This represented an average rate of a fraction under 2s. 7d. in the pound on 25,799,910l., the assessable value of the metropolis outside the jurisdiction of the Corporation of the City of London. The receipts of the Corporation during the year amounted to nearly a million and a quarter, of which over half a million was raised from the oppressive coal duties. The revenue of the whole of London last year, therefore, amounted to over four millions and three quarters. That the expenditure of such a large sum of money annually raised for purposes of local government should be in the hands of men who, for the most part, have no claim to be regarded as representatives of the ratepayers, is perilous to the best interests of the latter. — *Daily Chronicle* (Nov. 26).

**The Washington Monument.**—The great equestrian bronze statue to be erected to the memory of Washington in the capital of the United States is now progressing towards completion. It is being executed by Professor Siemering, of Berlin, and the various parts are now being cast in that city. Part of the pedestal represents a fountain, whence water flows into two basins, whilst on another are gilt animals in relief, representing the fauna of America. On the pedestal is also a group with a female figure in the centre representing America, on each side of whom are American soldiers and citizens of the time of the War of Independence, who, kneeling, offer banners and laurel wreaths to the ideal representative of America. This figure wears a Phrygian cap, her hair falling loose over her shoulders. There are also portrait medallions of the great commanders during the war.

**John Wesley's Chapel.**—The Episcopal Chapel in West-street, close to the two main thoroughfares of Shaftesbury-avenue and Charing-cross-road, is announced to be sold by auction on the 15th inst. It is stated that the chapel was used by John Wesley, who preached in it for more than half-a-century. Whitfield frequently preached in it, the first time in 1750. Wesley's pulpit still remains in the church, and the portable pulpit he used when preaching in the streets is in the vestry. Services have been conducted in the church until August last, when the incumbent died. The property will be offered either as a church or as a commercial building site.

**Evidently a Joke.**—According to the *Pall Mall Gazette*, "the Grosvenor Gallery split is going to lead to the opening of a new gallery. Messrs. Hallé and Carr will be the managers, and it will, we understand, be called the *Hallicarussian*."

**Value of New River Shares.**—At the Auction Mart on the 23rd ult. Messrs. Edwin Fox & Bousfield submitted to auction about one-half a King's freehold share, and a smaller part of an Adventurer's freehold share, also thirty-seven 100l. fully-paid new shares, and 3,000l. Four per Cent. Debenture Stock. The King's and Adventurer's shares are freehold estate, and pass by deed, as with all real property, these were offered in lots of 120th of a share in each lot, the dividend on which last year was 21l. 15s. each lot, and sold at from 700l. to 720l. each, giving as the value of a freehold share from 84,000l. to 86,400l. The new shares paid last year 12l. per cent., and realised from 325l. to 327l. ex div. The Debenture Stock (Four per Cent.) fetched 117 to 117½ per cent., also ex div. The total amount realised was 53,136l.—*Standard*.

**Registration of Plumbers in Dundee.**—One day last week Mr. W. R. E. Coles, Clerk of the Plumbers' Company of London, attended at the Town-hall, Dundee, to issue certificates of registration to plumbers from Inverness and Aberdeen. He afterwards met the Committee of the District Council for Forfarshire, Fifeshire, and Perthshire, which has its headquarters at Dundee. Dr. Anderson presided. The formation of technical classes for the plumbers of the district was discussed, and further consideration of the matter was deferred until the next meeting of the Council.

**West Ham Hospital.**—The *Stratford Express* says that the Committee for erecting this building, in reply to an advertisement inviting designs, have received twenty-two sets of plans. Mr. Angell, being a member of the Committee, was requested to report on the merits of such plans, but declined, and the reference was made to Professor Roger Smith, who reported upon the merits of the various plans submitted, and, in the result, the Committee adopted the design with the motto "Hygeia." Upon opening the sealed letter bearing this motto, it was found that Messrs. Houston, of Essex-street, Strand, were the authors, and the premium of 50l. was awarded accordingly.

**Dr. Chambers's Statue, Edinburgh.**—The *Scotsman* reports that he has been unanimously agreed, at a meeting of the Lord Provost's Committee of the Edinburgh Town Council, to recommend to the Council that Dr. Chambers's statue be erected in the centre of Chambers-street, opposite the entrance to the Industrial Museum.

**The New Alderman.**—Mr. James Ebenezer Saunders, F.S.A., who was last week elected an Alderman of the City of London in succession to the late Sir William M'Arthur, is, as many of our readers know, an architect and surveyor. He was elected a Fellow of the Royal Institute of British Architects in 1866, and has had an extensive practice.

**Migration of Industries.**—It is announced that the Dowlais ironworks are to be removed to Cardiff. — *The Manchester Courier* says that Messrs. Sharp, Stewart, & Co., the well-known locomotive builders, of Manchester, are about to remove their works to Glasgow.

**Locks for a Lunatic Asylum.**—We hear that the Kent County magistrates have entrusted Mr. James Hill, of Queen Victoria-street, with the order for 450 special locks, with master-key arrangements, for the Barming Heath Lunatic Asylum.

**Edinburgh Joiners' Wages.**—The *Scotsman* says that the committee met on the 25th ult., when it was reported that three out of those employers who had notified a reduction had withdrawn their notice, and agreed to pay the standard wage, namely, 7d. per hour.

**Wood-working Machinery.**—Mr. J. Stafford Ransome, Assoc. Mem. Inst. C.E., is contributing a series of articles to our contemporary the *Timber Trades' Journal*, entitled "How to Select Wood-working Machinery."

### PRICES CURRENT OF MATERIALS.

		£	s.	d.	£	s.	d.
TIMBER.							
Greenheart, B.G.	.....ton	6	5	0	7	10	0
Teak, E.I.	.....load	6	0	0	13	10	0
Sesuvium, U.S.	.....foot cube	0	2	3	0	3	0
Asp. Canada	.....load	3	0	0	4	10	0
Birch	.....	2	0	0	3	10	0
Elm	.....	3	10	0	4	10	0
Fr. Danish, &c.	.....	1	10	0	4	10	0
Oak	.....	2	10	0	4	10	0
Canada	.....	3	0	0	6	0	0
Pine, Canada red	.....	2	0	0	3	10	0
" yellow	.....	2	0	0	4	0	0



TIMBER (continued).		£. s. d.	£. s. d.
Lath, Dantio .....	athom	3 0 0	5 0 0
St. Petersburg .....	athom	4 0 0	5 10 0
Waincoat, Riga .....	athom	0 0 0	0 0 0
Odessa, crown .....	athom	2 10 0	3 0 0
Deal, Finland, 2nd and 1st ..	100	7 0 0	8 0 0
4th and 3rd .....	athom	5 10 0	8 10 0
Riga .....	athom	5 10 0	7 0 0
St. Petersburg, 1st yellow ..	athom	8 10 0	13 0 0
2nd .....	athom	7 0 0	8 0 0
Swedish .....	athom	6 10 0	8 10 0
White Sea .....	athom	8 0 0	14 0 0
Canada, Pine, 1st .....	athom	16 0 0	24 0 0
2nd .....	athom	10 0 0	16 0 0
3rd, &c. .....	athom	8 0 0	9 0 0
Spruce, 1st .....	athom	8 0 0	9 0 0
3rd and 2nd .....	athom	5 0 0	7 0 0
New Brunswick, &c. ....	athom	5 0 0	8 10 0
Battens, all kinds .....	athom	4 0 0	10 10 0
Flooring Boards, sq. 1 in., pre-			
Second .....	athom	0 8 0	0 11 0
Other qualities .....	athom	0 4 0	0 6 0
Cedar, Cuba .....	athom	0 0 0	0 3 0
Australasian .....	athom	0 0 0	0 3 0
Mahogany, Cuba .....	athom	0 0 0	0 7 0
St. Domingo, cargo average ..	athom	0 0 0	0 4 0
Mexican .....	athom	0 0 0	0 3 0
Tobacco .....	athom	0 0 0	0 3 0
Honduras .....	athom	0 0 0	0 5 0
New York, Bird's-eye .....	athom	0 0 0	0 7 0
Rose, Rio .....	athom	0 0 0	0 11 0
Bahia .....	athom	7 0 0	9 0 0
Bor, Turkey .....	athom	5 0 0	12 0 0
San, St. Domingo .....	athom	0 0 0	0 10 0
Porto Rico .....	athom	0 0 0	0 10 0
Walnut, Italian .....	athom	0 0 0	0 5 0

METALS.		£. s. d.	£. s. d.
Iron—Bar, Welsh, in London ..	ton	4 15 0	5 0 0
“ “ in Wales .....	ton	4 5 0	4 10 0
“ “ Staffordshire, London .....	ton	5 10 0	0 0 0
Copper .....	ton	65 0 0	65 0 0
British, cake and ingot .....	ton	65 0 0	65 0 0
Best selected .....	ton	68 0 0	69 0 0
Sheet, strong .....	ton	70 0 0	0 0 0
Chili, bars .....	ton	66 0 0	0 0 0
Yellow Metal .....	ton	0 0 0	0 0 0
Lead .....	ton	13 0 0	0 0 0
“ Spanish .....	ton	13 0 0	0 0 0
English, common brands .....	ton	14 5 0	0 0 0
Sheet, English .....	ton	17 10 0	17 12 6
Ordinary brands .....	ton	17 5 0	17 7 6
Strait .....	ton	164 0 0	0 0 0
Australian .....	ton	164 0 0	0 0 0
English ingots .....	ton	0 0 0	0 0 0
OILS.		£. s. d.	£. s. d.
Linseed .....	ton	19 2 6	19 10 0
Coconut, Ceylon .....	ton	23 15 0	24 0 0
Palm, Lagos .....	ton	22 0 0	22 10 0
Refined, English pale .....	ton	28 10 0	27 0 0
“ brown .....	ton	28 10 0	0 0 0
Cottonseed, refined .....	ton	20 10 0	9 0 0
Tallow and Olive .....	ton	25 0 0	45 0 0
Lubricating, U.S. .....	ton	5 0 0	6 0 0
“ refined .....	ton	6 0 0	12 0 0
TERRAZZO.		£. s. d.	£. s. d.
American, in casks .....	cwt.	1 4 9	0 0 0
TAR.		£. s. d.	£. s. d.
Stockholm .....	barrel	0 15 0	0 0 0
Archangel .....	barrel	0 10 6	0 0 0

CORK.—For rebuilding St. Luke's Church, Cork. Mr. W. H. Hill, B.E., architect. Messrs. Gribbon & Baker, surveyors:—  
 Colven Bros., Portadown ..... £11,000 0 0  
 J. Henry, Belfast ..... 10,900 0 0  
 J. W. Hill, Belfast ..... 10,558 0 0  
 S. Hill, Cork ..... 9,838 0 0  
 E. Fitzgerald, Cork ..... 7,890 0 0  
 J. Lusk, Cork (accepted) ..... 7,800 0 0

EALING.—For alterations and additions to Leslie Lodge, Haven Green, and stable buildings, for Dr. Hogg. Mr. Geo. Ashby Loan, architect. Quantities by the architect:—  
 W. Shepherd ..... £1,740 0 0  
 T. Nye ..... 1,490 0 0  
 W. H. Waters ..... 1,685 0 0  
 H. & A. J. Jones ..... 1,484 5 0  
 Perry & Co. ..... 1,575 0 0

EALING.—For building two shops and entrance to Shaftesbury Hall, Uxbridge-road, for Mr. Bortwell. Mr. Geo. Ashby Loan, architect:—  
 B. Myring (accepted) ..... £700 0 0

ENFIELD.—For constructing roads and sewers, for the Eastern Counties Estates Exchange, on their estate at Ponder's End:—  
 Pizzey ..... £447 0 0  
 Marshall ..... 444 0 0  
 Catley ..... 438 0 0  
 Nicholls ..... 435 0 0  
 Potter ..... 410 0 0  
 Treasman ..... 399 0 0  
 Bell ..... 388 0 0  
 Bloomfield ..... 386 0 0  
 J. Jackson, Enfield ..... 312 0 0

ISLEWORTH.—For erecting a public hall and additions to the Isleworth Free Library to commemorate Her Majesty's Jubilee. Mr. Stephen Woodbridge, jun., architect, 210, High-street, Bradford:—  
 J. Dorey, Br'n'ford (accepted) ..... £1,490 0 0

KILBURN.—For alterations to No. 8, Greville-road, Kilburn. Mr. Robert Willey, architect, 65, Ludgate-hill, E.C.:—  
 E. J. Isaacs, Hampstead ..... £210 0 0  
 J. Myring, Kilburn ..... 120 0 0  
 Jones Bros., Ealing (accepted) ..... 99 10 0

LEWISHAM.—For alterations and repairs, 178 and 180, High-street, Lewisham, for Messrs. Newton & Down. Mr. Albert L. Guy, architect, 45, High-street, Lewisham:—  
 Bennett ..... £107 0 0  
 Fisher (accepted) ..... 105 10 0

LEWISHAM.—For new show-room, &c., 89, High-street, for Mr. George Stroud. Mr. Albert L. Guy, architect:—  
 H. L. Holloway ..... £368 0 0  
 S. J. Jerrard ..... 319 0 0  
 D. & R. Kennard (accepted) ..... 300 0 0  
 For Fittings and new Shop Front, &c., to above.  
 Salter (accepted) ..... 331 0 0

LEWISHAM.—For alterations at the Anchor Brewery, for H. & V. Nichol (Limited). Mr. Albert L. Guy, architect:—  
 J. Hoare (accepted) ..... £170 0 0

LONDON.—For the erection of a block of stables and residential flats, John's-place, West Kensington. Messrs. Leven-Sharp & Arpin, architects, 3, Duke-street, Adelphi, W.C. Quantities by Messrs. Morris, Evans & Son, 7, John-street, Adelphi, W.C.:—  
 Belham & Co. .... £7,135 9 4  
 Patrick & Son ..... 6,825 0 0  
 Scrivener & Co. .... 6,839 0 0  
 Grover & Son ..... 6,742 0 0  
 Peto Bros. .... 6,887 0 0  
 Leslie & Knight ..... 6,870 0 0  
 Colls & Sons ..... 6,320 0 0  
 T. Boyce ..... 6,250 0 0  
 Patman & Fotheringham, Theobald's-road, W.C. (accepted) ..... 6,100 0 0

LONDON.—For erection of warehouse, Pipps-street, Curtain-road, Shoreditch, E.C. Mr. John Groom, architect:—  
 If Glazed Bricks and Iron Sashes are used. Fittings.  
 Simpson & Son ..... £4,684 ..... £4,684 ..... £283  
 T. Boyce ..... 4,854 ..... 4,940 ..... 630  
 Harris & Wardrop ..... 4,628 ..... 4,588 ..... 563  
 Jackson & Todd ..... 4,390 ..... 4,700 ..... 560  
 Holloway ..... 4,300 ..... 4,562 ..... 580  
 Kilby & Gayford ..... 4,286 ..... 4,470 ..... 559  
 J. Grover & Son ..... 4,264 ..... 4,450 ..... 500  
 Allan & Son ..... 4,249 ..... 4,449 ..... 578  
 W. Shummur ..... 4,178 ..... 4,545 ..... 584  
 Mattock Bros. .... 4,177 ..... 4,371 ..... 677

LONDON.—For alterations, additions, &c., to the Lord Belgrave public-house, Leicester-square, for Mr. W. Booker. Messrs. J. & A. E. Bull, architects and surveyors:—  
 Bywaters ..... £2,250 0 0  
 Patman & Fotheringham ..... 2,130 0 0  
 Stevens ..... 2,055 0 0  
 Oldrey & Co. .... 1,994 0 0  
 Williams ..... 1,987 0 0  
 Gould & Broad ..... 1,797 0 0

LONDON.—For sundry alterations and additions to the Kent and Essex Wharf, Lower Shadwell. Mr. C. Dauch, architect:—  
 Curtis & Son ..... £723 0 0  
 J. R. Hunt ..... 653 0 0  
 J. Moster ..... 821 0 0  
 Harris & Wardrop ..... 600 0 0  
 J. & J. Greenwood ..... 591 0 0  
 W. Shummur ..... 591 0 0

LONDON.—For decorative repairs to shop and premises in St. Martin's-lane, W.C., for Mr. J. Sahai. Mr. Richard Peters, architect, 72, Wool Exchange, Coleman-street, E.C.:—  
 Richardson Bros. .... £213 0 0  
 Watson ..... 130 0 0

## COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS

Epitomes of Advertisements in this Number.

### COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Public Library and School of Art.....	Doncaster Corporation	50l. and 25l.	Jan. 10th	x.

### CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Designs to be delivered.	Page.
Pipe-Sewer, &c. ....	Surbiton Imp. Com.	Official	Dec. 5th	ii.
New Church and Paving Road .....	Wandsworth Bd. of Wks	do.	Dec. 6th	x.
New Church, Newtown .....	Sir Fyfe Pryce-Jones	Aston Webb	do.	x.
Alterations and Additions to Bath ..	Harrogate Corporation	R. White	do.	ii.
Road-Making and Paving Works .....	Hammeramith Vestry	Official	Dec. 7th	x.
Goods Depot, &c., Liverpool .....	Great Northern Ry. Co.	do.	do.	ii.
Kerbing, Pav. Paving, Graveling, &c. ....	L. & N. W. Rail. Co.	do.	Dec. 13th	x.
Engine Repairs .....	Lewisham Bd. of Wks	do.	do.	ii.
Road-Making and Paving Works .....	West Ham Council	Lewis Angell	do.	x.
Kerling .....	Willenden Local Board	O. Claude Robson	do.	ii.
Well-Moring .....	Fulham Vestry	J. P. Norrington	do.	x.
Road-Making and Paving Works .....	Carlston Local Board	Official	Dec. 14th	x.
Cast-Iron Pipes, Tower Bridge .....	Hertford Corporation	W. H. Wilds	Dec. 17th	ii.
Goods Shed, Cardiff .....	Bridge House Estates	J. Wolfe Barry	Dec. 19th	x.
New Post Office, Lion Bridge .....	Committee	Official	Dec. 20th	ii.
Buildings, &c., Mill Dam .....	Com. of H.M. Works.	do.	do.	ii.
Additions to Hotel, Radnorshire .....	Hull Corporation	B. J. E. Bruce	Dec. 29th	x.
Additions, &c., to Rectory, Theale .....	The Rector.	Crickmay & Son	Not stated.	ii.
		J. Norton	do.	ii.

### PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom advertised.	Salary.	Applications to be in.	Page.
Two Borough Surveyors' Assistants .....	Reading Corporation	100l. each	Dec. 7th	xiv.
Four District Superintendents .....	Canterbury Vestry	32. 6s. per week	Dec. 8th	xv.
Clark of Works .....	Willenden Local Board	37. 3s. do.	Dec. 14th	xv.
Drawing Master .....	Government of Victoria	800l.	Dec. 16th	xiv.

### TENDERS.

BANBURY.—For the restoration of and enclosing, &c., of Banbury Cross, for the Town Council. Mr. W. E. Mills, architect, Banbury:— J. S. Kimberley ..... £137 0 0 C. Maeder ..... 139 12 6 E. Davis (accepted) ..... 115 0 0 W. G. & R. H. Thomas (ironwork only) ..... 68 10 0	CANONBURY.—For taking off roof, raising floors, constructing new roof, &c., at 10, Alma-road, Canonbury, for Messrs. E. G. Kinzett & Co. Messrs. Wells & Road, architects:— Baylis ..... £197 10 0 Deasling & Son (accepted) ..... 177 0 0	CHELSEA.—For alterations and additions to Nos. 77, 79, and 81, Calogian-place, S.W., for Major-General Keith Taylor, Messrs. Godwin & Bailey, architects. Quantities by Mr. Isaac Mason:— No. 77. No. 79. No. 81. Total. Loft & Son ..... £1,633 ..... £1,710 ..... £1,705 ..... 5,048 Taylor & Co. .... 1,270 ..... 1,255 ..... 1,283 ..... 3,778 W. Gladding ..... 1,259 ..... 1,177 ..... 1,183 ..... 3,619 Holliday ..... Greenwood ..... 1,159 ..... 1,227 ..... 1,223 ..... 3,609 Oldrey & Co. .... 1,180 ..... 1,215 ..... 1,215 ..... 3,610 Stimpson & Co. .... 1,180 ..... 1,240 ..... 1,240 ..... 3,660 J. H. Howley ..... 1,120 ..... 1,112 ..... 1,108 ..... 3,340 Garlick ..... 1,070 ..... 1,065 ..... 1,065 ..... 3,200 * Too late.	BLENDON (near Bexley).—For alterations, &c., to the three Black-bi., Blendon, for H. & V. Nichol (Limited). Mr. Albert L. Guy, architect, 75, High-street, Lewisham:— S. J. Jerrard ..... £270 0 0 J. Hoare ..... 285 0 0 T. Knight (accepted) ..... 253 0 0	BELLARIO (Surrey).—For the erection of a bungalow, at Ruffield Chase, Bellario, near East Grinstead, Surrey, for Mrs. Martineau. Mr. W. J. Kibbitts, architect, Savoy House, Strand, W.C.:— H. Baylis (accepted) ..... £385 0 0	BELLARIO (Surrey).—For the erection of a bungalow, according to design No. 7, at Bellario, for Mr. J. Ebbetts, architect, Savoy House, Strand:— H. Baylis ..... £310 0 0	BLENDON (near Bexley).—For alterations, &c., to the three Black-bi., Blendon, for H. & V. Nichol (Limited). Mr. Albert L. Guy, architect, 75, High-street, Lewisham:— S. J. Jerrard ..... £270 0 0 J. Hoare ..... 285 0 0 T. Knight (accepted) ..... 253 0 0
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**LONDON.**—For alterations to No. 26, Chapel-street, Edgware-road, W. Mr. Robert Willey, architect, 66, Ludgate-hill, E.C.1.

Asby Bros., City .....	£460 0 0
Rhodes, Hyde Park .....	373 0 0
Jones, Bros., Ealing (accepted) .....	361 0 0

**NEW SOUTHGATE.**—For new skittle alley, repairs, &c., at the Orange Tree public-house, New Southgate, for Messrs. Huggins & Co., Mr. W. West, architect:—

Spencer & Co. ....	£274 0 0
Horion .....	270 0 0
Dearing & Son .....	259 0 0
H. & J. Cocks .....	240 0 0

**OXFORD.**—For the erection of a covered swimming-bath, at St. Edward's School, Oxford. Mr. Wm. Hanson, architect, Oxford. Quantities supplied:—

Symms & Co. ....	£1,497 0 0
Wilkins & Son .....	1,332 0 0
J. Honoré .....	1,315 0 0
Wyatt & Son .....	1,268 5 10
T. H. Kingerlee (accepted) .....	1,174 0 0

[A. I. of Oxford.]  
[Architect's estimate, £1,250.]

**PAIGNTON.**—For the erection of a shop and dwelling-house on the Gerston Estate, Paignton, for Mr. H. Ching, Mr. S. Woodbridge, jun., 210, High-street, Brentford, architect:—

M. Bridgman, Paignton .....	£810 0 0
H. Rabich (accepted) .....	693 10 0

**BATCLIFF.**—For alterations and additions to the "Working Lad's Institute, Butcher's-row, E., for Mr. E. H. Murray. Mr. Geo. Sherrin, architect:—

J. Chapman .....	£782 15 6
------------------	-----------

[No competition.]

**STOKE NEWINGTON.**—For the erection of a house at Green-lanes, Stoke Newington, for Mr. A. Meares, Mr. John Groom, architect, 1, Broad Street-buildings. Quantities by Mr. M. King:—

Grover & Son .....	£2,968 0 0
Stimpson & Co. ....	2,988 0 0
Laurence & Son .....	2,679 0 0
Mattock Bros. ....	2,773 0 0
Jackson & Todd .....	2,774 0 0
Exton & Burton .....	2,717 0 0
H. L. Holloway .....	2,430 0 0

For Stable Buildings at the above House.

Jackson & Todd .....	839 0 0
Grover & Son .....	827 0 0
Mattock Bros. ....	799 0 0
J. Kent .....	790 0 0
H. L. Holloway .....	779 0 0

**TOTTENHAM.**—For erecting an addition to the Ice Factory of the Tottenham Lager Beer Brewery, Tottenham. Mr. C. Dunch, architect:—

J. & J. Greenwood .....	£238 0 0
Capel .....	320 0 0
W. Shurmer .....	297 0 0
J. R. Hunt .....	293 0 0

**TUNBRIDGE WELLS.**—For building a new market, Tunbridge Wells. Mr. L. M. M. Caley, architect. Quantities supplied by Mr. Thomas Laidie:—

Mansfield & Son .....	£4,010 0 0
J. Crates .....	3,650 0 0
Beale & Son .....	3,369 0 0
W. T. Judd .....	3,178 10 0
J. Jarvis .....	3,176 0 0
E. Thurbon .....	3,165 0 0

By direction of the Market Committee the plans and specification were considerably reduced and again tendered for as under:—

Crates .....	£1,509 0 0
E. Thurbon .....	1,463 0 0
Beale & Son .....	1,387 0 0
W. T. Judd .....	1,342 10 0
J. Jarvis (accepted) .....	1,340 0 0

**WALWORTH.**—For addition to laundry, at 126, Walworth-road, for Messrs. Drysdale Bros. Mr. R. Mc Clymont, architect, Acree-lane, Brixton:—

Sargeant, Hackney .....	£155 0 0
Tarrant, Walworth .....	159 0 0
Money Marsland, Chislehurst .....	127 0 0
Legg, Brixton .....	125 0 0

\* Accepted.

**WANDSWORTH.**—For paving the yards at the new casual ward, Garratt-lane, for the Wandsworth and Clapham Union. Mr. T. W. Aldwinckle, architect, 2, East India-avenue, Leadenhall-street, E.C.1:—

Nowell & Robson .....	£275 0 0
R. Mayo .....	475 0 0
W. H. Wheeler .....	444 0 0
G. Neal .....	437 0 0
J. Mowlem & Co. (accepted) .....	411 0 0

**WHITBY.**—For the completion of a further section of the Whitby Sewerage Improvement Scheme:—

Charles Winterburn .....	£1,680 0 0
Perth .....	708 0 0
Wm. Blooman .....	698 0 0

**WORKING.**—For the erection of a house at Working, for Mr. T. Jones. Mr. W. I. Chambers, architect:—

Wm. Butt, Working .....	£2,400 0 0
S. Wood, Weybridge .....	2,287 0 0
Robt. Pink, Milford .....	2,122 0 0
E. G. Curriogton, Guildford .....	2,100 0 0
Martin, Wells, & Co., Aldershot .....	2,000 0 0
G. Constable, Hampton Wick .....	1,946 0 0
E. Seaber, Godalming .....	1,850 0 0
Geo. Shears, Maybury .....	1,740 0 0
Ingram & Son, Working .....	1,715 0 0
A. A. Gale, Woking (accepted) .....	1,680 0 0

The three lowest tenders were invited to submit new estimates on reduced prices.  
The above does not include grates, chimney-pieces, hardware, or ironmongery.

\* SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than 12 Noon on THURSDAYS.

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All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline pointing out books and giving addresses.

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Addressed to No. 46, Catherine-street, W.C.

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rooms, granaries, tun-rooms, and terraces. [ADVT.]

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IMPORTANT COMMUNICATION.—FIRE AT WHITELEY'S.

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London, Oct. 12th, 1887.

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You will be pleased to hear that it has been decided to adopt your Patent Clutch-rebated Doors for all the party-walls in the new buildings now in course of erection.—I am, Gentlemen, faithfully yours,

(Signed) WILLIAM WHITELEY.

Offices and Warehouse: 76, CHEAPSIDE, London; Manufactures, Wharncliffe Works, Arlington street, London, N.



# The Builder.

Vol. LIII. No. 2345.

SATURDAY, DECEMBER 10, 1887.

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### Travels in Tunisia.



OW that the old and Classic shrines of the architectural pilgrim in Greece and Italy have become well-worn ground, there is a natural tendency on the part of architectural students and sketchers to

make the most, while they are still unbacked, of some of the regions that have not been so much visited, sketched, and written about. A little while ago we noticed the excellent and elaborate work by Mr. T. G. Jackson on the architectural remains on the east coast of the Adriatic ; and now we have a book,\* the joint production of two English travellers, Mr. Alexander Graham and Mr. Ashbee, on the architectural remains in what is, apparently, a still more inclement neighbourhood for the traveller and sketcher,—the region about Tunisia. Not that there is any difficulty in getting to Tunis itself, of course, but the penetration of the country in order to get at the desired architectural remains appears to be a pretty rough business, not to be undertaken by those (if there are any such) who want an architectural holiday in kid gloves. Our two travellers, however, seem to have been equal to anything of this kind, even to swimming across a river with their clothes packed on their heads, which was a necessary condition of progress at one point ; and they have produced a book which contains much information and a good many admirable illustrations, especially of the Roman remains of the country, accompanied also by notes on the general state of the country and population, over and above those details which are of special interest to architectural readers.

The first characteristic of Tunis, the authors note, is its excessive and pervading whiteness, all the cities in the neighbourhood being white, but Tunis the whitest of all :—"If economical in most things, in whitewash the Arab is extravagant. He applies it without discrimination,—from the mosque to the koubba, from the palace to the hovel. Bricks or mud, marble or stone, iron or lead, all pass under the same brush ; inscriptions are choked up, tracery is hidden, and carved capitals of beautiful design are thus made to look like stucco imitations." There was a time when this might nearly have been said of England,

and it is on record that London was at one time called "the white city" in consequence of its general white plaster physiognomy, a fact or supposition which was urged on us by a member of a certain Society the other day as a reason for leaving the old plaster on Staple Inn, instead of uncovering the older timber work. It is a curious feature in architectural history, this persistent recurrence of the desire to whitewash everything, developing itself as luxuriantly in the æsthetic taste of the Arab of the nineteenth century as in that of the English churchwarden of the eighteenth ; and it is, perhaps, still more singular that those who hold up their hands in horror at the idea of now whitewashing an ancient building will nevertheless regard with reverence the whitewash of a former generation, apparently on the principle that "whatever is, is right." Not that our authors condone the Arab whitewashings, if we understand them rightly, but they note that it renders the cities "beautiful at a distance," and as part of the landscape. The whiteness seen in the general view, however, is much diversified in the interior of Tunis ; the labyrinths of streets, the flying arches from house to house across the narrow thoroughfares, the shops with their painted wooden columns, and the wooden doors with quaint devices formed by numberless nail-heads (this latter feature being apparently a kind of charm, or so regarded) relieve to some purpose the otherwise monotonous white surfaces. A curious superstition is mentioned which we have not heard of before, that the constant use of black along with white voussoirs in the arches is a piece of moral symbolism ; it is the emblem of sin or imperfection, more especially when one black voussoir is inserted as a keystone where all the rest is white ; to build it or leave it all white would be to assume perfection, and leave the construction open to the revenge exercised upon it by the spirit of evil, who has to be propitiated by this form of recognition, provided for with black paint if "constructive polychromy" is wanting. If this be the case, it is a curious instance of the influence of superstition on architectural detail. It would be naturally supposed that the black and white voussoirs were the offspring of a pure desire for picturesque effect ; at all events, they seem, whether from association or not, to harmonise remarkably well with the Arab style of building generally.

The contrast between the modern and the ancient architecture of the neighbourhood is a very marked one. The authors give the following brief general description of the typical Arab town :—

"Low, brick-built, whitewashed houses, consist-

ing generally of one story, with arched doorways more or less pretentious, and barred windows planned externally without any attempt at symmetry, turning their backs, as it were, on narrow, tortuous, ill-paved streets, in which all kinds of ordure and objectionable matter are deposited. In the midst is a mosque of one uniform pattern, differing only in size and extent from that of some other town. On higher ground stands the military Governor's residence, the Kasba, or citadel. The whole is enclosed with a whitewashed rubble wall, crenellated, pierced for musketry, and buttressed at intervals ; pretty at a distance, but much less so in close proximity, and quite useless for purposes of defence. Such is the ordinary Tunisian town, almost devoid of architectural pretensions, if we except the Roman shafts of marble or stone that are conspicuous at corners of the streets, the support and mainstay of ill-constructed buildings."

These Roman bits built-in form, one might say, the only connexion between the architectural present and the architectural past. Of the latter the Consular report of Colonel Sir Lyon Playfair, for 1886, quoted by the authors, says :—"Great Roman roads radiated from Carthage, and even an immense series of secondary ones can still in many instances be traced by military columns, testifying to the ancient prosperity of the country and to the genius of its occupants, whether Punic or Roman. Every town on the course of these roads had its temples, basilica, palaces, forum, and therma, its theatre and amphitheatre. Triumphal arches and city gates are still found in all their classic grandeur, and at every step the traveller meets with Roman farms\* of almost monumental grandeur." The mosques of Tunis possess obviously some interest, as indicated by their picturesque gateways, but they are so jealously guarded from the incursions of the unbeliever that the authors can give no report as to their interior merits. One of the mosque entrances, that to the women's mosque at Tunis, is given in a phototype ; like some of the other doorways illustrated, it is a curious combination of a reminiscence of the Classic framework combined with Moorish details ; there is a built-up pilaster with a surbase and plinth on either side, a capital with a necking, and the survival of the architrave in the form of a flat arch ; and within this framework is the horseshoe arch and thin shaft of Moorish architecture, brought here by the Moors when expelled from Spain. Mr. Graham's drawing of this door was published in the *Builder* of January 10, 1885. The entrance to the Kasba at Susa, given in another plate, is also a curious combination of reminiscences of quasi-Classic general form, with corrupt or quasi-Moorish detail ; the cornice showing nearly the outline of a Classic

\* Travels in Tunisia ; with a Glossary, a Map, a Bibliography, and Fifty Illustrations. By Alexander Graham, F.R.I.B.A., and H. S. Ashbee, F.S.A., F.R.G.S. London : Dulau & Co., 1887.

\* Printed "farms" in the book : possibly it should be "forms."



cornice, with a kind of reminiscence of triglyphs below: the circular arch beneath springing from a clumsily-designed pilaster with capital and base, but the arch in sub-orders in the Gothic manner. Several other doorways are illustrated, and they are among the most picturesque illustrations in the book, and full of character and suggestion, both in their general forms and detail.

Even the larger palatial buildings of the modern period, though picturesque, are, in most cases, it would appear, of very flimsy construction, or are in a state of semi-ruin, partly owing to the practice of each new Bey building himself a new palace, the old abode of his predecessor being either dismantled or allowed to moulder away as it will. The Bardo, the palace of the last Bey, is, the authors say, so defective in construction that, though it has not been dismantled, in a few years it will be unsafe for occupation. It appears to contain a curious collection of things—shards from Carthage, mosaics from Italy, furniture from France, tawdry hangings, glass, and gilding, &c., “an unseemly collection of things good and bad, but mostly bad.” The Dar-el-Bey, or town palace, presents internally the same spectacle of a mixture of incongruous objects; but as a building it is, judging from the view given of the interior court, a very charming piece of architecture in a strongly-marked Moorish style, though built only in the beginning of the present century. The arcade is curious in detail, presenting something very like a thin Classical column to begin with, on the capital of which is mounted an oblong block on end, with the surface inlaid in panels, and from this spring the horse-shoe arches with their black and white voussoirs. The general effect of the whole is charming, except the mass of bare wall at the top, which sadly wants “treating” in some way. There is some talk, we are told, of converting this palace into a museum, a purpose for which the authors pronounce it to be very well suited, and in which capacity it would supply a want in Tunis.

In strong contrast with these picturesque but mostly perishable buildings of the modern period are the grand remains of the Romans and Carthaginians, who, in an architectural sense, were probably practically Romans, deriving their style from the great city of which Carthage attempted to be the political and commercial rival. The illustrations of these are the real objects of greatest interest in the book. The illustrations are, we presume, from the drawings of Mr. Graham; the authors have not given any direct clue to the distribution of the joint work between them, but these illustrations, reproduced in two tints from water-colour drawings, resemble in manner those of Mr. Graham's in illustration of Roman triumphal arches, which have already appeared in the same method of reproduction in the pages of the *Transactions* of the Institute of Architects. The first of these remains which is given is that of the aqueduct of Carthage, which marches over the plain in the usual magnificent manner so characteristic of the Roman aqueduct. In the portion shown in the view the aqueduct is in only one tier (about 70 ft. high), built in a kind of concrete in sections 3 ft. 8 in. in height; the piers, instead of having any spread at the impost, batter slightly inwards with a set-off like that of a Gothic buttress, only carried all round the pier, and from this spring the arches. The authors note that in another part of its course the aqueduct did present a grand series of superposed arches rising to the height of 120 ft., where it crossed the Oued Melian, but it was destroyed by a French Government engineer in order to assist in making a new bridge, and because he said the aqueduct obstructed the waterway of the river. This it may have done, no doubt; but nothing short of absolute necessity could have justified such a destruction of the finest portion of one of what are really the greatest remains left by the Romans in their capacity of builders. The most interesting and least known of the Roman monuments described are, perhaps, those of Sbeitla. Here are the cellas and a

quantity of the remains of three temples which stood side by side, with the porticoes nearly in a line; the colonnades are all overthrown, but, from the interesting view given of the actual state, there seems to be enough remaining to justify the restoration given on the next plate. A triumphal arch here, of which an illustration is given of the actual state, appears to have differed from the usual or most familiar model of Roman triumphal arches in having not merely applied columns on its face but advanced wings on either side of the archway, with columns spread out from the body of the structure and carrying cross lintels, one of which is still protruding from the face of the masonry above the anta, though the column which once sustained its other extremity has disappeared. The buildings, we are told, were constructed with a very hard compact limestone, “quite white when quarried, but acquiring a rich golden hue after long exposure to the sun. The other facing materials were limestone also, but of different shades of colour, from pale rose to deep red, from light grey to dark slate.” This latter piece of information is interesting, as it gives a rather new idea as to the use of a constructive polychromy in Roman masonry. The authors do not mention where they got the information as to the first-mentioned limestone “being quite white when quarried”; but we presume the same stone is now to be found and experimented on in the neighbourhood.

The authors have added to their book a very useful bibliography, or list of the works which have been previously written on the neighbourhood of Tunis; and a remarkably long list it is, showing that there is no want of literary information to be had about the country, though we presume that a good deal of this runs in the same tracks and does not take us into the less easily accessible places. They have also added a small map of the neighbourhood, an addition which saves a good deal of trouble to the reader desirous to follow the run of the country described. We may congratulate them on the production of what is a very pleasant and readable book in itself, though its chief value and interest consist in the description of the great Roman remains that were visited, and in the admirably executed and produced illustrations of these and of some of the Moorish buildings. In a practical sense, also, the book will be of use to any who may wish to explore the same line of country, in giving information as to the means (or no-means) of getting about, and the various and apparently not slight difficulties they will have to contend with.

#### “WHITELEY v. BARLEY.”

“SECRECY,” it has been often said, “is the badge of fraud.” If, however, the decision of Mr. Justice Mathew in the case of *Whiteley v. Barley*, delivered in the High Court on the 21st ultimo, be upheld on appeal, it would appear that the fullest publicity given through local journals, and transparent honesty on the part of the officers of local authorities, will not avail to save them from the pains and penalties imposed by the Public Health Act on jobbery and corruption.

We owe no apology to our readers for bringing this, the latest case, to their notice, as it concerns the character and welfare of an honourable profession, which has never yet been adequately remunerated for good service rendered to the public, and is for that reason exposed to manifold temptations.

The action referred to was brought by an informer under the 193rd section of the Public Health Act of 1875, to recover certain penalties from the Surveyor of the Corporation of Ransgate. Under several contracts made by the Corporation for the improvement and drainage of the town, the Surveyor was instructed by formal resolution of the Works Committee to take out the quantities of the contract work, his fees being calculated at a sum equal to 2½ per cent. on the amount payable by the Corporation under the contracts; and, as is customary in such cases, the amount of these fees was charged in the contractor's accounts,

and received by him upon obtaining a certificate from the Surveyor that the works had been completed.

There were contracts also for main drainage works which the defendant Barley was appointed to supervise as engineer by a special resolution of the Council, and for extra services in respect of these contracts he was entitled to receive also a percentage on the cost, together with a sum equal to 1½ per cent. on the amounts certified for taking out the quantities as a necessary part of the preliminary engineering work.

It was proved beyond all question that there was no attempt at concealment in the transaction. All was fair and above board, and, although the fees payable to the Town Surveyor passed through the hands and accounts of the contractors, still there was no ground for saying that they came from any other source than the borough funds, lawfully chargeable under the terms of the contracts with such payment. It was alleged at the trial that the Surveyor was bound to account for them, less his expenses out of pocket, but the jury found that such an arrangement was not in fact made.

After some consideration, and with evident reluctance, the judge held that the Town Surveyor was a party “concerned and interested” in these contracts within the meaning of the statute, and inflicted four several penalties of 50l. each, or a sum of 200l. in all,—just one year's ordinary salary of the unhappy delinquent, whose honesty and *bona fides* from first to last had never been impugned; and further, in addition to these penalties, he was, in pursuance of the same section, declared incapable of continuing in his office, or holding any employment under the Act.

It may be expedient to strive to make men virtuous by Act of Parliament, and we certainly do not desire to throw blame upon the Legislature for a laudable effort to check the plague of secret “commissions,” and put their heel upon the whole tribe of petty pilferers and speculators who are a standing disgrace to local self-government, and the gravest obstacle to its extension and development; but we contend that this practical interpretation of a well-meant clause is a *reductio ad absurdum*.

If sound in law, and we fear that it will be so held, the position of a Town Surveyor, always inadequately paid, may become well-nigh untenable; and it behoves the Surveyors' Institution, or the Association of Municipal Engineers, to beset themselves to obtain an amendment of the Act without delay. It has been done before when a similar paradox was brought to light, and by following the lines of the amending Act, known as the 48 & 49 Vict., c. 53, there will be no difficulty in amending the statute, so that real offenders will be punished as they deserve, whilst taking the sting of injustice out of a very salutary enactment.

It was the decision of the Court of Appeal in *Burgess v. Clark*, followed by an equally startling interpretation of the Act in *Todd v. Robinson*, some weeks later, which brought about the amendment of the law. In the first case, the Clerk of a Local Authority was held liable and fined in the sum of 50l. for letting rooms in his own offices to the Board at a rent payable to himself, this being held to be an unlawful bargain. In the second case, the Clerk of a Sanitary Authority held a few shares in a gas company which had contracted to light the public streets at a price which would leave a small profit to the company. He was held to have an “interest” in such contract, and was also fined 50l. under the section.

These and other similar anomalies induced the Legislature to amend the Public Health Act by providing that a formal resolution of the Authority approving the transaction, after seven days' notice of the meeting published in a local newspaper, should render the letting of rooms and lands, or the holding of shares in any public company which had contracted with the Board, no longer unlawful. Moreover, the written consent of the Attorney-General was made necessary in certain cases.

We think that the case now under review



will serve to indicate the necessity of a still further revision, so as to extend the exemption from liability to honest servants, in all transactions and bargains openly made and approved by the employing authorities.

The resolutions of a public body, publicly advertised, ought to put every ratepayer on his guard, and in this wise many meritorious officers will be saved from a public condemnation, which ought to be reserved for a class of "pestilent fellows" who love darkness because their deeds are evil.

## NOTES.

**M**R. SPIERS has sent us a letter and a diagram in reference to our remarks about the sphere in perspective in our notice of his book on architectural drawing, which we are unable to publish this week, as the diagram was sent late and requires an alteration in the scale of the lettering before it can be reproduced. We may say at once, however, that Mr. Spiers did not intend to suggest that a sphere *per se* could, in any position, be seen as distorted, but only that its projection on the plane of the drawing involved distortion under certain circumstances. We thought he could hardly intend the former meaning, but the sentence struck us as not very clear in its expression. Even on this ground, however, we do not think the question, also referred to in Mr. Bagdall's able and practical paper read at the Architectural Association (and printed in another column), is practically quite such a simple one or so easily disposed of as one or two correspondents who have written to us appear to consider it, for reasons which we will give when we print Mr. Spiers's letter and diagram.

**T**HE *New York Herald* has published a statement of the expenditure on the Panama Canal to the 30th of June, 1886, which has been drawn up by Signor Armero, the agent of the Columbian Government. Among the items to which Signor Armero directs special attention are the following, the prices being stated in dollars:—Stables, 600,000; buildings for offices, private residences for manager, country seat for same, grounds, &c., 5,250,000; central hospital at Panama, hospital and ambulance at Colon, sanatorium at Tabago, and the pharmaceutical staff cost, together, 12,760,000; the offices at New York, Paris, and Panama cost 8,400,000; and there is an item of 2,000,000 for the cost of entertaining guests invited to accompany M. de Lesseps to Panama to inspect the canal during a week's sojourn. It will have to be very clearly shown on what evidence Signor Armero gives figures which, as is the case with the above, are not to be found in the yearly statement of accounts furnished by the Directors of the Canal Company. Indeed, it has to be made more clear than is at present the case, in what currency the dollars above stated are calculated, as the value of the American dollar would give a much larger sum than the accounts of the Company show; while, at the same time, the heavy charge of 1,784,000, for preliminary expenses does not appear in the table. The total given by Signor Armero is 154,909,088 dollars. The total expenditure to June, 1886, according to the balance-sheet rendered by M. de Lesseps on June 30th, 1887, was 640,173,195 francs. It is a remarkable thing that among the numerous reporters who have from time to time given accounts of the state and progress of the enterprise, only two, as far as we remember, namely, Herr Bayeler and Mr. Rodriguez, seem to have taken the necessary precaution of consulting the series of the *Bulletin du Canal Interocéanique* for definite statements as to work done and cash laid out.

**T**HE displacement of the centres of productive industry from their inland homes to places accessible by water still goes on. The great Atlas Works of Messrs. Sharp, Stewart, & Co., of Manchester, are, as we mentioned last week, to be closed, the business being transferred to Glasgow. Had

the Manchester Canal experienced less delay in obtaining Parliamentary sanction, it is possible that a movement so disastrous for Lancashire would not have taken place. But our manufacturers cannot afford to wait. The *Staffordshire Advertiser* announces the probable re-introduction into Parliament of the Upper Trent Navigation Scheme, which was thrown out by the landowners' opposition last year. The magnificent waterway of the Trent, neglected as it has long been, is unrivalled in the kingdom for its natural capabilities, and the work necessary for putting Birmingham in direct water connexion with this arterial channel is surprisingly little. It is estimated that goods may be conveyed the 170 miles from Birmingham to the Estuary of the Trent for 8s. per ton, or about half of the lowest rate practicable by railway. As compared with existing charges, of course, the reduction will be much more considerable. The Warwick Canal Company co-operates in the promotion of the new navigation, the opening of which can be hardly less than of vital importance to Birmingham.

**T**HE recently-decided case of Bateman v. The Poplar District Board of Works seems to show that some amendment is required of the Metropolitan Local Management Act, 1855. The houses on one side of a road at Poplar were drained into a 9-in. drain running under the yards and gardens at the back of the road, and this was connected with a main sewer. The Court of Appeal held that this drain was not a sewer, and so was not the property of the District Board. The question then arose, it being discovered that another drain belonging to different premises had been connected with the first mentioned one without the knowledge of the District Board, whether this circumstance made the first-mentioned drain a sewer? Mr. Justice North held that it did not, because the defendants could not have known of the connexion with reasonable care. Certainly a connexion surreptitiously made could not well alter the position of the Board; but, on the other hand, it seems to us that such a drain as this should be vested in the Local Authority immediately it is made. It is essentially a "trunk" sewer or drain, not appertaining to any individual house, and it falls within the category of general drains, which ought to be under the charge of the local public authority.

**I**T is reported that Mr. T. J. Steel, of Gracechurch-street, has purchased for the sum of 200,000, the Strand property of Lord Salisbury. The property in question, whereof the sale was mooted rather more than two years ago, comprises Cecil and Salisbury streets, together with part of the ground between Savoy Mansions (now being built) and the Adelphi, lately washed by the Thames, and extends over about 66,000 feet superficial. On this fore-shore stand some stables, &c., and the tenement which until about 25 years ago was known as the "Fox under the Hill." Its signboard remains across what used to be an approach to the halfpenny steamboat pier at the foot of Ivy Bridge-lane. In the account of a fire in Cecil-street on the morning of Sunday, September 5th, 1880, it was announced that the flames broke out in a house which was "once the residence of the Cecil family . . . and in one of the rooms, which amid all alterations has been preserved intact, Queen Elizabeth when a guest of the Cecil family is said to have slept." That can hardly be the case, inasmuch as by 1695 had been pulled down the two tenements known as "Great Salisbury House" and "Little Salisbury House." These, combined, formed the original Salisbury House, one of the famous Strand palaces, which was built westwards of the garden of Carlisle, since Worcester House, by Sir Robert Cecil, James I.'s Lord High Treasurer, elevated Baron Cecil in 1603, and advanced Earl of Salisbury the 4th of May, 1605. Queen Elizabeth was present at the house-warming on the 6th of December, 1602. The ground was traversed by the brook Ulebrig, which crossed the Strand beneath the Ivy Bridge. A view of the house may be seen in

the Fauntleroy Pennant at the Soane Museum, and in Wilkinson's "London Illustrated," after Hollar. William, second Earl, divided his father's house into two, as indicated. He reserved one portion for his own town mansion, Great Salisbury House. The other portion, Little Salisbury House, was rented to persons of quality, and was at one time occupied by William Cavendish, third Earl of Devonshire, husband to Elizabeth, daughter of William, second Earl of Salisbury. This latter house's site was leased out, in 1692, for Salisbury-street, since rebuilt by Payne, the architect, the crescent and flight of steps at the southern end being added when the brothers Adam obtained their Act in 1771 (Geo. III., c. 34) for making encroachments upon the riverside. The western horn of the crescent stands over Ivy Bridge-lane, which is overlooked by the back bay-windows of the street. A further portion of the estate was let on lease, and covered by a range of shops, the Middle Exchange, reaching from the Strand to the bridge, or stairs, at the river's bank. Proving a failure, the Middle Exchange, together with what remained of Great Salisbury House, was demolished in 1695, and their site appropriated for Cecil-street, whereof the eastern side lies within the Precinct of the Savoy, and abuts against Carting-lane, alongside of the Savoy Theatre. It was whilst standing before the door of his patron, the Earl of Devonshire's, house here that Hobbes was seen and cordially recognised, in June, 1660, by Charles II., who was driving along the Strand. At the sign of the Globe, in Cecil-street, lived, until 1715, Partridge, cobbler, astrologer, and almanack-maker, whom Swift pertinaciously killed in 1708. His almanack, *Merlinus Liberatus*, did not die with him. In 1723 were advertised "Dr. Partridge's night-drops, night-pills, &c., sold as before, by his widow at the Blue Ball, in Salisbury-street." In Cecil-street lived Patrick, ninth Baron Gray (1706), and Sir William Dawes, Archbishop of York, during the interval 1721-4: these at the end house on the western side. No. 18, eastern side, was, in 1800, tenanted by Dr. Wollaston, the celebrated chemist and natural philosopher, who invented the reflecting goniometer, discovered palladium and rhodium, and familiarised us with the practical uses of the camera lucida and the blow-pipe.

**A**T the annual presentation of prizes last week to students attending the Life School of the Royal Scottish Academy, Sir William Fettes Douglas, the President, delivered an interesting lecture on the Beginnings of Art. He inferred from the discoveries of Schliemann amongst the ruins of Troy that, upon the whole, the Greek record was the least broken, and the most steadily consecutive. "Art," he said, "is the truest and most subtle guide when men seek to judge of works of unknown provenance," and it would be well if archaeologists and ethnologists would look to it for the assistance they need." From the carvings found in the Dordogne cave, in circumstances and surroundings showing a state of wretched barbarism, he judged that they were the work of "a race who had not been always savages, but who were the degraded outcome of a degraded civilisation,—a civilisation which probably existed before that of Egypt."

**I**N a recent issue (Oct. 8) we drew attention to a remarkable discovery made by the French excavators at Mantinea,—three marble reliefs representing the contest of Apollo and Marsyas. It will be remembered that the great interest of the reliefs was that, presumably, they once decorated the basis of certain statues made by Praxiteles and described by Pausanias. Since our last notice a good many particulars have come to light. The reliefs have been taken to the Central Museum at Athens, casts are already made, and they are shortly to be published either in the *Ἐπιτομή Ἀρχαιολογική*, or the *Bulletin Hellenique*. Meantime, we may state that each relief measures c. 1'5, and that the marks of cramp-irons which served to attach the slabs are still visible. The composition is disposed as



follows:—In the centre relief, Apollo seated holding his lyre; in front, Marsyas playing on the flute, near him a Scythian; in each of the two remaining slabs three Muses. Unhappily, not only the style of the reliefs, but the form of the cramping-irons used leaves no doubt in the minds of experts that the relief is of much later date than Praxiteles; so we are bound to relinquish that cherished hope. The further interesting question remains, are the reliefs seen by Pausanias? Pausanias distinctly says (viii., 9, 1) he saw "the Muse and Marsyas playing on the flute" (*τὴν τῇ βάβρῳ Μοῦσαν καὶ Μαρσῖαν αἰδῶν*). It has been proposed to amend the singular into the plural in order to admit the other six Muses. It seems to us perfectly obvious that no such emendation is necessary. Pausanias, in his perfunctory way, glanced at the front of the basis, saw one, and only one, draped figure playing on the lyre, and concluded it was a Muse. He says nothing whatever of Apollo. The Muses have, it is reported, all the air of being copied from statuary types, and are, therefore, not successful in relief composition. The figure of Marsyas is in the, no doubt, typical attitude of the Myron replicas.

THE Greek Archaeological Society have laid bare the foundations of the small temple to Roma and Augustus, on the Acropolis. The site is twenty-five metres to the east of the Parthenon. The building was of white marble, circular, and surrounded by nine Ionic columns. The diameter is seven metres. The existence of such a temple has been known since the days of Cyriac of Ancona. The priest of Augustus, who, no doubt, presided over this temple, had a special, inscribed seat in the theatre; and there is also a seat inscribed with the joint names of Demos, the Graces, and Roma. From another inscription (C. Corpus, 478) we learn that Roma, as a goddess, had a joint sanctuary with Augustus on the Acropolis. A short account of the excavation appears in the *Berliner Philologische Wochenschrift* for the 3rd inst.

AN invention has been recently patented which promises to be of material service in all cases where the flow of water, gas, or electric fluid has to be varied at stated hours. Constant attendance and supervision are now required for the purpose, and when the variation has to be made late at night, or early in the morning, the expense of watching is an object as well as the risk. The improvements in question have been made by the Right Honourable Major-General Sir J. C. Cowell, K.C.B., an officer of the Royal Engineers. A wheel is driven by clock-work, so as to make one revolution in each cycle of periodic variation required. This wheel bears a horizontal ring or disc, the surface of which is made to rise or fall in proportion to the variation of supply required from time to time. A regulator is raised or lowered by the revolution of this curved surface, which opens or closes the pipe or channel through which the current of fluid passes. The utmost accuracy is thus attainable, both as to the time and the quantity of supply; and the motion of machinery may be stopped, modified, or set going at the exact time required, without the need of any attendant. In cases where machinery is driven by turbines, and where arrest at a late hour, or starting at an early hour is required, the time-regulator will perform the function of an un-sleeping engineer. The lowering of a gas supply over a large area, say at one or two o'clock in the morning, may be punctually secured by the same means. Mechanical men will readily recognise the valuable service that may be rendered by the Time-regulator.

FLATTED houses are now becoming common, owing to the high prices of building sites within cities. Where portions of these tenements are owned by different parties, nice questions are apt to arise as to the rights and duties of the respective holders. A strange hitch of this sort has arisen in Edinburgh. The fronts of two contiguous houses in the High-street, which had been discovered to be in a dangerous condition by the Burgh

Engineer, were ordered to be taken down. The frontage was seven stories, and the proprietors of the five lower stories have rebuilt their portions, but the owners of the two uppermost floors decline to proceed. The roof has been propped up, and there is considerable risk of its being displaced by a high wind. The matter is under the consideration of the Dean of Guild Court. We have heard of instances where a tenement has been taken down and has not been replaced for years owing to misunderstandings between the joint owners, but never of a case like the present. There would appear to have been no arrangement entered into between the owners, as should have been done before building operations were commenced.

THE new premises for the accommodation of the Elder Chair of Naval Architecture and Marine Engineering, Glasgow University, are now completed and occupied. These buildings, which also comprise a principal gateway and janitor's house, are the donation of Sir William Pearce, Bart., M.P. The picturesque and impressive facade of the old College in High-street, with its bold corbelling, has been incorporated in the principal front of the new edifice, the entire stonework having been successfully transported from east to west. The masonry, which is of a very vigorous character, dates back to A.D. 1633-58. The entrance for pedestrians is through the original archway, conspicuous by its massive rusticated quoins and vousoirs, which opens into a handsome arcade piazza. The ancient sculptured escutcheon bearing the Royal Scottish Arms and the monogram "C. R. 2," a fine old carved shield with the arms of the University, and a tablet relating its foundation by Bishop Turnbull, A.D. 1451, and the curiously-carved window-head and dormers, on which may be recognised the arms of England, Scotland, Ireland, and France, are embodied in the structure. These several features have been grouped with the new work, which is designed in harmony with the mixed Jacobean and French style of the old College. A Latin inscription above the principal entrance records the circumstances of Sir William Pearce's gift. The access to the classrooms is by a circular stair tower, and the carriage entrance gates are flanked by massive stone turrets, rusticated to match the principal arch, and surmounted by high-pitched conical caps. The malleable iron gates, which are of imposing dimensions, have been designed by the architect in the old Scottish style of ironwork. The entire structure constitutes a stately and interesting entrance to the University precincts,—a link between the present and the past. It may be added that the doorway of the former Fore-hall has been re-erected in its wonted position at the head of the quaint "Lion and Unicorn" staircase in the Professors' Quadrangle, itself a relic of the old college. The architect of these buildings is Mr. Alexr. George Thomson, I.A., Glasgow, who, in October, 1883, advocated in the press the removal and re-erection of the ancient stonework and decorative features as an adjunct to the University in its new site at Gilmour Hill.

#### ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE third ordinary meeting of the present session of this Institute was held on Monday last, Mr. Edward T'Anson, F.G.S. (President), in the chair.

#### Obituary.

Mr. W. H. White (Secretary) announced the death of Mr. Edmund Woodthorpe, Fellow. The President.—It is not my intention to trouble you with any long speech on the subject of the announcement which has just been made to you. I am quite sure I have only to mention the name of one who was so universally known amongst us, for a more cheery, bright, and honourable man did not exist in the profession. Gentlemen, with these words I will say no more, because you will have in my Proceedings a short paper I have written myself, and I have no doubt also that the professional papers will deal with the subject.

Professor Kerr.—I am glad to be allowed to say a word on this subject. Nothing could be added to the very feeling testimony which you have borne to Mr. Woodthorpe's memory. We all knew him so exceedingly well, both in this room and professionally at large. He was, as you have said, a most honourable man, most genial in his ways, and most useful as a member taking part in our discussions. But there is one thing I must say, if I may be allowed to do so without verging upon indiscretion. We know that Mr. Woodthorpe held two very important offices, and that he and his family must have been largely dependent upon the income derived from those offices. The headship of his family has now devolved upon a most worthy son,—a man of high education, character, and estimation. I think I may say that we hope the authorities will not overlook the claims of the son, as a matter of respect to the father. If it should be, as I think it will be, decided elsewhere, that this will be mentioned to the Metropolitan Board of Works, quasi officially, I am quite sure this meeting will authorise the Council, or any representative of the Council, to recommend this gentleman as successor to a father so very much respected as a public officer of the highest standing, and possessed of great wisdom, as I can testify from his management of our affairs in connexion with the District Surveyors' Association. I think, therefore, that it would be a most graceful testimony to the respect in which Mr. Woodthorpe was held, if some favour were shown to his son (applause).

#### The Institute Examination.

The Secretary next announced that at the Examination lately held, twenty-five candidates were examined, of whom nineteen had passed, and were qualified to become candidates for the Associateship. The following were the successful candidates, viz.:—Messrs. A. T. Bolton, E. J. Brydges, Thomas Davidson, E. H. Dawson, G. A. H. Dixon, J. W. Donald, G. W. Durrell (from Sydney), S. G. Gosse, R. M. Graggin, Thomas Henry, George Hornblower, L. V. Hunt, W. C. Jones, John Peter, A. B. Pite, G. W. Sadler, jun., H. A. Satchell, A. Sykes, and W. H. Woodroffe. These, with the twenty-five candidates who had passed in March, made altogether forty-four who had been successful this year (applause).

The Secretary further announced that the Ashpitel Prize had been awarded to Mr. Thomas Davidson, aged twenty-three, formerly of Scarborough, and now of London.

#### Theatre Construction.

Mr. Ralph Nevill, F.S.A., then read a paper entitled "The Auditorium of a Theatre," of which the following is an abstract:

The author, after a few introductory remarks, dealt with the plan of a theatre and the arrangement of seats. In England, within the last few years, various efforts had been made to meet modern requirements. The drawings which he was able to exhibit by the kindness of Mr. Phipps and Mr. Verity would confirm that statement. Mr. Irving's plan was bad, for the people at the back could only see the lower half of the stage. The system of seating at the Haymarket was the best artistically, and the proportions allotted to the various parts of the audience were commercially most satisfactory; the system was also economical in first cost, and in proportion of cubical space to accommodation. The pit, which should be as large as possible, would, with good accommodation, always prove a financial success. The stalls should be only slightly curved, having no central passage, and the seats should be regularly alternated, so as to afford a clear view between the heads of those in front. The visible openings of boxes should not be more than 5 ft. or 6 ft. high. The gallery should be at the back, and not in the circle. It was important, artistically, as well as for acoustic reasons, that the ceiling of the auditorium should be as low as possible.

Acoustics.—The circular form of building afforded no advantage, the best being a triangle with the stage at the apex, as in the theatre at Baireuth, although seats arranged on a curved plan allowed a greater number to receive unimpeded waves of sound. In a plan by the author,  $\frac{1}{4}$  the diameter was taken for the height from the stage level to the springing of the ceiling; this was lower than most modern



theatres, the height of which, apparently, measured as much as the diameter. The lesser height was, however, an artistic and economical, as well as acoustic, gain. Flat ceilings rendered the hearing in the upper part defective; if curved, the sound was collected and delivered in a body on to the upper circle. Ventilation and fire risk were also connected with the ceiling; the introduction of the sunlight rendered it more easy to ventilate through the centre of the roof, and some suggested a cupola, but this he considered impracticable and undesirable. Proposals had been made for reversing the draught by ventilating through the stage, but most architects would agree with Professor Roger Smith that all draught should be from the actor to the audience. Professor Smith quoted, in his treatise on acoustics, some experiments to the effect that though sound travelled better with the wind than against, yet it travelled better still across the wind. If this were true, and the author believed it was, one great objection to the central ventilating flue disappeared. Saunders, Professor Smith, Mr. Salomons, and nearly all English theatrical architects, upheld wood, while Lachez, followed by some of the French architects, demanded solid construction. A house for music requiring an amount of resonance, while in one for acting sound should be delivered pure and distinct. Wood was, therefore, as bad for the latter as stone or hard walls for other reasons. Plaster was the suitable substance, supplemented by drapery where necessary. Wood might be a suitable lining to solid walls if carefully selected, put together like cabinet work, and well oiled and varnished; but floor boards nailed to wooden joists, or match boards papered or painted, had no beauty of tone, and the consequent vibration interfered with the purity of the sound. In Terry's Theatre no wood was used in this way, but, instead, concrete floors and partitions of plaster on wire netting and iron uprights. The ceiling should be treated as a resonant surface, constructed of iron and plaster, with a second roof over enclosing a sufficient hollow. The spaces under the floor and orchestra should also be hollow. Any resonant substance used should be of homogeneous character.

**Lighting.**—This ought to be regarded by the manager as a potent means of inspiring an audience. It might be accepted that the electric light would be used, but, nevertheless, provision must be made for gas. To be successful artistically, the light must be various. In the event of fire the electric light would be extinguished; the gas sunlight ought, therefore, never to be put out, but turned low during the performance, and turned up full between the acts, the electric light being turned quite out in the first case, so that the eye was entirely drawn to the stage. The front of the circles was the natural place for electric lights. Putting them high up in a cupola, and using ground-glass globes for electric lights, was to be strictly condemned; the latter, though much used, destroyed the brilliancy of the light. The lights to the passage and on the stairs should be on a separate system altogether from that of the auditorium or the stage, and should be controlled from the front of the house. To protect against rushes of carbonic gas extinguishing the light, at certain points, such as the entrance to stairs and opposite doors, small flues and openings with thick glass fronts should be provided in the walls for lamps or gas-lights.

**Ventilation.**—The electric light rendered no great provision of fresh air necessary during a performance. It would, however, be always requisite to provide an exit for impure air,\* and, as long as gas was used behind the scenes, there must be sufficient ventilation to take away the enormous and dangerous heat at the top, without creating a draught to the stage. The sun-burner ought to be in a little cone or drum of its own, and have an outer ring to the shaft, which should be opened by the same action that turned up the light, in order that ventilation might be accelerated between the acts.

**Exits and Entrance Stairs, &c.**—Necessarily the site largely governed both exits and entrances, and the important point was to get plenty of doors leading out of the auditorium. Any part accommodating more than 200 persons

should have more than the usual two doors. The pit holding 350, in a plan of his own, possessed four doors and an extra one in the middle. All doors should have the upper panels glazed, should open outwards, and be self-closing, so that, when the audience was out, the doors would be closed to fire. No more dangerous arrangement could be conceived than a long straight staircase. The straight exit from Terry's Theatre had been made a great deal of in the public press, but having passed down it, he would rather take his chance anywhere in the passages of a burning theatre than be one of a crowd going down it. No flight of stairs should be long without at least a small landing that might afford opportunity to resist pressure from behind. The best form of landing-stair was undoubtedly such as that to the gallery at the Prince of Wales's Theatre, in which four flights of four steps each went round a centre. The rounding-off of the corners was a great improvement. The great desideratum in a staircase was that a crowd could pass from top to bottom without any great pressure at any point, and in a continuous stream. A circular staircase would best attain this, the difficulty of the difference in the width of tread being overcome by using an ellipse for the plan, in which the steps were set to a very large radius, and the small ends used as landings. There was another form of the ellipse still more easy, and often applicable to a theatre—this was by forming the ellipse round a triangle. The Metropolitan Board of Works required that every staircase should be solidly closed in on both sides. The author ventured to say that regulation was a dangerous mistake. A staircase in a public building should be open at the sides from top to bottom; there should be no part from which the passengers were unable to see what took place all the way down, and, especially, to see the way out. Mr. Nevill considered it would be of the greatest advantage if all the staircases could be concentrated in one building, and be under one general control and supervision. A design for such a staircase, on the triangular plan, was exhibited; each flight rose 8 ft. 6 in., the height of the floors. A separate staircase started from each corner—one to the pit circle, one to the upper circle, and one to the gallery. The central space was left open, and the whole building carried up to a good height to allow smoke or gas to escape upward. Iron foot-rests should be built into the stair on the inside, up which firemen could climb if required.

**Fire Risks.**—At the present moment this was the point of most interest in connexion with theatres, and after deprecating more than a certain degree of legislation and State interference, the author expressed his belief that in London, in a well-regulated theatre, fire risks were of the slightest. The only particular danger in a theatre, above other places, was the reckless use of gas behind the scenes and the extreme combustibility of the woodwork over the stage. Electric light and fireproof paints, together with the careful use of iron and concrete in the structure generally, would minimise the danger. Some form of fireproof curtain must be obtained, and sufficient of the top of the stage should open to form a chimney. It was an advantage to substitute iron in the seats where feasible, to avoid a blaze as much as possible. The seats should be cut off by a fire-resisting partition or wall from the corridors. The opening in the top of the stage should not be too large, and the same action which opened it should open a valve at the bottom for inlet of air. Referring to the fireproof curtain, Mr. Nevill mentioned several, such as hydraulic curtains of two thicknesses of iron, solid oak or teak, asbestos, silicated cotton curtains, and the water curtains of Captain Heath and M. Marinus. A very useful addition to a theatre would be a separate door and small iron stair in a fireproof shaft for firemen to enter from the outside.

The reading of the paper not being concluded until a quarter to ten,

Professor Kerr moved the adjournment of the discussion, as the subject was one of too great importance to be dismissed in the quarter of an hour which remained to them that evening.

Mr. Walter Emden said he had been invited to be present with a view to taking part in the discussion, and he was afraid he would not be able to attend at the adjournment.

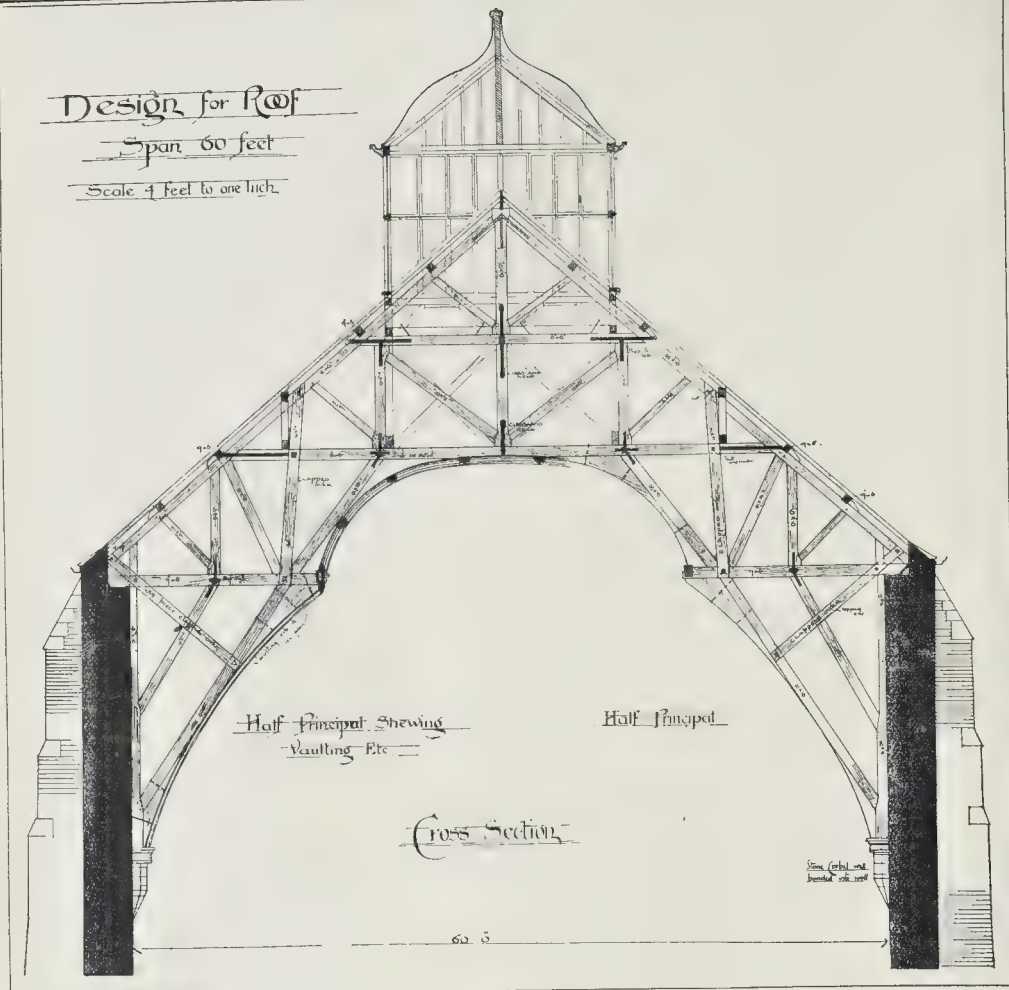
The President believed the paper would lead

to a long discussion, as the subject was one of extreme interest. They had, however, still a quarter of an hour before them, and there was no reason why they should not occupy that time in commencing the discussion, at any rate.

Mr. Walter Emden then said he would be pleased to follow the paper as far as he could; at the same time, there was in it so much of pure theory and assertion, and so much which was opposed to practice, that it would be impossible to go through it in anything like a satisfactory manner. He would, therefore, only take up one or two points, which seemed to him those on which he could more particularly touch. The first was the placing of the pit people in a better position. No manager could afford to make his theatre a "Royal Pit Theatre," by giving the best portion of his house to the frequenters of the pit. Mr. Irving's plan of putting the pit people a long distance back was not advisable, as they would not be able to see, they would be pretty well suffocated by the heat, and a great portion of them would not hear what was going on. At the same time, the ordinary theatre which obtained favour in England, with its pit and stall tier, its dress-circle tier, and its upper-boxes and gallery tier, was the one most suited to the habits of the people. With regard to acoustics and the use of wood, it had now been proved that iron and concrete were equally good conductors of sound, creating a much better and more resonant sound than wood construction. No doubt plaster on wire would act in much the same way, but was it necessary? In the case of Terry's Theatre, the partitions between the boxes were not of plaster, but were of hollow fire-brick. As to staircases, there was no elliptical one which would be helpful in case of a crush, although a crush was sometimes stopped by a square staircase. People often got out better by a straight staircase, but whether the straight or square form was the better was a question that might be debated for ever without any satisfactory conclusion being arrived at. By using an elliptical staircase, he was quite sure no one would be saved. He had had experience of one in his late offices, and everybody stumbled who came up it, as the tendency of the eye to look in a curved direction gave the body a proneness to swing over. What was required was to make the staircases as straight and clear as possible for people coming down, and particularly when in a state of panic. The lecturer had made a mistake in stating that theatres were generally lit by gas or electricity commanded from the side of the stage. That was not so; for, according to the regulations, there must be a separate meter in the front of the building to command the lighting of the house, the only portion of the front of the house commanded from the stage being the sunlight. As to theatres being fireproof, he could absolutely affirm from experience that no theatre had been built, before Terry's, that was really what could be termed fireproof. The circles or tiers were built in the ordinary way, with iron girders and columns, but the intermediate construction between the girders had, up to the present time, been of wood, and, although a small portion of concrete might have been used in the corridors, the tiers which carried the public had been built of wood. There was no doubt that it was a perfectly easy matter to build a fireproof theatre, so far as the auditorium was concerned, and of materials that would not communicate fire. The difficulty and danger was from the stage, and it was that portion of the building which required to be dealt with in the most experienced manner. As the lecturer had not travelled outside the question of the auditorium he himself would stop at the fireproof curtain. An iron curtain would probably buckle under the action of heat more quickly than a wooden one, and in doing so, its immense weight might pull down the proscenium walls and wreck the theatre. What was wanted most was to save the audience by giving them time to get out of the building. In order to do that something was wanted which could be readily at command. An ordinary asbestos sheet curtain on an iron grille could be used in the same manner as an ordinary green curtain, going up and coming down between the acts, and such a curtain, especially if of double thickness, would stand for a sufficient time to allow the house to be emptied. The line of sprinklers over the curtain would keep it cool, and it would probably stand when everything on the

\* And how is the exit to act, unless there is an inlet of corresponding superfluous? Unless this is supplied in a proper place, the requisite exit can only act by drawing in fresh air through places not intended,—doors, &c.; i.e., by creating draughts.—Ed.





stage was burnt out. Therefore, as long as the curtain stood, the theatre would practically consist of two buildings, - one on fire and the other not. He did not consider sprinklers to be useful when they were automatic, though they were serviceable if placed under the control of valves. A sprinkler with a small spray of water was not intended to extinguish a great fire, but rather to attack the fire in its incipient stage. A pail of water could have saved the Exeter Theatre had it been applied to the part of the border which first took fire. As to the system stated to have been used at Drury Lane in 1812, so far as it went, it was upon much the same system as the modern idea of sprinklers. It consisted of rows of pipes pierced with holes. These might have rusted or otherwise got out of order, and were probably found expensive to deal with, owing to want of pressure, because the water-supply then came from Adelphi-terrace. He believed the arrangement had not fallen into disuse so much because of its ineffectiveness as from want of the necessary pressure, and from the pipes being left unused, and getting out of order. And though the present sprinkler was a very effective and useful appliance, it would be wrong to exaggerate its use; it was simply serviceable in arresting a fire in its incipient stage.

Mr. Alfred Darbyshire said that he had come from Manchester to take part in the discussion. As it had been decided to adjourn it, he would ask to be allowed to send his contribution in the form of a written document, as in all proba-

bility he would be unable to attend when the matter came up again.

Mr. Robert Walker seconded Professor Kerr's proposal for the adjournment of the discussion. The paper they had heard contained a great deal that was valuable, and also much that was startling to those who knew anything about theatres and theatre-building. It had fallen to his lot during the last twelve years, as District Surveyor of a central part of London in which fifty per cent. of the largest and principal theatres were situated, to have a great deal to do with them. He had seen many theatres destroyed, and many reconstructed and rebuilt, and, from the experience he had been compelled to gain in active service, he differed from a great deal that Mr. Nevill had advanced. He was therefore prepared, if the discussion were adjourned, to re-open it on its resumption. But he would like in the most emphatic manner, as a practical architect, associated officially with the supervision of a large number of the London theatres, to protest against one expression which had fallen from Mr. Nevill. That gentleman had said that the public were under great obligation to managers for providing theatrical entertainments, and that (though he was not quite sure he had caught the exact words) the question of the number of exits, and the absolute safety of the public in the buildings as regarded the exits, were not altogether subjects for legislation of the most direct character. Now, he must dissent entirely from that view, and believed that it was their business, as professional men, who had to overlook those build-

ings, to see that there was the minimum of danger attaching to them. And, so far as they could, by legislative enactments, bring their influence to bear, it was their solemn duty to see that such enactments were carried out as necessary for the absolute safety of the public. He would, therefore, warn his hearers, as professional men, that unless they adopted that as a principle of their professional career and practice, the public would sweep them away.

Mr. E. J. Tarver\* then proposed a vote of thanks to Mr. Nevill.

Mr. Octavius Hansard seconded the motion, adding that he hoped the members would have copies of the paper *in extenso* before the discussion was resumed.

The resolution, on being put to the meeting, was very cordially received.

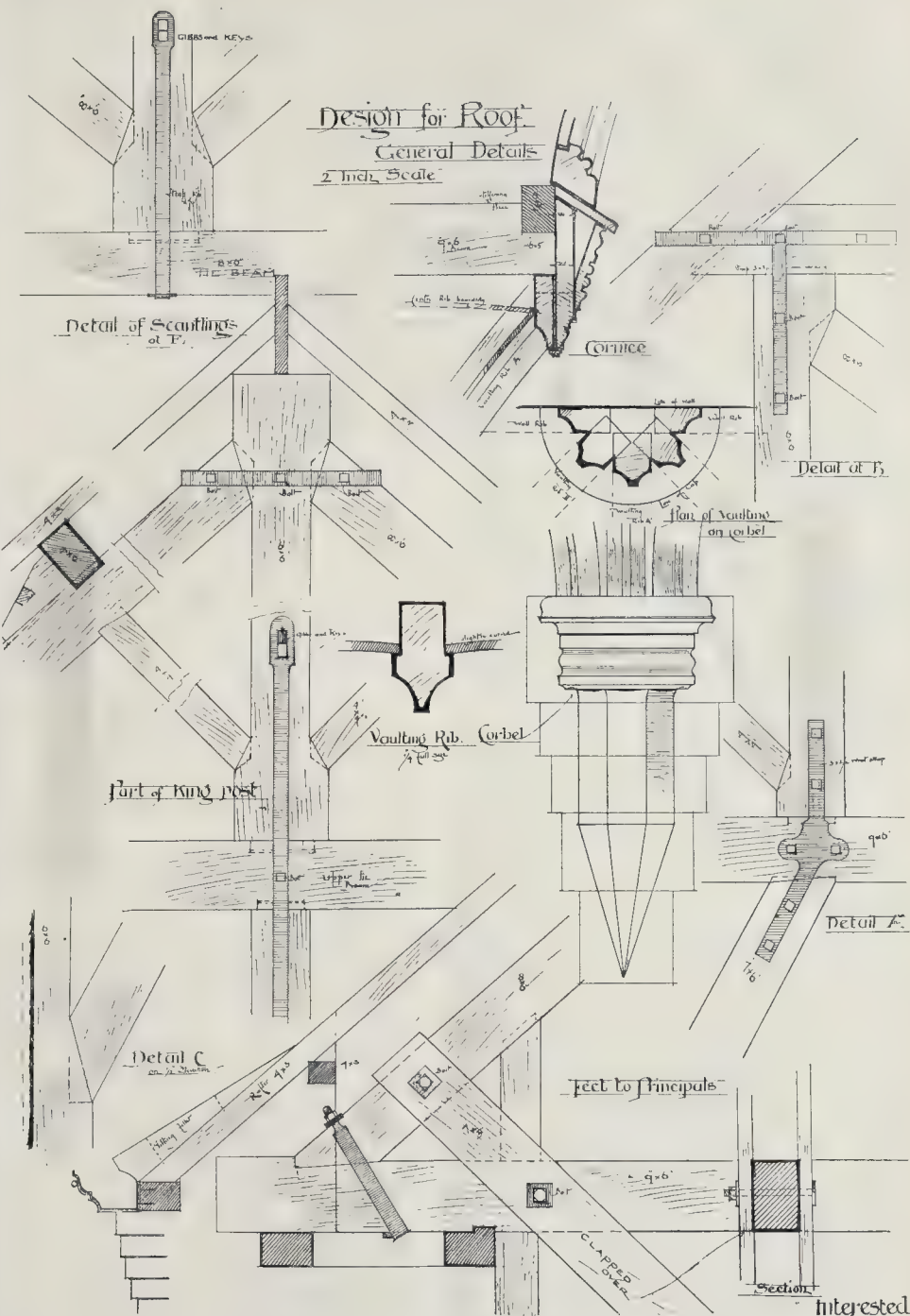
Mr. Nevill briefly acknowledged the vote of thanks and begged the members not to go too much upon the abstract of his paper, which was wanting in the great amount of detail he had given in the paper itself.

It was then agreed to adjourn the discussion to the first meeting of the Institute in February next, by which time the members would have the complete paper with the plans accompanying it in their hands.

The President stated that the next meeting would take place on the 19th inst., when the winner of the Edis Prize would be announced, and other important business be transacted.

The proceedings then terminated.

\* Some remarks which Mr. Tarver intended to make in the discussion will be found on another page.



THE GRISSELL GOLD MEDAL  
DESIGN FOR A ROOF.

We give a small-scale drawing and details of the design to which the Grissell Gold Medal

and the usual prize of ten guineas were awarded by the Council of the Royal Institute of British Architects last January. The author is Mr. James Strong, of Liverpool. The subject set was a design for a roof over a railway station,

60 ft. span, without floor supports; wood construction, without iron ties; central lantern light; height of walls, 40 ft. In the illustration, the lower part of the walls is omitted.

Interested



# THE ASSOCIATION OF PUBLIC SANITARY INSPECTORS.

On Saturday last, Dec. 3, at the meeting of this Association at the Westminster Town-hall, Mr. Alexander (Shoreditch) presiding, a paper was read by Dr. W. Collingridge, Medical Officer of Health for the Port of London, on "The Duties of Port Inspectors of Nuisances." The powers of Port Sanitary Authorities conferred in the Public Health Acts of 1872, 1875, and the Diseases Prevention Act of 1883 had, he said, placed Port Inspectors, so far as their duties were concerned, in the same position as Inspectors of Nuisances of Urban Sanitary Authorities, ships being now legally considered as "houses." It would be difficult to exaggerate the importance of the duties of sanitary authorities on which the country relied for protection against invasions of cholera from foreign countries in a city which was the centre of commerce of the entire world. As on shore, the duties divided themselves into two parts: first, prevention; second, cure. In recommending preventive measures the inspector could often do more by persuasion than by compulsion, but he must be thoroughly acquainted, not only with the technical duties of an ordinary inspector, but have a thorough acquaintance with the construction of ships of all classes, from the stately liner to the humble barge. The first essentials were effective ventilation and the frequent cleansing of the bilge water. That the effect of the appointment of Port Inspectors has been valued and appreciated by those most concerned was strongly evidenced by the increasing number of liners and ships which now made arrangements to have their crew's quarters cleansed at the earliest possible moment after their arrival. The first point in dealing with the second part of the subject, the cure of disease, was to secure at the earliest possible moment notice of the outbreak of infectious disease. The lecturer strongly commended to the imitation of the whole metropolis a regulation which had worked well in the Port of London and in seven of the largest ports in the kingdom. The masters of ships were bound to report forthwith—that is, within two hours or so,—any case of infectious disease, under a penalty of 5*l*. The patient was also compulsorily removed into hospital. Public opinion was fast becoming ripe for demanding compulsory notification of disease, and a regulation enforcing that principle all over London could not be long delayed.

In the discussion which followed, and in which Mr. Alexander, Mr. Jerram, Mr. Fairchild, Mr. Fuller, and other members took part, the speakers one after another objected strongly to the policy of putting the Inspector of Nuisances under the direct control of the Medical Officer. If they were ever to raise the status of inspector, as they were endeavouring to do, his authority should be collateral with, but on no account subjected to, that of the Medical Officer of Health.

After a vote of thanks had been accorded to the lecturer, Mr. Middleweek (Kensington) moved a resolution in favour of the compulsory notification of infectious disease, which, after discussion, was unanimously adopted.

During the evening an application from the North-Western District (Liverpool) for affiliation to the Association was discussed and adopted, and Liverpool was decided upon as the place for holding the forthcoming third provincial meeting.

# A PROPOSED IMPROVEMENT IN THE CONSTRUCTION OF THEATRES.

The following communication was intended to be read by Mr. B. J. Tarver at the Institute meeting on Monday evening last, as a contribution to the discussion on Mr. Ralph Nevill's paper, elsewhere reported; but, owing to want of time, it had to be omitted.

"I should mention, at the outset, that I have obtained a provisional patent for this improvement, which is tantamount to saying that it is, to the best of my belief, an original invention, so far as anything in this old world can be said to be original; for I hold the truth of the old adage that 'nothing comes from nothing,' and I admit that this idea has been suggested to me by the ancient Roman amphitheatres.

If, however, the ghost of one of those old builders were to accuse me of copying his ideas

and were to contest the patent with me, I should reply, in the first place, that his patent was extinct; and, secondly, that the idea is altered to suit modern wants.

We always speak of the ancient Romans as a practical people, and, in this case, the opinion is borne out by their sensible arrangements for rapidly filling and emptying their vast amphitheatres. Remove the upper crust, as it were, formed by the tiers of seats, and the sub-structure is found to consist entirely of staircases, so that the mass of spectators must have melted away after the performance like a film of ice in a rapid thaw.

It is hardly necessary to say that a Roman amphitheatre is utterly unsuited to modern dramatic performances, consisting, as it does, of one continuous slope of seats rising from the arena to the back benches, whence our actors would be almost invisible and inaudible.

How, then, can the Roman system of staircases be applied to modern theatres?

This is the problem which I have endeavoured to solve, with the object of saving life in the case of fire or panic, and I have done so with a result,—on paper,—which has far exceeded my expectations.

An outbreak of fire during a performance is, happily, a very rare occurrence; still, it has happened, and may happen again, or it may be suspected, and the suspicion may produce a panic. Any means, therefore, of reducing to a minimum the distance between any seat in the house and the outer air must be a distinct gain in theatre-building.

Now, if we examine any ordinary theatre (I do not mean a circus or a lecture theatre, but a theatre with the usual arrangement of dress-circle, upper circle, and gallery), we shall find that, with the occasional exception of the gallery, these portions are invariably approached from a corridor behind the highest row of seats in each portion, and, supposing the pit to be on the street-level, every seat in these portions has to be approached, first by an ascent to these respective corridors, and then by a descent to all but the back rows of seats.

Many theatres are constructed with the dress-circle on the street-level, or nearly so, and with the pit and stalls below that level, a system which renders it impossible to have dressing-rooms, &c., below the pit, and one which is, so far, wasteful of space. Even in such cases the upper circle and gallery have to be approached by the ascent and descent that I have described and, the gallery being generally the fullest part of the house, this long route affects the safety of the largest section of the audience.

By reversing the point of approach, that is to say, by ascending immediately to the front or lowest tier in each portion, it is obvious that the distance between any seat in the theatre and the outer air is reduced to a minimum.

On working out a set of 4-in. scale plans of a theatre of precisely the same dimensions as an existing one in London which contains 766 seats, I was delighted to find that I obtained 1,064 seats, or half as many again.

This satisfactory result dispelled the objection that would be raised to the loss of seats where the emerging stairs occur.

Moreover, by placing these stairs at the extreme sides of the auditory, the audience would, in case of panic, immediately diverge towards the doors by which they entered, instead of converging, as they often do now, and they would also find themselves close to an exit door at the foot of each staircase.

Another advantage of this system is that any draughts admitted through the doors would be directed into the body of the house and be carried off by the ceiling ventilator, instead of giving one a stiff neck as they do now from behind.

There is yet another minor advantage in the fact that one enters facing the numbers on the backs of the seats, which can thus be easily found.

The entrances are not so far forward as to involve the danger of running towards a fire breaking out on the stage; the movement is rather sideways.

Comparing the number of steps (each 11 in. by 6 in., as required by the Metropolis Management and Building Acts Amendment Act, 1875) in this design with those of the existing theatre that I have alluded to, taking the pit as the datum level, I find that that theatre has twenty-six steps up to the dress-circle corridor (mine only fifteen), fifty-three up to the upper-circle cor-

ridor (mine only thirty-four), and eighty-four up to the gallery landing (mine only fifty-one).

It will be noticed that the position of the gallery in my design admits of a flatter gradient, and consequently an easier ascent to the back seats than a gallery which is placed further forward. This, of course, is due to the angle of the radial line struck from the foot of the stage.

Lastly, I would point out that my system admits of a cantilever construction, and thereby obviates the necessity for supporting columns, which are fidgeting, however small they may be.

I am quite prepared to find the small saloon accommodation objected to by those who think that repeated refreshments during long waits are necessary for the revenue of the manager. Other people, however, consider this a doubtful blessing, and find the repeated return of young gentlemen, smelling of cigarettes, a nuisance.

The diagram plan is merely suggestive. There are dozens of ways of treating the stairs and gaining saloons, &c., where the headway admits of it, and I see no reason why the curved dress-circle corridor should not be rendered picturesque, by cross arches and a skilful treatment of the recesses at the ends.

[It has been arranged to exhibit the diagrams at the adjourned meeting to discuss Mr. Nevill's paper in February.]

# THE SARCOPHAGI OF SIDON.

THE following communication, which has been received by the Chairman of the Palestine Exploration Fund from Professor T. Hayter Lewis, appears in the *Times* of Thursday last. Professor Lewis has returned from a visit to Constantinople, where he was allowed by the Director of the Imperial Museum to see the photographs of the sarcophagi:—

"The following notes were made chiefly from descriptions given by his Excellency Hamdi Bey personally to myself, and are to a large extent in his own words. They may form useful addenda to the very admirable account given in the last Quarterly Statement, and also to Hamdi Bey's own description in the last number of the *Revue Archéologique*. I had not seen these until after my return to London. The shaft was about 16 ft. by 13 ft., and 50 ft. deep. In chambers leading out of it, of which he gives plans and sections in the *Revue*, were found the following:—

Three Phœnician anthropoid sarcophagi, two of these being in white marble (one male and the other female), and the third in black marble (female).

Seven sarcophagi of Greek design, of different epochs, carved out of Greek marble blocks.

Three of these are similar, and one simply in the form of pedestals, without any figure sculpture, but with beautifully moulded and enriched cornices and bases, which much resemble those of the sarcophagus in the British Museum brought from Crete. The covers are coped, and with pediments and acroteria. The fourth is of the peculiar tall Lycian form, surmounted by a curved roof, with gables, of which we have two good examples in the British Museum. But, in place of the usual panels in and beneath the gables, the Sidon tomb has griffins and other sculptures which are purely Greek. On one of the long sides there are, splendidly-sculptured, two cars, with four horses each, in full career. On the other side is a hunting scene. The fifth sarcophagus (not in the Lycian form) is equally well sculptured with Assyrian subjects.

The sixth represents a Greek Ionic temple with antæ, but with three-quarter columns only between the two antæ, and three-quarter columns to the sides. Between each two columns or antæ is a female figure showing signs of deep affliction. In all there are eighteen of these statues. The temple rests on a stylobate, having a finely-moulded base and subbase, the dado being enriched with figures, partly sculptured and partly painted. The cover represents the roof of a temple, and in the pediment at each end is a fine group of sculpture. As a curious variation from the temple form, there is along each side, surmounting the cornice, a tablet, on which is carved a funeral procession. Such a decorative feature is not unusual in sarcophagi of late date, one such being in the British Museum, but I can call to mind no example of such a feature surmounting the cymatium in any temple.

All the above sarcophagi show large remains of coloured decoration, and, as described to me,



confirm Hittorff's theories as given in his work on Sicily.

The seventh sarcophagus is the grandest of all. It is out of one block of white marble, about 11 ft. long, with a coped and pedimented cover, and having no columnar decoration, but with an enriched cornice and base, the panels between these, on each side, being filled with sculptures of marvellously fine execution. On two of the sides the subject is the chase; on the other two are represented combats between warriors both on horse and foot. One prominent figure reminded Hamdi Bey of that of Darius in the famous mosaic from Pompeii (and having seen this recently I quite agree with him), and certain characteristics on another of the principal figures induces him to assign it to Alexander.

In any case, there can scarcely be a doubt that the sculptures represent a battle between Greeks and Persians, and most probably between Darius and Alexander. The cover of this magnificent tomb is of the ordinary coped form, but is enriched with rows of heads on the eaves line and on the ridge,—a very unusual style of finish, but which may be seen partly carried out on a small scale on one of the Greek sarcophagi figured in Sir C. Fellows's "Asia Minor." At each end of the eaves is a lion. This also reminds one of the lions' heads and fore paws sculptured in the roof of another Lycian tomb figured in the same work.

The architectural details of all these sarcophagi, so far as I can judge from the photographs, are of the Greek type of the best period, without a trace of Roman influence, and the sculpture appears to be of the highest class. It is altogether different from the bold style of the Pergamus sculpture, and much more nearly resembles the beautifully delicate carving of the Parthenon frieze, of which the horses, the figures, and the drapery of the Sidon monument strongly remind one.

Hamdi Bey thinks that it is probably by Alysippus or his school; but as to this, only some one specially qualified by a study of ancient examples (and such a one, no doubt, he will consult) could give a definite opinion. He will have to determine, to begin with, whether the sculpture is the product of an artist accustomed to work in marble, or whether it is not that of one accustomed to work in bronze. I can only venture to suggest, from certain details, that the latter is the case.

But it is not only by the sculpture that this monument has been adorned. It has been so, in the most careful and artistic way, with colouring, which was (and I trust still is) in a perfect state of preservation, and producing a charming effect, each of the different reds, purples, violets, &c., being put on in various tints and gradations with great delicacy, gold being sparingly applied and with great judgment. The spears, &c., are of bronze. The flesh of the figures is not coloured.

To show the care which has been taken with this decoration I may mention that the portions of marble which have been left untinted have been treated in three different ways,—viz. (1), by the ordinary finish; (2), by being slightly roughened; and (3), by an exquisitely finished surface such as one finds in the finest Greek sculpture.

As to the date of all these works, except the one with the well-known Phœnician sarcophagus (to which I allude below), there is no guide whatever beyond what the sculptures tell. The absence of any inscription is not surprising, inasmuch as very few of the sculptured sarcophagi (chiefly Græco-Roman) left to us are inscribed, and I have Hamdi Bey's authority for saying that there is not a line, not a word, which could give a clue to the date, nor anything definite as to the persons for whom these splendidly-adorned tombs were made.

How was that a great sepulchre should have been hewn 50 ft. deep in the solid rock, chambers carved out from it, these immense blocks of the finest marble brought from Greece, carved by the best Greek sculptors, painted (it would seem) by the best Greek artists, and then lowered into their resting-places in times of no great antiquity, and yet not a single record of any kind be left to give a clue to the names of those for whom such great works were done? Possibly, in the careful study which Hamdi Bey is giving to the subject, this question may receive an answer.

It will be months before the sarcophagi can be seen by any one, as it would be highly dangerous to expose them, however slightly, to

the dust and damp of a Constantinople winter, as would be the case if they were uncovered before being placed in the building now being erected for their reception. To preserve their colouring during their removal from Sidon the greatest care had to be taken. The workmen were required to wear gloves, and the sculptures were protected by having cotton wool stuffed behind them most carefully. This was done by Hamdi Bey himself, the whole then being covered by layer upon layer of soft material.

The last sarcophagus to which I shall allude is the famous one of the Priest and King Tabuite, the account of which occupies a large portion of Hamdi Bey's article in the last *Revue Archéologique*. It is of black marble, the inscription on it showing it to have been the tomb of the son of Esmunazar, King of Sidon (I give the name as spelt on the tablet in the Louvre). But Tabuite's tomb differs in many important particulars from that of his father. Both are anthropoid, but Esmunazar's, of which we have a copy in the British Museum, shows the human form only in the head and shoulders, the lines of the sarcophagus being carved thence straight down in a tapering form to the raised tablet which marks the position of the feet. This is the case also with ten out of the eleven other sarcophagi in the Louvre brought from Sidon, and in the only one (I believe) in the British Museum brought from the same site. But Tabuite's tomb has the flowing lines which may be seen in the numerous Egyptian anthropoid sarcophagi which are in the same collection and in our own Museum, and which give, to some extent, the outlines of the figures. One corner of this tomb has been cut off, thus giving it an irregular shape, and this part has been polished, and a band of Egyptian hieroglyphs, which passes round the block, is carved round this polished corner.

We can scarcely suppose that a king who could afford to have so splendid a tomb made for him would accept an imperfect block of marble for it, and it seems likely, therefore, that it was made originally for another person in ancient times in Egypt, and repaired and renewed at a later period for Tabuite.

The descriptions and drawings of this interesting tomb will form one of the most attractive chapters in the detailed and illustrated account of the Sidon monuments which Hamdi Bey is now preparing for publication; and considering the amount of care which he took in their preservation, every one will be glad to concede to him the full honour and credit of first conveying the description of them to the public in an authentic form. No doubt it would have been better to have retained them on their ancient site, if they could have been so retained with safety. But my experience in the East makes me confident that such a course would have resulted in the eventual destruction of these splendid monuments by Moslem fanatics and Arab dealers.

Athenæum Club. T. HATYER LEWIS."

#### COMPETITIONS.

*Proposed Public Building for New Barnet.*—The New Barnet Public Building Committee having invited architects to send in competitive designs for a building to contain a large hall, about 75 ft. by 55 ft. (to seat not less than 700 persons); second hall, about 40 ft. by 25 ft., with ante-rooms and other requisite offices; also public and professional offices, caretaker's apartments, &c., the cost not to exceed 5,000l., have, we are informed, received sixteen sets of designs, which are to be publicly exhibited at the assembly-rooms, New Barnet, on Tuesday evening, December 13th.

*Walton-le-Dale Sewerage Scheme.*—Some little time back the Local Board of Walton-le-Dale, near Preston, Lancashire, advertised for schemes for the sewerage and disposal of the sewage of their district. In response to this, many schemes have been sent in. The ultimate decision as to the merits of the various schemes was submitted to Mr. Thomas Fenwick, C.E., of Leeds, and we are informed that he has just awarded the first premium to Mr. William Wrennall, C.E., of Liverpool, and the second premium to Messrs. H. T. Johnson & Co., civil engineers.

*The City and Guilds of London Institute.*—The prizes and certificates gained during the past year will be distributed on Thursday, the 15th inst., at Carpenters' Hall, by Sir John Lubbock, Bart., M.P.

#### Illustrations.

##### THE VILLA MONTECCHIO, NEAR VICENZA.

WE give illustrations of the Villa Montecchio, near Vicenza, the property of the Contessa Maria Nievio. Bonin, which has been lately restored by Signor Michele Cajarati, a talented architect of Milan.

The villa still retains (in part) its ancient walls, though these have been merged in the extensive alterations necessary when transforming a ruined castle of the eleventh century into a princely villa of the nineteenth.

The old castle suffered all the vicissitudes of war; in that stirring time it was stormed by the Vicentines in the days of Ezelino, 1232. Its fortifications were destroyed by the Paduans in 1386, so that Antonio della Scala, of Verona (who had erected them anew after the attack of the Vicentines) had to abandon the castle finally in 1387. The Counts Nievio had the first investiture of the land. It then passed to the Sanbonifacios, of Verona, and the family of Montecchio (Montague), so well known as that of the fair Juliet, is said to have sprung from this ancient house. In the last century the castle was converted into a villa in the Classical style by its owners the Counts Nievio; but the plan so inconvenient that it was again altered, though with little success, later on, and has now received its latest transformation at the hands of Signor Cajarati.

The Villa Montecchio (its high southern facade crowned with crenelated parapets imitated from the fourteenth-century old castle of Collesene in Thione) rises on an elevated plateau, —a broad terrace 625 ft. long (running westward across its southern front), —commanding fine views over a country dotted with hill villages, church spires, and country-houses,—the snowy peaks of the Alps in the background, and the deep blue sky of northern Italy overhead. The gardens round the palace are formal in design, while conservatories full of exotics and tropical plants are added to beautify the interior.

The external walls, from basement to cornice, are covered with mouldings, carvings, and traceries of fantastic variety and colour,— arabesques, scrolls, coats of arms, monograms, and full-sized figures of warriors and historical personages, such as one seen painted on palace fronts in the backgrounds of Giovanni Bellini and Vittore Carpaccio's pictures in Venice.

##### MANTELPIECE AND PORCH IN TERRA COTTA.

THESE were designs made by the architect, Mr. W. H. Sugden, as a commission for a client, but owing to circumstances they were not carried out. We give them as what appear to us good examples of characteristic terra-cotta treatment.

##### SWIMMING BATH, BOURNEMOUTH.

A NEW swimming-bath and private baths are now in course of erection in the Bath-road, Bournemouth. The illustration gives the view of the entrance as it is approached from the pier. The site is on ground much lower than the road, and it was necessary to keep the roof of the swimming bath as low as possible to avoid interfering with the view of the houses on the opposite side of the road.

The bath is 75 ft. long and 30 ft. wide. The depth varies from 6 ft. at one end to 3 ft. 6 in. at the other. It is constructed of Portland cement concrete, and lined throughout with white glazed bricks. The dressing boxes are of pitch pine, and a gallery is arranged overhead to enable visitors to view races or entertainments.

The elevation towards Bath-road is faced with Farnham red bricks and red Mansfield stone dressings, and the roofs are covered with strawberry-coloured tiles.

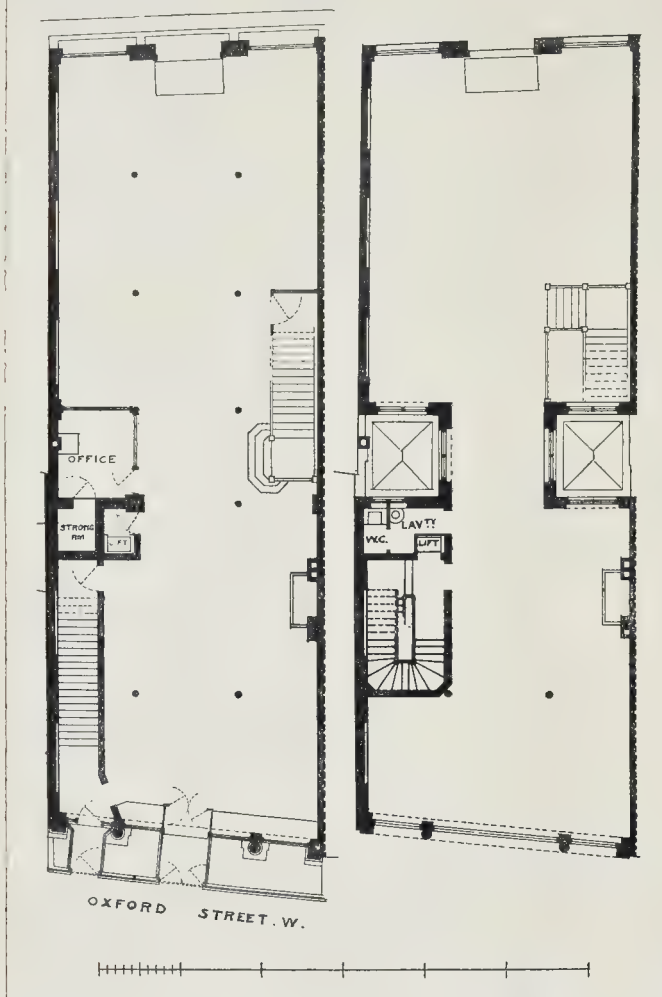
It is proposed during the winter months to maintain an even temperature of 75° in the swimming-bath, and the heating is obtained by the admission of steam into the water through a perforated copper pipe. A Cornish boiler supplies the steam for this purpose, as well as for pumping the salt water from the sea. The water is pumped up through a suction-pipe,



Nos. 461 &amp; 463 OXFORD STREET. W.

GROUND FLOOR.  
NORTH ROW.

FIRST FLOOR.



which is carried out to the head of the pier into deep water, so as to ensure its purity.

Eight private baths are also to be constructed of concrete and glazed bricks, and to be sunk below the floor and entered by steps.

Ladies' and gentlemen's waiting-rooms, with lavatories attached, and an entrance-hall, complete the arrangement.

The building has been carried out from the designs of Mr. John Pollard, engineer.

#### NOS. 461 AND 463, OXFORD-STREET.

This building is part of the large reconstruction of premises on the south side of Oxford-street, on the Duke of Westminster's estate, and was recently erected from the designs of Messrs. Thomas Chatfield Clarke & Son at a cost of about 6,000*l*.

The basement, ground, and first floors are devoted to the purposes of business, so that clear space and good light were here the primary considerations.

The large amount of glass on the ground and first floors in the Oxford-street elevation was necessary for the exhibition of furniture and fine-art goods.

The second, third, and fourth floors of the

premises are used as a private dwelling, and are fitted with every comfort and convenience.

The front, which partakes largely of the style of the Brothers Adam, is executed in Portland stone and red brick, the roofs being of green slates.

The contractors were Messrs. E. Lawrance & Sons, of Wharf-road, City-road; the carving was executed by Mr. Anstey; and the constructional cast-iron work was supplied by Messrs. Young & Co., of Eccleston Ironworks, Fimlico.

#### SIDLESHAM VICARAGE, SUSSEX.

This house has been erected by a grant of 1,500*l*., given by the Ecclesiastical Commissioners, who are landowners in the parish, aided by a sum of 100*l*. voted by the Chichester Diocesan Association. These sums together have covered all expenses connected with the building, including the drives and approaches. The accommodation is that laid down by the Commissioners, with the addition of a dressing-room and two attics and an increase in the size of the dining-room beyond the minimum recognised by them. To obtain this result careful attention to economy was given by the architect, who had, however, to provide that

everything should be thoroughly substantial, or he would find it vain to submit his drawings to the thorough criticism of the Commissioners' architect. The lower story is enclosed with 16-in. hollow walls of red brick, and the first floor with weather tiling secured on brickwork. The works have been carried out by Mr. W. Irish, of Lavant, near Chichester, under the direction of Mr. Lacy W. Ridge, the Diocesan Surveyor.

#### HOUSE AT CHARING, KENT.

THIS house has been erected for Mr. Frederick Hardwick, M.D., on a fine site close to the railway station, and overlooking the ancient and interesting village of Charing, in Kent. There are good views in all directions except towards the south-east. That towards the north, which includes Charing Church and the remains of the Archbishop's Palace, backed by the Chalk Downs, is so particularly interesting that special provision has been made for its being seen from the drawing-room. Beyond the rooms shown on the plans, the house contains two large attics, one smaller room, and a box-room on the second floor; and a cellar in the basement.

The tender of Mr. Thomas Coast, of Charing, was accepted at a sum of 1,436*l*. 5*s*. for the house and stables. There has, however, been some additional outlay on the buildings, grounds, and fences. The works have been satisfactorily carried out by Mr. Coast and local tradesmen working with him, under the direction of the architect, Mr. Lacy W. Ridge.

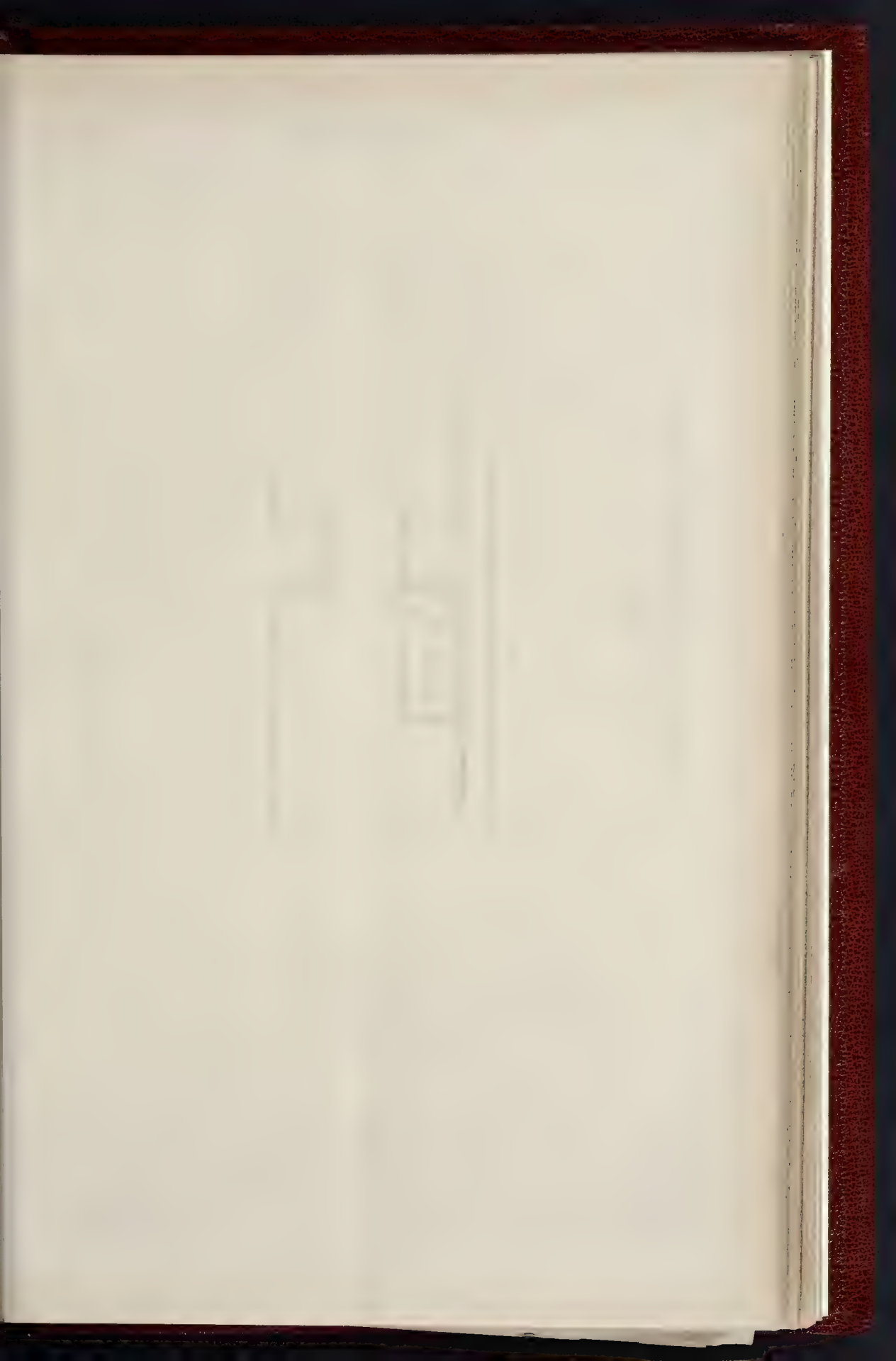
#### ANCIENT MONUMENTAL SLAB.

THE slab from the Cathedral at Siena (of which an illustration is given) is incised and filled with mastic. The arabesques in the border are black marble and mastic.

The present cathedral is only the transept of the original design; the drawings of the whole scheme, made by the architect, Maestro Landò, still exist. The part used as the choir contains the grand pavements, by Beccafumi, which are chiefly in dark grey marble inlaid upon white. These are now visible, the planking having been recently removed which covered them for the past century or more.

The drawing is an illustration from a work to be published almost immediately, on "Ancient Sepulchral Monuments," by Mr. W. Brindley and Mr. W. S. Weatherley.

**Society of Engineers.**—At a meeting of the Society of Engineers, held at Westminster Town Hall on Monday evening, December 5th, Professor Henry Robinson, President, in the chair, a paper was read on "A New Formula for the Flow of Water in Pipes and Open Channels," by Mr. Edgar C. Thrupp. The author said that, having worked out, by means of graphic diagrams, a formula for the flow of water in pipes, based on a large number of experiments by M. Darcy and others, with some by himself, he was induced to try, this year, how far experiments on the flow of water in open channels (such as those by Darcy and Bazin, and by Major Cunningham) would be amenable to the same mode of treatment. The results were not only satisfactory, but unexpectedly threw light upon some points in the question of the flow in pipes, which had before been difficult to explain. He had thus been enabled to obtain a general formula, applicable both to pipes and open channels, and taking into account the effects on velocity of the varying relations between hydraulic depth and roughness of surface, in a manner that had not hitherto been done. After describing the experiments of Professor Osborne Reynolds, which brought out the curious fact of a "critical velocity" at which eddies come in, for a limited range of velocities, after which an even flow again takes place, the author described the apparatus he had himself used, and showed the graphic results of experiments, which he had also reduced to tabular forms. He then gave Reynolds's formula, and Hagen's, of which latter his own was a modification, the changes introduced having for their object to express the effects of various degrees and kinds of roughness in the surfaces flowed over, with varying hydraulic depths. He concluded by justifying the effort to make a more accurate formula, by comparing the results of experiments with the results obtained by calculation.







SIDLESHAM VICARAGE—MR. LACY W. RIDGE, F.R.I.B.A., ARCHITECT



GROUND FLOOR PLAN



FIRST FLOOR PLAN

SIDLESHAM VICARAGE



GROUND FLOOR PLAN



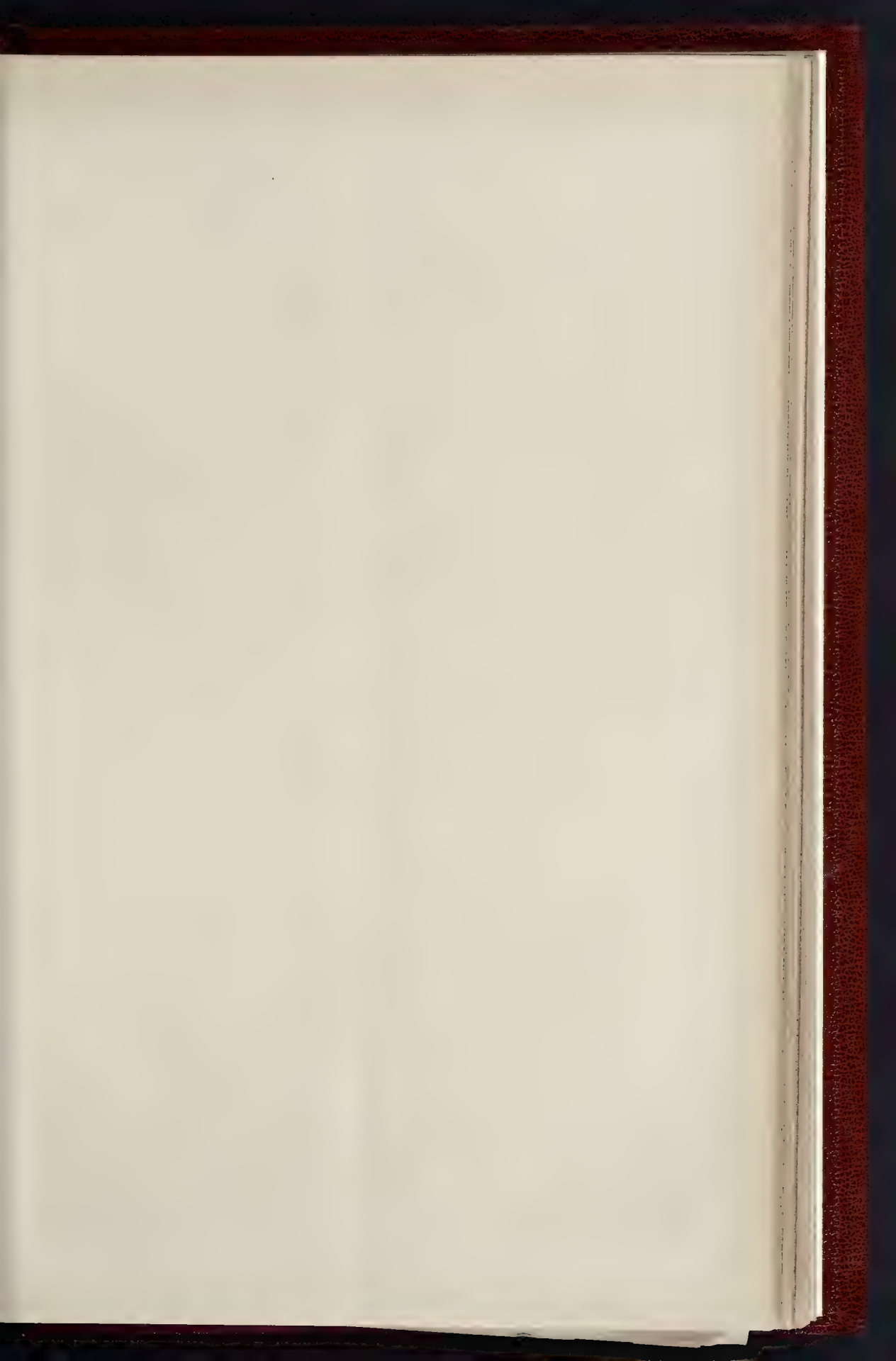
FIRST FLOOR PLAN

HOUSE AT CHARING

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HOUSE AT CHARING, KENT. MR. LACY W. RIDGE, F.R.I.B.A., ARCHITECT



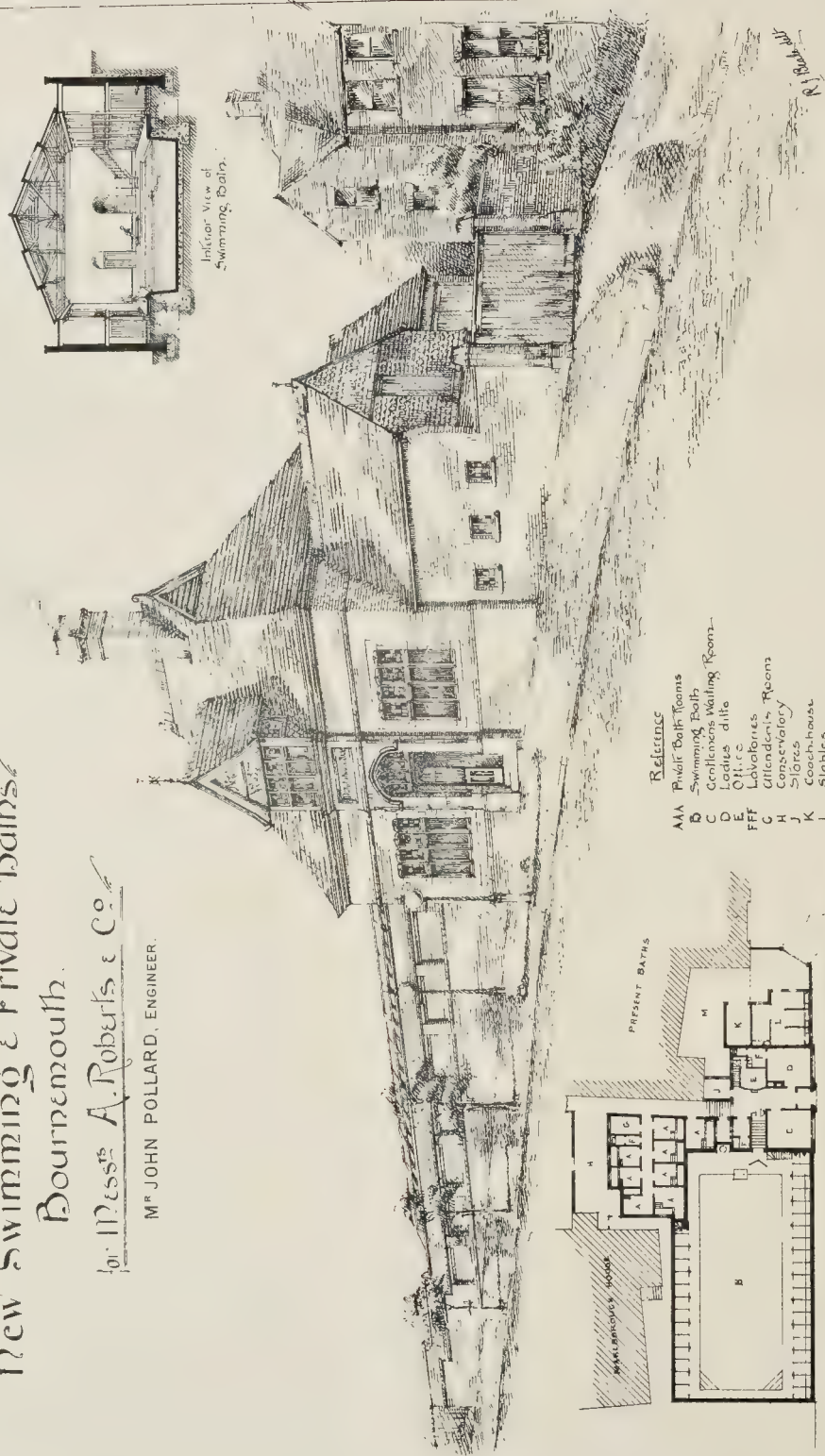


THE BUILDER, DECEMBER 10, 1887.

# New Swimming & Private Baths Bournemouth.

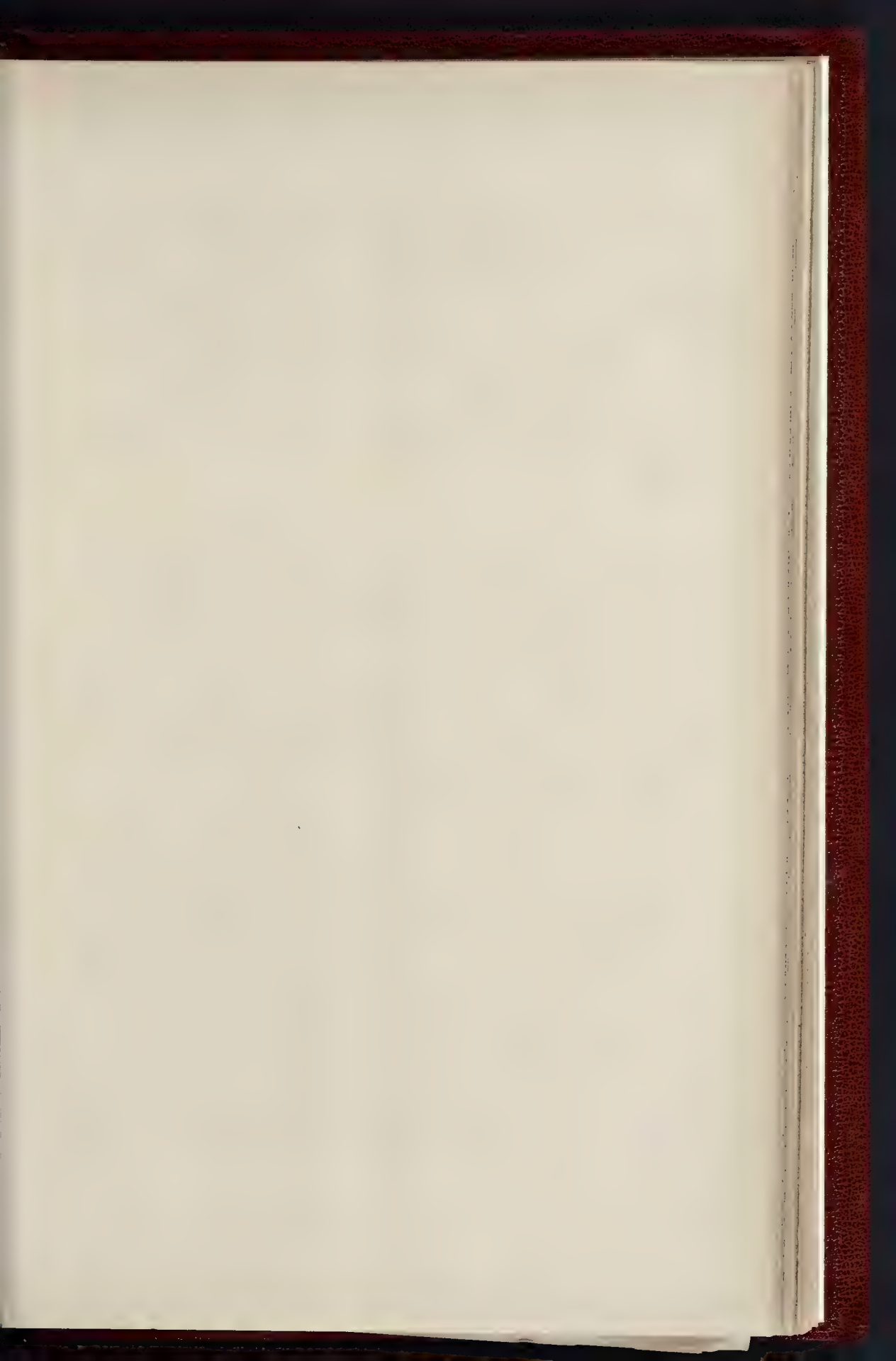
for Messrs A. Roberts & Co.

MR JOHN POLLARD, ENGINEER.



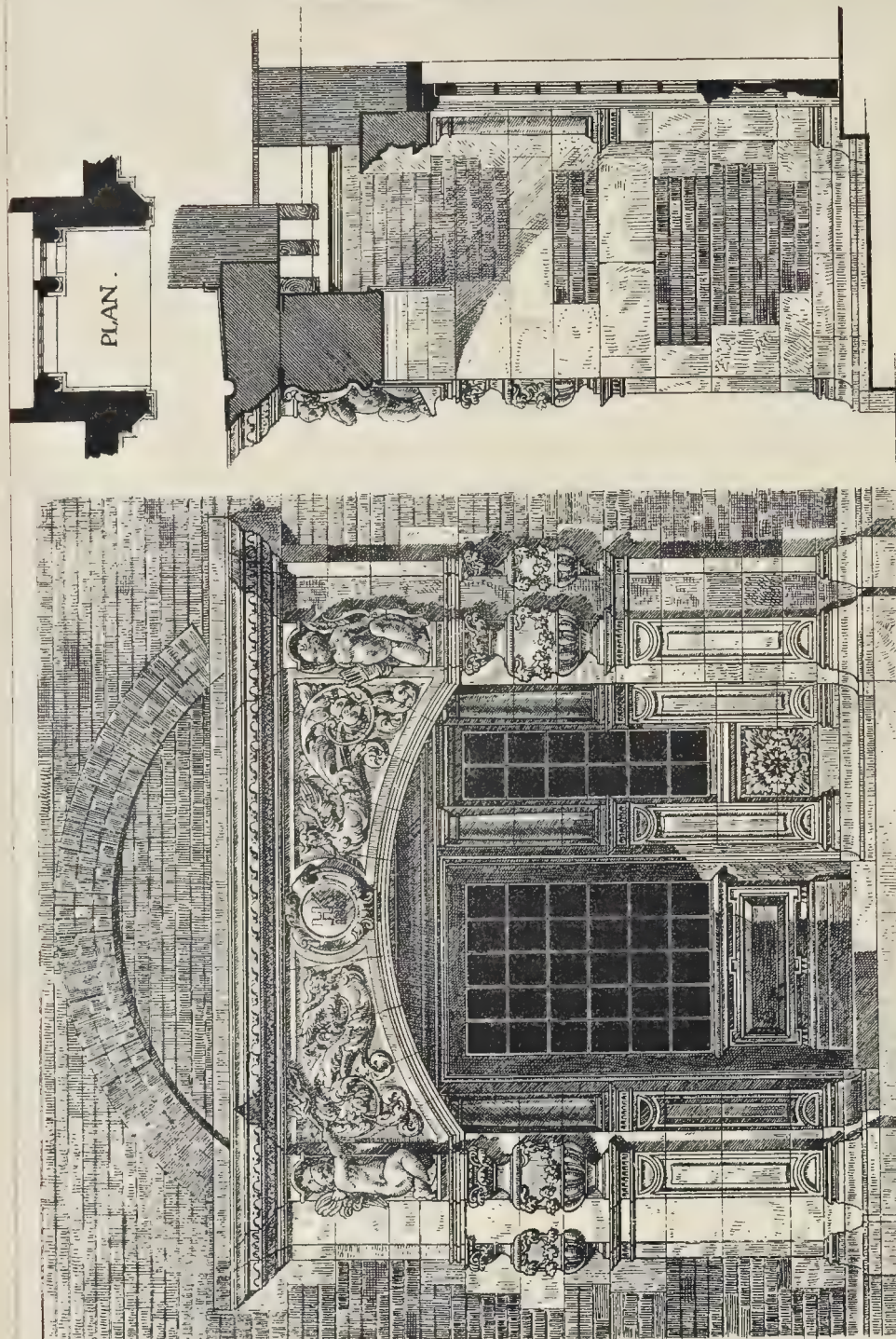
- Reference
- AAA Private Bath Rooms
  - B Swimming Bath
  - C Gentlemen's Waiting Room
  - D Ladies' ditto
  - E Office
  - FFF Lavatories
  - G Attendants' Rooms
  - H Conservatory
  - J Slates
  - K Coach-house
  - L Stables
  - M Covered Yard

Key Plan





THE BUILDER, DECEMBER 10, 1887.



SECTION.

ELEVATION.

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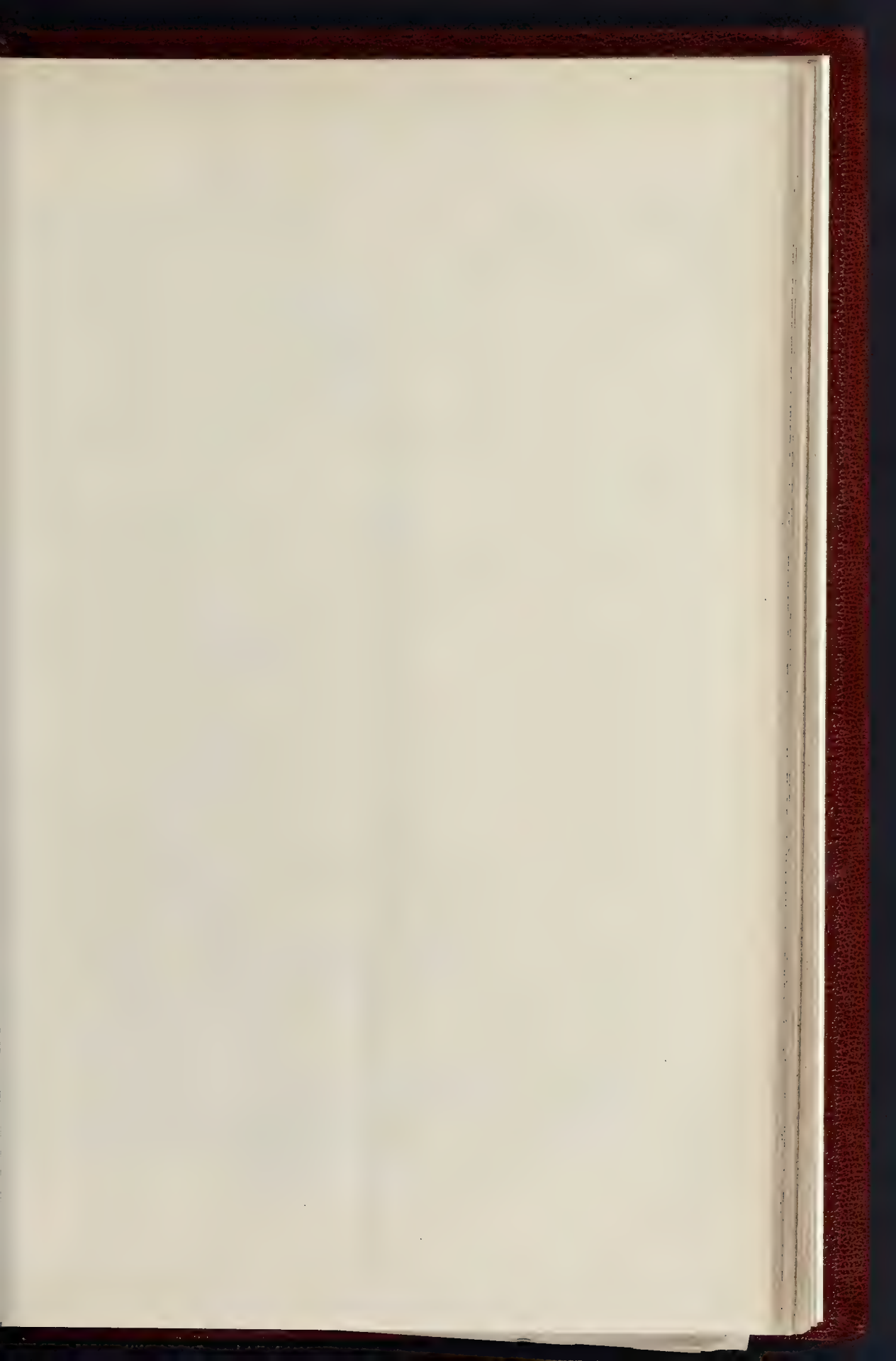
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THE BUILDER DECEMBER 10, 1887.





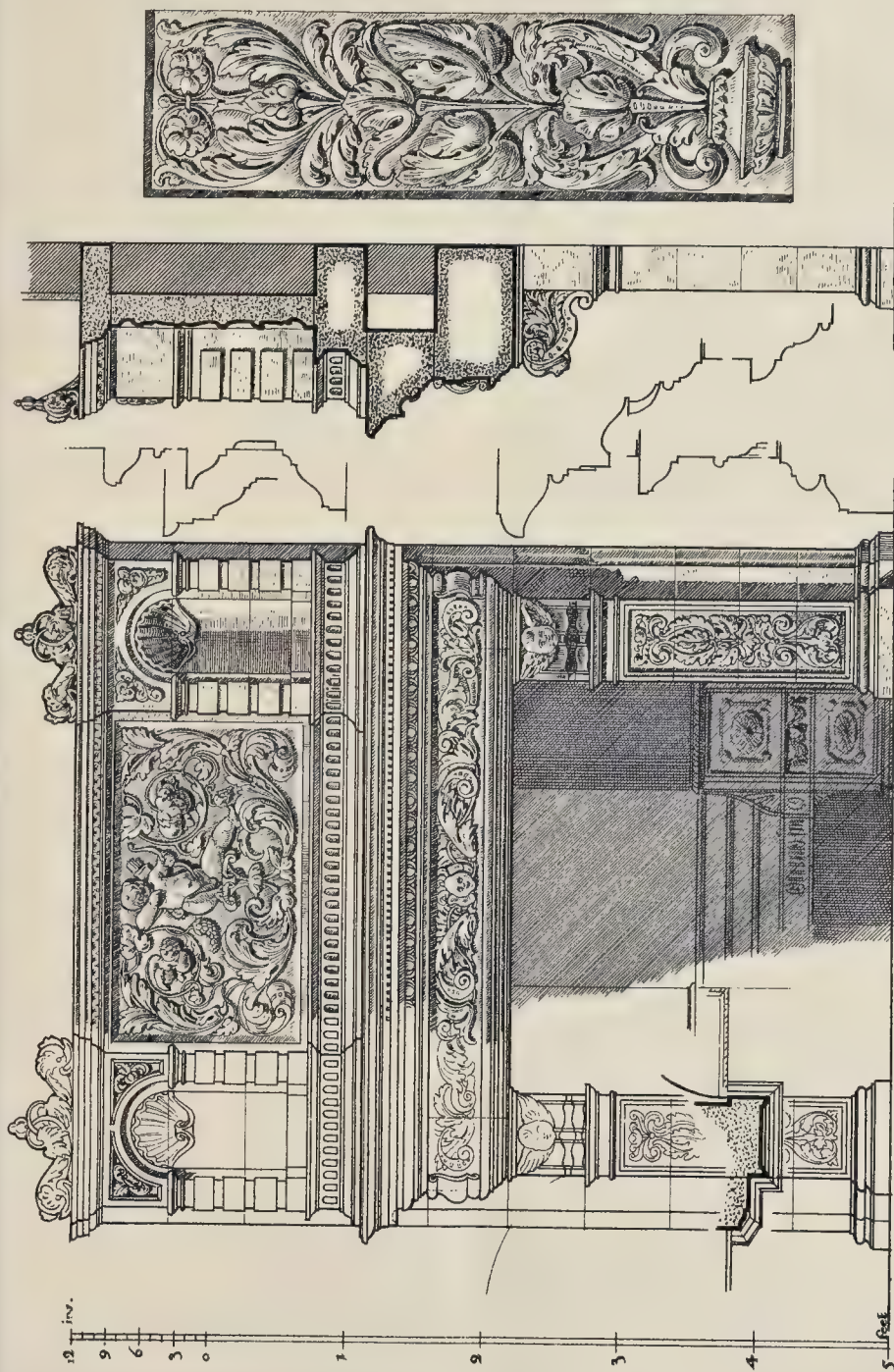
J. W. DILLON & CO. PHOTO-ENGRVERS

H. LUDGATE H. & CO. L.C.

VILLA MONTECCHIO, NEAR VICENZA (AS RESTORED) — SIGNOR MICHELE CAJRATI, ARCHITECT.  
PORTION OF GARDEN FRONT, LARGER SCALE.







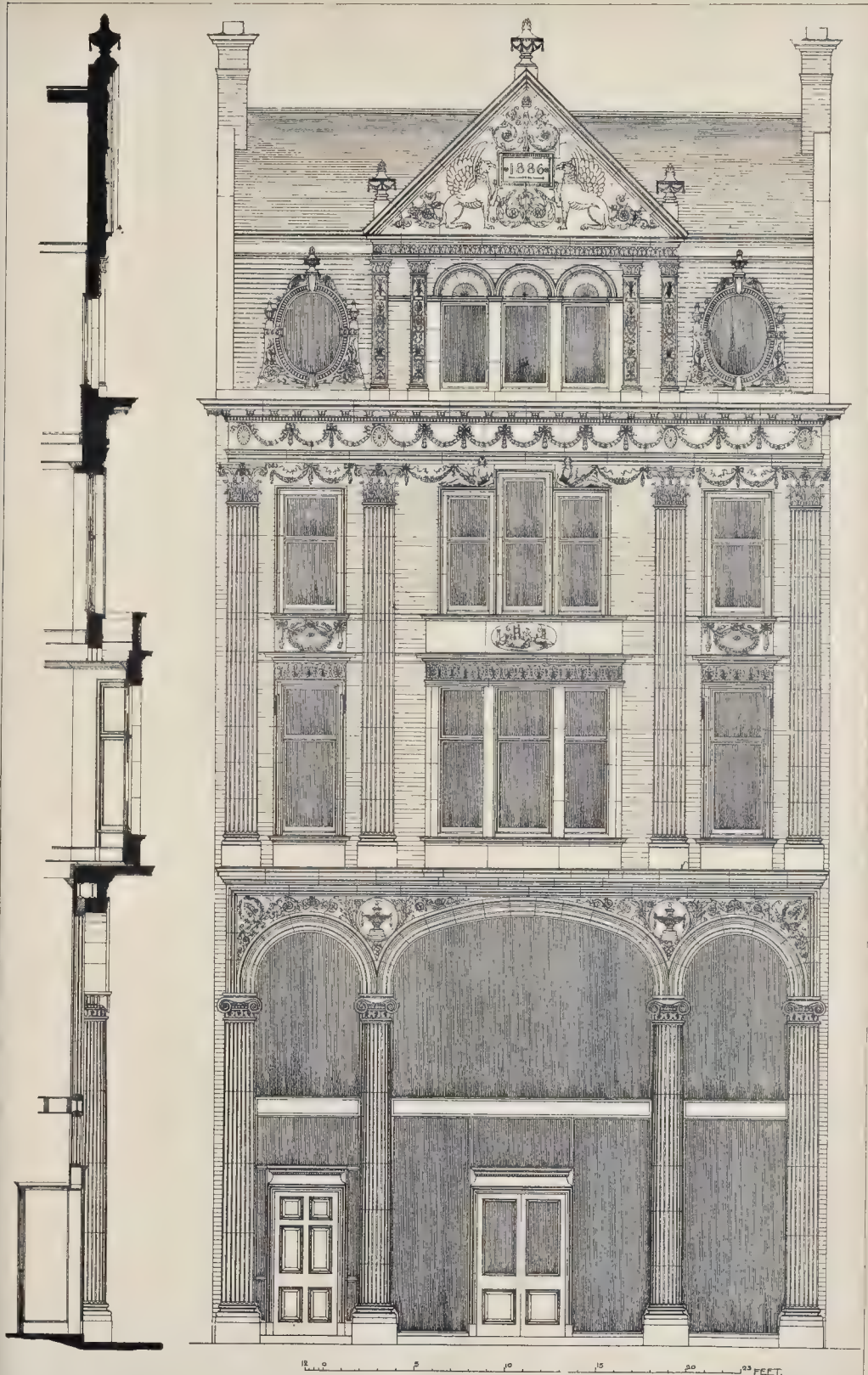
SECTION.

ELEVATION

A CHIMNEY PIECE IN TERRA COTTA.—MR. W. H. SUGDEN, ARCHITECT.







PREMISES IN OXFORD STREET.—MR. T. CHATFIELD CLARKE, F.R.I.B.A., ARCHITECT







INLAID SEPULCHRAL SLAB, SIENA CATHEDRAL. DRAWS BY MR. W. S. WEATHERLEY, F.R.I.B.A.





PERSPECTIVE AND APPARENT FORM.  
ARCHITECTURAL ASSOCIATION.

The fourth meeting of this Association for the present session was held on the 2nd inst., in the meeting-room of the Royal Institute of British Architects, Mr. John Slater, B.A. (President), in the chair.

The Chairman announced that a requisition, signed by several of the members, had been received, asking the Committee to convene a special business meeting, to take such steps as might be necessary for insuring the proper observance of Rule 22. It would be impossible to hold the special business meeting on the Friday fortnight, as Mr. T. G. Jackson, of Oxford, would then read a paper entitled "The Proposal to make Architecture a Close Profession by imposing tests of Examination and Registration." By that time, however, the Committee would have fixed the date for holding the special meeting.

Mr. W. Burrell (Hon. Librarian) announced the donation to the library of two copies of the "Architect's Register" and the "Transactions" of the Civil and Mechanical Engineers' Society.

Mr. F. T. Baggeley, A.R.I.B.A., read a paper entitled "Perspective Drawing, and the Apparent Form of Objects." The following is the substance of it:—

The outline of most objects, at any rate of inanimate objects of simple form, such as buildings, is sufficiently constant to enable us to predict, pretty accurately, how it will appear from a given point of view under certain given circumstances, and even to draw on a sheet of paper or other surface an outline which, looked at in a particular way, will, theoretically, exactly resemble the outline of the object when looked at in a similar way. Further than that,—and this is what we usually try to do,—we may, by choosing our conditions carefully, draw an outline which, looked at in an ordinary way as drawings are generally looked at, will resemble the outline of the object itself with something very closely approaching to accuracy.

This is all that perspective science pretends to do, or can do. It enables us by a simple scientific method, when we know the real form and outline of an object, to make a drawing on paper which, looked at in an ordinary way, so strongly resembles the outline of the object as seen from a particular point of view that we cannot see where the two differ, and hardly that they do differ. Put in that way, it does not sound very much. But, when we think how immeasurably more is thus done for the sense of sight than can be done for three at least of our other four senses, it seems a great deal, and we cannot, moreover, escape the conclusion that some power, necessary to produce accurate impressions, must be wanting in our powers of vision, at least under some circumstances, or we could not possibly produce anything differing from something else as much as a drawing differs from a building, but which at the same time presents to the eye a scientifically correct impression of the other thing in a most important particular.

My interest in this subject was first stirred by a paper read before this Association on November the 24th, 1876, by Mr. Augustus Frere, which he called "Binocular Perspective and Natural Drawing,"—a clever paper, in which, after pointing out that the greatest masters have frequently not drawn in accordance with the laws of plane perspective, the author went on to show that we had been furnished with two eyes because "with one eye we have little cognisance of visible position"; that an ordinary perspective drawing represents things only as we see them with one eye; and that "our eyes have no inborn power of distinguishing the forms or magnitudes of objects, nor can they discern their distance from themselves." After going very carefully into the structure of the human eye and the laws of vision, Mr. Frere ended by giving us a set of rules for producing pictures of what we see with two eyes.

As a matter of fact, it does not need much demonstration to prove that it is, not only practically but theoretically, impossible to represent on a flat surface, or to a small scale, even the crudest outline of a solid object as we see it with our two eyes. I do not mean that our imperfect skill stands in the way. If a draughtsman were ever so skilful, he could not do it. As pointed out by Mr. Frere, Leonardo da Vinci paid much attention to perspective, and

"came to the conclusion that objects could not be represented in a picture as seen in nature"; and Malton, in his book, says,—"*Artists would have all objects represented in perspective as they appear to the eyes. There is no such thing to be done. It is not in the power of art or science to represent on a plane any single object as it appears.*"

What stands in the way is not so much a difficulty as an impossibility; and, if by binocular perspective, is meant a science to enable us to draw objects as we see them with two eyes, in the same way that ordinary plane perspective does enable us to draw objects as we see them with one eye, then no such thing as binocular perspective can possibly exist.

Forgive me for calling your attention for a moment to the simple natural laws which govern our sight of objects. We see an object by means of rays of light reflected from the object upon the retina of the eye. These rays, originating in a luminous body, and striking upon surrounding objects are reflected from every part of those objects in every direction. Such of these reflected rays as happen to enter the pupil of one of our eyes strike upon the retina and produce a sensation which we describe as seeing the points from which the rays were reflected. All rays of light proceed in straight lines; that is to say, they do so in a vacuum; and the refraction that they undergo

take a simple form such as a cube, and look, with one eye, say, at an angle of it, you cannot see that the three plane faces you look at are squares; you may guess that they are so because it is a commoner form than a lozenge, but that is another matter; for all your eye really sees they may be lozenges of almost any length; or the four sides of each plane may be unequal, but so long as they meet on particular rays the image seen by the eye will remain the same.

Now, our science of linear perspective is based on this inability of the eye to detect distance. It assumes that a man has but one eye, or at least uses but one, and that, if he cannot tell where the points that make up the outline of the object looked at are situated on the several rays that bring the images of them to him, then we may, as it were, deceive him and place those points anywhere on the rays that we choose. We generally prefer to draw on a plane surface, and therefore we imagine the points so situated that they would all lie in a plane surface. All our rules are merely directed to finding out where each ray would cut that plane surface. Drawings made in this way, with accuracy, are scientifically correct representations of what we should see with one eye from a certain spot; but they are in no sense, of course, what we see with both eyes, for the image of every point is conveyed, by separate rays, to each eye, and its position is thereby fixed for us beyond the possibility of doubt. Neither eye can suppose it

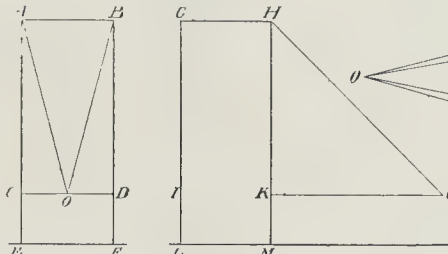


Fig. 1.

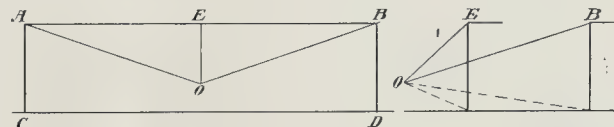


Fig. 2.

in passing into pure air, or from air of one denseness into air of another denseness, is so slight that it may usually be neglected. The area of the pupil of the eye, being greater than that of any one point in the object looked at, is entered by a large number of rays from each point, called a cone or pencil of rays; but that one may conveniently be represented by the axial ray, called the central visual ray, which is, of course, a straight line, so that, for the sake of simplicity and convenience we may conceive the eye seeing every point of an object by means of a ray of light proceeding in a straight line from that point to the retina of the eye, where it impresses the image of the point, and the spectator is thereby made aware of the direction in which the point lies. If the ray proceeded from a different direction, the image would, of course, either rest upon a different part of the retina, or the whole eye would turn round to receive it. In either case the brain would be aware of the change. This happens in each eye, and one eye, therefore, is enough to tell us the direction in which a point lies; but it is not enough to tell us how far off the point is. If it were nearer or more distant, the image brought by the straight ray of light would still be upon the same spot on the retina, and, except for a slight difference of distinctness, would be exactly the same image, and the effect upon the eye being thus exactly the same, the brain could have no cognisance of the difference.

It follows, from this inability of our eyes, taken singly, to measure the distance of points from themselves, that one eye cannot tell us the form of an object. If, for instance, you

situated anywhere but where it is, because the uncertainty of each is corrected by what is seen by the other.

The condition, therefore, which enables us to make a correct drawing of what we see with one eye is absent when we take both eyes into account. If we attempted to make a section of the rays in this case, every point of the object would have to be represented by two points; otherwise it must look wrong to one eye at least, if not to both.

The impossibility of drawing what is seen with both eyes may, to some extent, be demonstrated by a very simple experiment. Hold up an object, say a pencil, about in a line with some more distant object, such as a pole or rod; look steadily with both eyes at the rod, and you will see two pencils; squint and look at the pencil, and you will see two rods. How will you draw the pencil and the rod? Shut one eye, and you see quite clearly what to draw.

There are two more points to be noted about binocular vision, both of which illustrate the impossibility of making a drawing of a solid object which will be correct for both eyes. The first is, that there are always parts of such objects which can only be seen with one eye. For instance, if you hold up a book in front of your face with the back towards you, each eye sees one of the covers which is not visible to the other, and, whether you draw one or both or neither, the picture will be wrong for one or both eyes. The other point is that, although a part of a solid object,—usually the greater part,—can be seen by both eyes, an entirely different view of it is seen by each. In the same experiment the back of the



book is seen by both eyes, but each sees a different view of it which, if drawn, would be wrong to the other. This experiment presents, of course, merely an extreme case of what occurs, to some extent, with every solid object we look at, though usually it is in a much smaller degree.

With respect to the vanishing of vertical lines, there can be no sort of doubt that, as we look at them, we see them vanishing, both upwards and downwards; and so with horizontal lines at right angles to the axis of vision, or, to use a perspective term, horizontal lines parallel to the plane of the picture. Such lines also seem to vanish both ways.

Let A, B, E, F (fig. 1) be the front elevation of a tower, and G, H, L, M its side elevation, and suppose O to represent the position of a person's eye, then he would see the top angles of the tower by means of the rays A O, B O, and the points at the sides of the tower, just opposite to him, by means of the rays C, O, D, O.

Now project these two pairs of rays on a plane, and suppose this person to be judging of the width of the tower at the top, and also immediately opposite to him, remembering that the eye only sees direction. A and B must appear closer together than C and D, for they appear to be between C and D; that is, the top of the tower must appear narrower than the part immediately opposite to or nearer the eye. This is expressed by saying that the apparent length of a line is measured by the size of the visual angle.

Again, let A, B, C, D (fig. 2) be the front of a long building immediately opposite the eye of the spectator at O. If he looks up at E, the nearest point of the cornice, he looks along the ray, O, E; if he looks at B, he looks along O, B. Now, E and B are at the same height, but O B is much longer than O E (fig. 2), therefore E must appear higher than B, or the line E B vanishes downwards towards B. This has nothing whatever to do with a man's turning his head, as is often asserted. The result is not in any way different if he keeps his head and his eye perfectly still; except that he does not see so far, and, therefore, the diminution is not so perceptible. It is simply due to the fact that a line of a certain length at a distance subtends a smaller visual angle than a line of the same length nearer to the spectator. The base of the triangle, in fact, remains the same, but, the sides being longer, the angle contained by them is more acute. To say that, when a man moves his head to look at a thing, he alters his horizon line or vanishing points, or anything else of the kind, and that that is the reason certain lines seem to vanish, is to say that the laws of perspective govern those of vision, which is absurd. Leaving out of account a slight change in the position of his eyes, what he sees when he turns his head is exactly what he would see if he held it still; if only his eyes had sufficient range. The vanishing depends only on the positions of the points looked at, and the position of his eyes, not in the least on the direction in which he looks.

Of course, if lines parallel to the picture plane seem to vanish in one direction, they must seem to vanish in both; that is, vertical lines seem to vanish downwards from the point nearest to the eye as well as upwards from the same point, and horizontal lines seem to vanish to the left as well as to the right. In fact, in any two parallel lines the points nearest to the eye must look farther apart than any similar pair of points farther away, because the rays from them contain a larger visual angle, and if we could project the rays on to one plane, the further pair of points would certainly appear to be between the nearer ones.

In the horizontal cornice, therefore, the line appears to vanish to the horizon on both sides of the spectator, and, as we see no angle in the middle, it might easily be concluded that it does not vanish in a straight line, but in a curve of some sort. At first sight it seems impossible that it should be otherwise. But it must be remembered that the line we are looking at, however much produced, never would really meet the horizontal plane. The appearance of meeting is due to the deficiency in our eyesight before referred to, namely, that the eye, as a piece of mechanism, can only tell us the direction of a point, and not its distance from us. If it were otherwise, we should see exactly what exists, and there would be no question of appearances. If, once more, we think of the rays which

carry the picture of the cornice line to the eye; we see that they will all lie in a plane surface, in which the line itself and the centre of vision of the eye are also situated; and the appearance of the line is exactly the same as the appearance of that plane surface would be, because the line is a part of the plane surface. It is like looking at the edge of a sheet of paper from a point in the edge. The horizontal plane is another similar plane, also passing through the centre of vision, and meeting the first in a straight line; as one leaf of a sheet of writing paper meets the other at the fold. As the eye is situated at a point on this line, and looks round at what it can see of these planes, namely, their thickness or section, always, of course, a straight line, the farther the eye looks to right or left, the nearer the planes appear to approach each other, until at  $90^\circ$  on each side they seem to meet.

Thus we seem to see parallel straight lines meeting at both ends, or that would meet if produced, which is a thing that cannot exist and cannot be drawn on a plane surface.

It can, however, and must, be represented on a spherical surface if such a surface is used. The early masters of perspective, the architects and painters of the Renaissance, were especially fond of exercising themselves in that way, by painting architectural features on domes in such a way that, standing in the centre under the dome, the drum seems to be lengthened upwards, or the surface of the dome disappears, and other buildings, usually very magnificent ones, seem to be seen surrounding the opening. Even Correggio had the bad taste to do something of the sort in the cathedral at Parma, and innumerable more dreadful instances by lesser masters are to be found, as you know. The process is quite simple, and the rules of plane perspective can be used, the base line in plan being made a circle, struck from the station point, and the heights being measured vertically, and not on the spherical surface.

A perspective drawing may, of course, be equally well made on any surface, mechanical facilities for execution being neglected. I mean, theoretically, it may just as well be made on one surface as another. Circular panoramas are drawn on cylindrical surfaces, merely in order to get a more extended view into the picture without apparent distortion.

The process of making a drawing on a cylindrical surface is similar to that described for a spherical one, and indeed it is the same for any surface, remembering that, in setting out on plan, the picture plane must be of the same plan as the surface drawn on, and that, in setting up heights, they must always be set up vertically, finishing, of course, on the picture plane. It is to be remembered also that the lines of the drawing are what is called a conical projection of the lines of the object on the surface of the picture; and that they will not be straight lines when projected on curved surfaces.

If we leave theory and come to practical matters, the question presents itself,—can we make any alterations in the science of perspective, as it is now understood and practised, that will be an improvement, in the sense of enabling us to represent, by any scientific process, more exactly what we see? I believe there are many persons who still believe that to be possible, notwithstanding the fact that no advance has been made since Dr. Brooke Taylor first clearly enunciated the true principles of plane perspective, and put it upon a firm scientific basis in his book published in 1715. Dr. Priestley in 1770 said, respecting this matter, "Of all the imitative arts this of perspective . . . has actually been brought the nearest to perfection . . . as much is known as we can imagine will ever be made use of."

A few years later, in 1779, Thomas Malton, in his well-known treatise, made a very explicit declaration on the subject. He said, "I maintain that all which can be done by rule is (he means 'has already been') performed on the most perfect and infallible principles that can be devised; that perspective is absolutely at its *non plus ultra*."

I firmly believe that no improvement is possible, and that every one who examines the subject more than very superficially will come to the same conclusion. The limitations of our science of perspective seem sufficiently serious when stated in words. It only enables us to draw what we see with one eye, stationed at one particular spot; and, still worse, the picture itself, to be seen correctly, must also be

looked at with one eye, stationed at one particular spot. In practice these are not such serious matters, for our eyes are not very fastidious or ready to discover small inaccuracies, and memory and imagination often come to their aid when looking at a perspective drawing, and correct many of the errors that a trained eye would otherwise detect. But yet it is obviously worth consideration whether or no these defects could be overcome.

Binocular perspective we have already examined, and found that to draw things as we see them with two eyes is quite impossible. The next point is not worth examination, for, obviously, we see a different view of a solid object every time we shift the point from which we look at it; and, equally obviously, we can only draw one view at once on a flat surface.

The possibility of removing the remaining defect, namely, that a perspective drawing must be looked at by one eye stationed in a particular spot, is worth a trifle more consideration, if only because it is so often asserted that the use of a curved picture plane would overcome it. Every writer on perspective has pointed out what I have already referred to, namely, that all our rules are merely directed to finding out where the rays which carry the image of an object to the eye would cut the surface on which we draw, if we held it up between the eye and the object, and the rays could pass through it. The fact that a section through those rays looks the same as the object itself is the very foundation of perspective science. We begin by making a plan of the rays and of the surface to be drawn on; that plan enables us to see where certain of the rays would cut the surface. If we are going to draw on a flat piece of paper, of course the plan of the paper will be a straight line; if on the walls of a circular room or on a dome, the plan of the circular or domical surface will be circular; but to draw the plan of a flat piece of paper as a circle will, obviously, get us into considerable difficulties, and, however we overcome them, the result cannot be right. It must not, however, be forgotten that it is impossible to make persons look at a drawing with one eye and from one particular point; and that, when looked at from any of the other possible points (which are a great many times more numerous than the single right one), any and every drawing will be more or less wrong. It is a legitimate question, therefore, whether by sacrificing absolute correctness as regards one point of view we could not get more nearly correct (or, at least, less wrong) as regards all the other points. I am inclined to think we could do so, but it would be at an expenditure of time and labour very much greater than the advantage gained. All that is necessary is, to treat our drawing on the flat paper as a development of the drawing we should get on a spherical surface. We must use, of course, a circular picture plane in the plan, and circular height lines of various diameters, according to the points at which they cut the sphere, and very nearly all the lines that are straight in the real object will, of course, become developments of circular arcs,—that is, elliptical,—so that the labour of making such a drawing would be colossal.

The rules of perspective are so perfect that, if only means could be found to make people look at a drawing from the right point of view, no distortion would be apparent, however much the picture were extended. We all know the rule that the picture must be confined within a visual angle of  $60^\circ$ ; and the reason usually assigned is the right one, namely, that it is all the eye can conveniently grasp at once. A person always wants to grasp the whole of a picture at one view; and he gets far enough away from it to do so. If we have drawn more than is contained in that angle, no one will look at our picture near enough to see it properly. I would add, as equally important, that we should always draw as much, at least, as will be contained in a visual angle of  $45^\circ$ , and with a similar object, namely, to induce the spectator to go far enough off. I believe that one very important condition of success, in making a perspective drawing, is to arrange matters, as far as possible, so that any one who looks at the drawing will be inclined to look at it from somewhere about the right point of view. A good deal may be done in this way without in the least affecting the grouping of the picture or the choice of the point of view. Besides the







and in that way creating an impression that the building was much finer than it really was. That was what was vulgarly termed "faking-up" (laughter).

The Chairman said the meeting had listened with great attention to Mr. Baggalley's able paper, and many of them would read it with even greater interest, because he believed they were, like himself, in Mr. Berry's position of not being able to follow the whole of it. The question of the vanishing of vertical lines was a curious one. A most difficult question was that of single vision with two eyes. There was no doubt that on each retina there was a distinct image formed of the thing looked at, and yet practically one object only was seen. Mr. Farrow was quite right in saying that the retinal image was reversed, and that it was an act of the brain which enabled one to see the object the proper way up. In looking at any particular point with one eye it was difficult to say how far off it was in a direct line, and even with two eyes it was often impossible to state the distance of such a thing as a wire stretched horizontally. There was nothing one was more likely to do in walking across a field, with a wire fence, than to run against that.

The vote of thanks was then put, and was very cordially received.

Mr. Baggalley, in replying, said that on every disputed point he was ready to maintain his position. As to the vanishing of vertical lines, he had said that they could see them vanish with their eyes, and when they drew lines on a sheet of paper they saw them also vanish, exactly in the same degree as the vertical lines in nature vanished. In the case of columns, entasis was not given to counteract the tendency of a vertical object appearing to spread. Those who invented entasis took a tip from nature. In trunks of trees, limbs of animals, &c., the point where they were attached to something solid was thicker than the other end. The thinning did not occur in a straight line, but in a curve, and that natural peculiarity was imitated when entasis was given to columns. He had not been able to see that the top of a tower or of a column, however high, looked wider than the bottom. People said it did, and he must try and believe it; but he had never himself been able to detect it. The point on which he was weakest was the making of the plane 1 ft. 6 in. or 2 ft. from the point of sight, but that was only a rough sort of estimate, and if Mr. Berry made his drawings to be hung on the walls of the Academy, he had better take a little longer distance (laughter). What he had meant to convey was, that the point of sight should not be taken too close. The work going on between the retina and the brain was a difficult subject. He did not agree with Mr. Farrow's theory, but he was not prepared to prove that it was wrong. He did not see how the brain could arrive at any conclusion, except through the retina, on what it saw at the moment. Memory might help to correct what the retina stated to the brain, but as far as what was seen at the moment was concerned, he could not believe that the brain had any knowledge except from what the retina told it. As to seeing objects upside down, it had been clearly explained by the fact that though seen in that position, their appearance relatively to one another was exactly the same as if they were seen the right way up. Mr. Pratt had referred to a paper on the same subject read some years ago, and he (the speaker) had already given the date of it, viz., November 24th, 1876. They might find an explanation of what Mr. Slater had said about the wire in the fact that it was very much in the plane of the eyes, and there was little or nothing around or about it to compare with it or to show its position.

#### CASE UNDER THE METROPOLIS MANAGEMENT AND BUILDING ACTS (AMENDMENT) ACT, 1882.

##### TEMPORARY STRUCTURES.

On Friday, December 1st, at the Wandsworth Police Court, before Mr. Paget, John Foster, of 5, Mount Pleasant, Merton-road, Wandsworth, was summoned by Professor T. Roger Smith, District Surveyor of Wandsworth, for having erected at 5, Mount Pleasant a wooden structure of a movable or temporary character without having obtained the licence of the Metropolitan Board of Works, required in accordance with Section 13 of the above-named Act. Mr. Barnard appeared for the complainant, and Mr. Bell for the defendant.

The structure complained of was erected in the forecourt of the house; it was 17 ft. long, 7 ft. 5 in. wide, and 8 ft. high; and formed a lean-to addition to the house, and was used as a shelter for goods exposed for sale. It consisted of wooden rafters supported by two horizontal timbers, one fixed to the wall of the house, and one carried by three wooden posts standing in sockets let into the ground. The roof was of canvas laid on the rafters. The front and two ends were open, and to the posts in front was fixed a tradesman's sign-board.

On behalf of the District Surveyor it was contended that this was a wooden structure of a movable or temporary character, and that the licence of the Metropolitan Board of Works should have been obtained for its erection.

For the defendant this was disputed, on the ground that the structure was set back some distance from the road; that the construction was very slight; that no part was fixed; and that the whole could be removed in a few minutes.

The Magistrate held that it was a structure to which the requirements of the Act applied, and that no licence having been obtained for its erection, he must order it to be removed.

#### SALT-WATER FOR STREET-WATERING.

SIR,—Your correspondent's experience is interesting, but engineers will distinguish between his facts and his theory.

It is obvious that the inconvenience he describes [p. 728, *ante*] is not the fault of the salt-water. On the contrary, frost is much less likely to injure the road watered with salt-water than that watered with fresh-water, as it rarely happens in England that the frost is severe enough to freeze salt-water at all, especially at some inches under the surface.

As regards the phenomena observed after "soaking rain," they are also without doubt wrongly attributed to the salt, as salt does not "heave," i.e., I suppose, expand when wetted, as any one may easily prove for himself.

H. D. PEARSALL, C.E.

#### BIRMINGHAM, DUDLEY, AND DISTRICT BANKING CO. v. ROSS.

SIR,—We think your editorial remarks upon this case, in your issue of the 26th ult. [p. 728], are somewhat misleading. The buildings are not upon adjoining sites; they both front a main street, but between them, and at right-angles to the main street, is a public thoroughfare, 30 ft. wide, called Warwick-passage. This passage was designed and laid out at the time the lease of plaintiffs' property was granted, and their buildings were designed and built with numerous windows facing to it, with full knowledge that a building would be erected on the opposite side of the passage as soon as the land could be let.

Mr. Justice Kekewich did not alter the rule of law, that a man cannot derogate from his own grant, but followed a dictum of Lord Justice Cotton in a previous case, to the effect that an implied grant could be qualified by circumstances in the knowledge of the grantee at the time of the grant, and held that the plaintiffs' predecessor in title knew that a building would be erected on the opposite side of Warwick-passage; that the defendant's building was not an unreasonable height; nor, having regard to the locality, higher than might have been anticipated when the plaintiffs' lease was granted.

This decision seems to us in accordance with common sense, but we understand the plaintiffs will appeal.

DEMPSEY & HEATON  
(Defendants' Surveyors).

Birmingham, December 6, 1887.

#### "ST. AUGUSTINE AT ST. ALBAN'S ABBAY."

SIR,—Referring to a letter from Mr. Homs [p. 728], embodying part of another from Mr. Hucks Gibbs, published in your issue of last week, and relating to the question as to whether Augustine, the missionary, has a just claim to the title of "saint," Mr. Hucks Gibbs writes to say that my quotations from Mr. Surtees "amount simply to this, that Wheatly, writing in the last century, said what was quite true, that Pope Gregory sent Austin the monk to England (obviously Austin was not then canonised). . . ."

This he seems to consider as in some mysterious way an argument in favour of his subsequent canonisation, and apparently considers that though the best writers on English church history term him Augustine only, as Mr. Surtees remarks, and I will add also the best of writers on English history, all these authorities are valueless, Augustine not being canonised at the time to which they refer. When, however, authors of the twelfth century, and later, are found sedulously bestowing the title on St. Gregory, and so carefully withholding it from Augustine, I think this argument is proved to be of little service.

I quote the following to substantiate my statement:—

"In the meantime Augustine was sent by Pope St. Gregory into Britain."—Jeffrey of Monmouth,

of the twelfth century; Thompson's translation, 1713, p. 367.

"St. Gregory commissioned the servants of God, Mellitus, Augustine, and John, with several others who feared the Lord, to preach to the English nation."—"Ordericus Vitalis" of the twelfth century, Forester's translation, 1853, pp. 347-8.

"St. Gregory . . . appointed Austin, or Augustin, a monk of the convent of St. Andrew at Rome, with forty other monks, to go into England . . . they made a stop, and sent back Austin their leader, to represent these difficulties to St. Gregory."—Henry's "History of England," 1774, vol. ii., p. 136.

In conclusion, let me remark that one satisfaction is, at any rate, ours. If the nimbed figure is a mistake, it will not in any degree equal in symbolical inaccuracy that of Mr. Cottingham's lady bishop at Rochester.

H. LITTLEHALES.

#### "STATUS OF SANITARY INSPECTORS."

SIR,—I was glad to see in your issue of last week [p. 728] Mr. W. J. Addiscombe's letter about the status of Sanitary Inspectors, and more especially that part of the letter which dealt with the Sanitary Institute examination, and the hardship which provincial candidates have to undergo in competing with those who reside in or near London, and thus are able to attend the lectures, while the provincial candidate, let him be ever so willing, is unable to do so unless at considerable expense.

Another hardship which they have to undergo is in the fact that the examinations are always held in London, and thus they have to incur considerable expense compared with their London brethren; for instance, in my own case, should I go up for the examination, my railway fare alone would amount to over 3*l.*, and, together with the fees for examination (which are ridiculously high), hotel expenses, &c., would bring the sum total to between 12*l.* and 14*l.*, not to mention loss of time, &c.

Why cannot the Sanitary Institute hold an examination in the North of England, as they hold their congresses, and thereby bring it nearer the doors of Scotch and North of England candidates? I am certain that if the Institute could only see it in their power to do so, they would confer a great boon on candidates in the North, and materially add to the number of candidates.

ROBT. A. WILSON.

Lee Mount House, Burntisland.

#### DEODORISING WATER-CLOSETS.

SIR,—Herewith I send you a simple method of deodorising a w.c. when supplied with water from a separate cistern. I have tried it for three months, and it answers very well.

Take a bottle about 5 in. deep if for a flushing cistern, or larger for a supply cistern. Such bottles as those used for citrate of magnesia are the best. Fill it with permanganate of potash, cork it securely, bore two holes in the cork with a large pin, then suspend it upside down in the cistern by a string or wire passed round the neck and bottom of the bottle and tied to a piece of wood across the top of the cistern or to a hook hooked over the side. The bottle should be covered by the water when the cistern is full. This arrangement will cost 3*d.*, and last five or six months. It will keep the water charged with permanganate in proportion to the time that elapses between each discharge of the closet or the number of holes in the cork.

HENRY OUGH.

#### THE RECENT MEETING OF SANITARY ENGINEERS AND SURVEYORS AT LUTON.

SIR,—The reference in the paper read by me [see *Builder*, p. 696, *ante*] relative to the trial of the Native Guano Company's process was, I regret to say, made in error.

W. H. LEETE, Borough Surveyor.  
Luton, December 3rd.

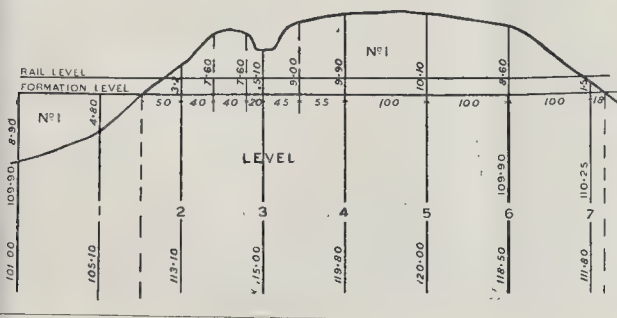
#### Royal Institution of Great Britain.

Mr. Hubert Herkomer, A.R.A., Slade Professor of Fine Art in the University of Oxford, will deliver three lectures at the Royal Institution early next year, viz., Jan. 19, "The Walker School"; Jan. 26, "My Visits to America"; Feb. 2, "Art Education."

**Trade Smoking Concert.**—The thirteenth annual smoking concert of the office staff of Messrs. Wm. Brass & Son, builders, and their friends, was held on Saturday evening in the large dining-saloon of the Falstaff Restaurant, Eastcheap. Over 300 persons were present, including representatives from many other building firms. Mr. R. Fraser was in the chair, and Mr. G. Bland in the vice-chair. Mr. A. Cox was the accompanist at the pianoforte. The programme was diversified. The concert was under the management of Messrs. W. Arnold, C. R. Crispin, W. R. A. Hughes, and Mr. G. W. Norris (hon. sec.).

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SLOPE OF BANKS  $\frac{1}{2}$  TO 1  
SLOPE OF CUTTINGS  $\frac{1}{2}$  TO 1  
EXCEPT ROCK



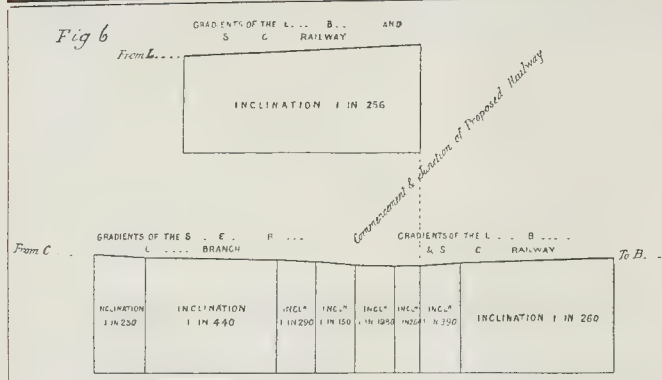
### The Student's Column.

LAND SURVEYING AND LEVELLING.

XXIII. —RAILWAY QUANTITIES.

**T**HE diagram illustrates a working contract section for a line of railway, 6 furlongs 1 chain in length. The surface levels of the natural ground having been plotted by the method explained in our article (*Builder*, November 19th, p. 719), vertical red or blue lines are ruled upon the section at each chain's length perpendicular to the datum line. The level of the datum line having been determined, the heights of the surface levels above the datum line are then written, as shown upon these vertical lines, just above the datum





line. These heights should be derived as much as possible from the figures contained in the column headed "Reduced Levels," in the "Level Book," and should be only scaled as a check upon the plotting or at points where no reduced levels are given in the "Level Book." The level of the upper surface of the rails should next be figured upon the section. This is arrived at by first "grading" the section by stretching a piece of cotton over portions of the irregular line which indicates the present level of the ground, and adapting the cotton line by successive rising or falling gradients to allow of the amounts of banks and cuttings in each case appearing equal to the eye. In so grading a section, regard must be had to what is termed the "ruling gradient," namely, 1 in 100, or such other maximum inclination as is decided to be adopted. At each change of gradient a vertical black line is drawn in between the datum line and the surface level, and the heights of the rail level scaled off the section are figured upon these vertical lines. The horizontal distance is then scaled, and the inclination of the gradient calculated. If it is desired to make the gradient so found to rise or fall one unit in a certain multiple of chains, the height of the rail level at the further end can be raised or lowered the fractional tenths and hundredths of a foot which will enable the gradient to work out to this exact number in the given distance without remainder. The levels of the rails at each chain's length, or of the "formation level," from 9 in. to 2 ft. below the level of the upper surface of the rails, is next arrived at by calculation, and figured upon the section. Thus, referring to the diagram, the difference between the heights 109.90 and 122.20 gives 12.30 ft. in a length of 34½ chains (2,277 ft.), which is equal to a rising gradient of 1 in 185 or '567 ft. per chain (66 ft.). Hence, if we alternately add 0.35 and 0.36 at each chain, we shall find we obtain 122.20 at a distance of 34½ chains from the point where we measured 109.90. Thus if either the rail level or the formation level (if preferred) be 109.90 at 6 chains, it will be 109.90 plus 0.35 equals 110.25 at 7 chains; and 110.25 plus 0.36 equals 110.61 at 8 chains. The upper row of figures upon the section shows the amount of depth of the cutting or height of the bank. The surface level at 6 chains being 118.50, by subtracting 109.90 from this we obtain 8.60 depth of cutting. The surface level at 7 chains being 111.80 and the formation level (or it may be the rail level) 110.25, the amount of cutting is here seen to be 1.55 as figured upon the section.

The quantities of earthwork can be most readily arrived at by the use of Bidder's tables (sold in sheets, at 2s. each or mounted 3s. 6d.). The section is headed with the number of the railway, in this case No. 1, and the banks and cuttings are each numbered in order, the banks in this section numbering 1 to 5, and the cuttings 1 to 4. A viaduct is indicated in the place of a high embankment between 9 and 18 chains and a tunnel in the place of deep cutting between 23 and 36 chains. The adoption of a viaduct or tunnel in the place of a bank or cutting is generally a question of expense, the cheapest being usually recommended, but it is also dependent upon the geological formation and the nature of the property. The diagram illustrates the application of Bidder's tables in tabulating the results.

A form of level book sometimes employed in railway work is also shown, in which columns are provided for the heights of formation levels, embankments, and depths of excavations.

Widths of roads, and the natural slopes of earths, should be thus tabulated:—

#### WIDTH OF CENTRE.

Occupation Roads .....	16 ft.
Single Line Railway .....	18 ft.
Ditto " " .....	20 ft.
Public Road .....	28 ft.
Double Line Railway .....	30 ft.
Ditto " " .....	33 ft.
Turnpike Road .....	38 ft.

#### NATURAL SLOPES OF EARTHS.

##### Table of Angles made with Horizontal Line.

Gravel, average .....	40°
Dry Sand .....	38°
Sand .....	22°
Vegetable Earth .....	50°
Compact Earth .....	39°
Shingle .....	45°
Bubble .....	45°
Clay, well drained .....	45°
Ditto, wet .....	16°

#### XXIV. PARLIAMENTARY WORK.

The preparation of plans for Parliament connected with projected schemes having reference to railways, tramways, docks, subways, water or gas supply, and other works, is generally effected by correcting such portions of the Ordnance map as show the country which lies between the limits of deviation to be indicated upon the deposited plan. Prior to the publication of an Ordnance map, showing any particular country to be traversed, it was the custom to trace the parish or tithe map and to correct this tracing upon the ground. The minimum scale for plans to be deposited under Standing Orders is 4 in. to the mile, and the minimum scale for such portions as require to show enlarged plans of buildings is six chains to the inch. The diagram, fig. 1, shows the form of a finished plan. The numbers in each enclosure refer to the Book of Reference, and are inserted by one of the reference clerks engaged by the solicitors to the undertaking, whose duty it is to describe each enclosure, and to state the names of the owners, lessees, and occupiers in proper Parliamentary form. The rules and regulations to be observed are published under the name of "Standing Orders" of the Houses of Lords and Commons. It is the surveyor's work to see that all roads, fences, streams, buildings, county and parish boundaries, centre line of proposed work, with ticks indicating miles and furlongs, are accurately shown upon the tracing which is handed to the solicitor for reference.

An accurate plan is important, in order to make an accurate section. The section is seldom chained from end to end, but its position in open country is measured from well-defined points in the fences, and in towns from the corners of buildings shown on the plan. These measurements should be scaled off the original map, and figured upon the tracing that is to be used for setting out in the field. The minimum scale for sections to be deposited under Standing Orders is 4 in. to the mile horizontal scale, and 100 ft. to the inch vertical scale. The minimum scale for cross sections

and sections of road alterations is 40 ft. to the inch. Fig. 2 shows a portion of a Parliamentary section, in which it will be observed that according to the Standing Orders the section is drawn to the same horizontal scale as the plan. The mileage and furlong points correspond with the plan. The depth of all cuttings and embankments at their deepest points over 5 ft. above or below the rail level are stated, the heights (calculated) and the inclinations of the proposed gradients are also given. Roads that are crossed upon the level, and all public roads are noted, and the method of dealing with them described (see also cross sections).

#### PARLIAMENTARY REGULATIONS FOR RAILWAYS CROSSING ROADS.

	Turnpike road. ft. in.	Public road. ft. in.	Occupation road. ft. in.
Clear width of under bridge, or approach .....	35 0	25 0	12 0
Clear height of under bridge for a width of 12 ft. ....	18 0	—	—
Ditto, for a width of 10 ft. ....	—	15 0	—
Ditto, " " 9 ft. ....	—	—	14 0
Ditto, at springing .....	12 0	12 0	—
Over bridge. Height of parapets .....	4 0	4 0	4 0
Approaches. Inclination ..	1 in 30	1 in 20	1 in 18
Ditto. Height of fencing ..	3 0	3 0	8 0

#### Maximum Limits of Deviation.

In towns, 10 yards each side of centre line.  
In the country, 100 yards, or 5 chains nearly.

#### Maximum Deviations of Level.

In towns, 2 ft. In the country, 5 ft.

#### Maximum Deviations of Gradient.

Gradients flatter than 1 in 100, deviation 10 ft. per mile steeper.  
Ditto, steeper, 3 ft. per mile steeper.

#### Maximum Deviations of Curves in Construction.

Curves upwards of ½ a mile radius may be sharpened to ¼ mile radius.  
Curves of less than ½ mile radius may not be sharpened.

Fig. 6 shows the half-mile sections which have to be taken when a railway is intended to form a junction with an existing or an authorised line of railway. The Standing Orders state that the scale shall be the same as the general section, and that the gradients of the existing or authorised line of railway shall be given for a distance of 800 yards on either side of the point of junction.

#### RECENT PATENTS.

##### ABSTRACTS OF SPECIFICATIONS.

14,994, Sliding Sashes. T. Cooke and W. H. Boyens.

This invention relates to an appliance for assisting in the raising and lowering of sashes and sliding windows, and holding them in position when raised. A spring, formed of a loop-shaped metal bar, is fixed at its end either to the side of the sash or the jamb of the window, and carries in a bend formed at the middle of its limbs the axis of a barrel or roller, the axis being fixed, with the barrel revolving loose upon it, between the limbs of the spring. The barrel contains a volute spring, the inner end of which is fixed to the axis, while the outer end is fixed to the barrel. Thus, assuming the barrel to be turned upon its axis so as to wind up the spring to a greater or less extent, while the barrel is pressed with its periphery against the jamb of the sash by means of the spring, it will be seen that if the sash be moved in the direction in which the barrel is rolling upon the jamb or sash, it will allow the spring to unwind; whether its direction be upward or downward, the power of the spring will assist the power of the hand in applying the motion, while in moving the sash in a contrary direction, the barrel will be rotated so as to wind up the spring again. If the sash be left in any intermediate position, it will be held there by the frictional pressure of the barrel against the jambs or sash caused by the spring.

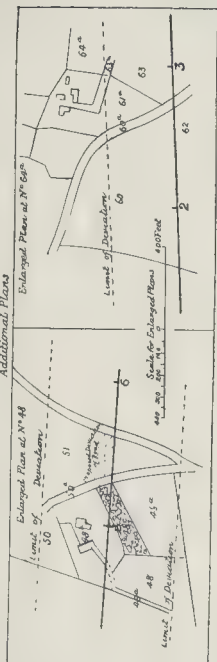
16,809, Feed for Circular Saws. E. Hughes.

By this invention wheels and gearing are dispensed with, but the rollers generally used with the feed are retained. An endless band or chain is passed round a number of sheaves or carrying drums or rollers, and round a rotating wheel, sheave, or drum, from which it receives motion. On the bed of the machine are one, two, or more rollers, with sheaves at one end round or against which the band or chain also passes. These rollers are mounted in slots or on movable brackets, so as to be easily adjusted to the thicknesses or inequalities of the surface of the timber, and may either be tightened into position or left loose so that the weight of the chain or band will hold them with sufficient force against the timber to be fed by it. The brackets are somewhat in shape like "lax tongues," to allow for adjustment.

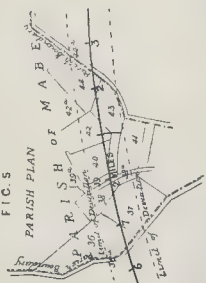
CHANGING  
 HORIZONTAL SCALE FOR PLAN & SECTION  
 0 10 20 30 40 50 60 70 80 90 100 Feet  
 0 1 2 3 4 5 6 7 8 9 10 Miles  
 PARISH OF MABEY  
 FORM OF PARLIAMENTARY PLAN & SECTION  
 FIG. 1.  
 Vertical Scale for Section  
 Feet 0 10 20 30 40 50 60 70 80 90 100  
 0 10 20 30 40 50 60 70 80 90 100 Feet  
 RAILWAY SHEET NO. 1



**FIG. 3.**  
*Additional Plans*



F1C.5



**FIG. 2.**

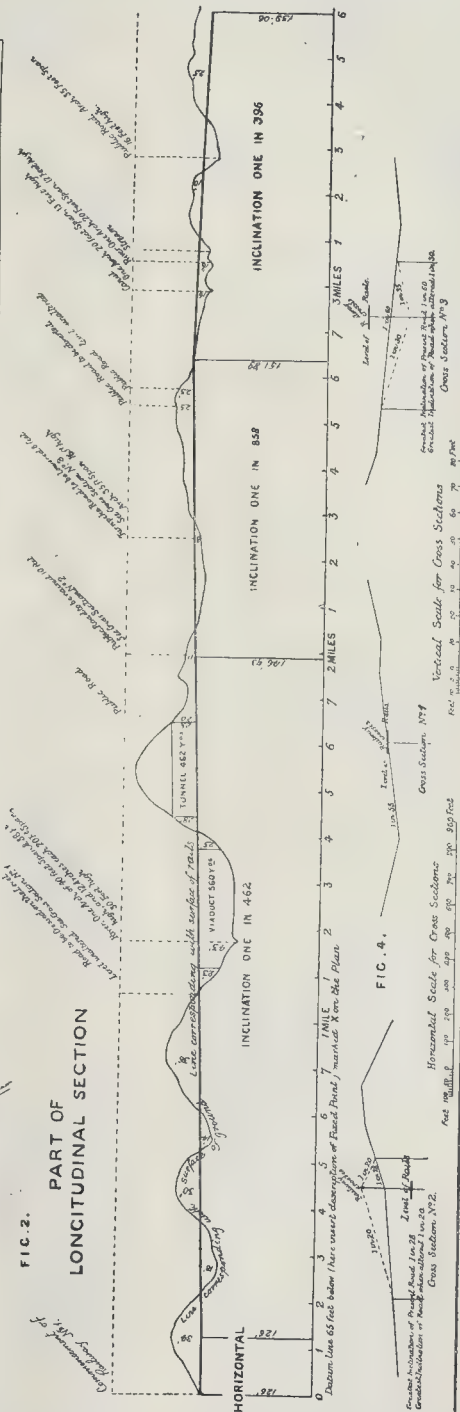
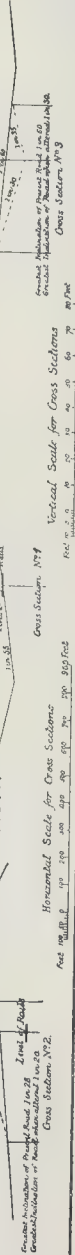
PART OF  
LONGITUDINAL SECTION

FIG. 4.





16,956, Ventilating and Flushing Water-closets. W. J. Stevens.

A rim runs round the whole of the basin, and terminates at the back in an up-current ventilating-shaft communicating with the outside air. A gushing rim curves inwards and downwards, causing the water to flush out the pan with great force.

17,057, Preventing Escape of Gas. H. W. and A. F. Cole.

A frame is disposed about the burner in such a way that it becomes heated by the flame. The tap or valve is provided with a spring or equivalent means of causing it to close the gas passage when released, and a detent is so placed as to engage with an arm handle of the tap and hold it open. It acts by the difference of temperature actuating mechanism which closes the valve and shuts off the supply.

#### NEW APPLICATIONS FOR PATENTS.

Nov. 25.—16,234, J. Sheldon, Wall Ties or Bond Iron.—16,235, C. Onions, Flushing Cisterns.

Nov. 26.—16,262, F. Seyde, Metallic Lathing or Backing for Plaster or Cement Partitions and Ceilings.—16,263, A. Johnstone, Mitering Tools.—16,264, A. Illidge, Opening and Closing Fanlights, Skylights, &c., and Retaining them in any desired Position.—16,300, O. Elphick, Automatic Flushing Taps.

Nov. 28.—16,322, W. Birdthistle, Draught and Dust Excluder for Doors, Windows, and Skirtings of Rooms.—16,349, A. Spiess, Blocks and Other Mouldings for Building Purposes.

Nov. 29.—16,397, J. Pollock, Lock and Latch Furniture.—16,399, E. Kent, Automatic Ventilating Apparatus.

Nov. 30.—16,456, F. Cook, Preventing Air and Dust passing under Doors.—16,459, D. Knowles, Sash-fasteners.—16,478, W. Snowden, Floors for Ball-rooms.—16,488, H. Howard and Others, Syphon Cisterns for Flushing Water-closets, &c.

Dec. 1.—16,505, W. Phillips and E. Verity, Sash Windows.—16,506, F. Collins, Sash-fasteners.—16,507, F. Collins, Indicator for Door Fastenings.—16,508, T. Switzer, Water-waste Preventers.—16,512, B. Clark, jun., Automatic Grip Handle and Lock or Latch for Doors, Sashes, &c.—16,529, S. Bort, Apparatus to be used in Making Bricks, Tiles, &c.

#### PROVISIONAL SPECIFICATIONS ACCEPTED.

12,554, H. Lomax, Door Fastenings.—13,859, H. Steven and J. Walker, Fastenings for Securing Rain-water and Other Pipes.—13,839, J. Gregory and J. Gilfort, Domestic Fire Escape.—14,287, P. Keogan, Fastening Window Casements, Show Case Doors, &c.—14,507, C. Watts, Balancing Elbow Levers for Opening Greenhouse or Other Lights, Ventilators, or Windows.—14,955, D. Bostel, Syphon Flushing Cisterns.—15,023, J. Lander, Artificial Stone for Flooring, Pavings, Decorating, &c.—15,065, F. Ransome, Manufacture of Cement.—15,406, A. Orr, White Lead.—15,520, W. Stanford, Jointing Stoneware and Other Pipes.—3,568, G. Girling, Artificial Stone.—15,203, J. West, Water Waste Flushing Cisterns.—15,342, S. and S. Chatwood, Hydraulic Lifts.—15,531, J. Dyson, Inlet Ventilators.—15,559, R. Lee, Blowpipes.—15,771, F. Crane, Varnishes.

#### COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.  
388, A. Beaumont, jun., Automatic B-36 for Double Doors.—777, N. Leroy, Portable Wooden Houses.—1,294, T. Brown, Raising, Lowering, Balancing, and Holding, in Closed or Open Position, the Sashes of Sliding Windows.—1,338, T. Ward, Hoisting Apparatus.—1,443, J. Bidder, Chimney Cowl or Ventilator.—3,630, T. Jones, Ladders.—4,369, E. Bury, Slide Rule for Cubing Timber, &c.—14,495, J. Cathie, Open Fire-grates.—908, J. Jeffreys, Ventilators.—1,790, J. and E. Podmore, Sash Fasteners.—3,512, A. Kitson, Step Ladders and Trestles.—7,571, J. Tuckett and G. Foster, Mortise Lock.—14,897, P. von Krystoffovitch, Artificial Granite.

#### RECENT SALES OF PROPERTY.

##### ESTATE EXCHANGE REPORT.

NOVEMBER 25.

By HORN, SON, & EYRESFIELD.  
Chelsea—Cremorne Wharf, area about 1 acre, freehold; and 27, Lot's-road, 73 years, ground-rent 24. £8,570  
17, 19, 23, and 25, Lot's-road, 73 years, ground-rent 214. 685

By WATKINS & GIBBS.  
Paddington—35 and 37, Watlington-road, 78 years, ground-rent 201. 775

39 and 41, Watlington-road, 76 years, ground-rent 201. 825

Cubitt Town—20, Stebbanale-street, 63 years, ground-rent 61. 147

Putney—Ground-rent of 1, reversion in 75 years.—218, Upper Richmond-road, freehold. 210

Tufnell Park—7, Tabley-road, 73 years, ground-rent 71. 385

By WILKS & RAY.  
Southwark Park-road—Nos. 397 to 403 odd, 10 years, ground-rent 844. 55

NOVEMBER 29.

By E. & F. SWAIN.  
Notting Hill—30 and 32, Ladbroke-grove, 35 years, rent 201. 1,000

Shepherd's Bush—10, 15, and 17, Providence-place, 22 years, ground-rent 131, 106. 415

25 and 27, Providence-place, 22 years, ground-rent 61, 88. 275

By BRAN, BURNETT, & CO.  
Willesden, Tubb's-road—Ground-rents of 41l. 13s. term 7 years. 4280  
Camberwell, Peckham-road—Ground-rents of 8l. 15s. term 33 years. 115  
Ground-rents of 8l. 15s. term 33 years. 115  
8 and 10, Denmark-road, freehold. 470  
Carshalton, Stanley-road—A plot of freehold land. 25

NOVEMBER 30.

By REYNOLDS & ELSON.  
Hackney—1 to 25, Essex-place, 10 years, ground-rent 621. 620

By F. MATTHEWS.  
Streatham-common—The freehold residence, Craigmore. 1,151

Maida Vale—5, Aberdeen-place, 38 years, ground-rent 6l. 10s. 830

Edgware-road—117, Princess-street and stabling, 32 years, ground-rent 24l. 6s. 310

9, Milner's-mews, 30 years, ground-rent 6l. 6s. 170

Euston-square—23, Melton-street, 23 years, ground-rent 16l. 10s. 170

By EASTMAN & SONS.  
Waterloo-road—No. 68, term 35 years, ground-rent 8l. 18s. 8d. 600

Anerley, Crofton-road—Wrighton House, 73 years, ground-rent 10l. 275

By ALEXANDER DANIEL SELWY & CO.  
King's Cross—164, Farringdon-road, 69 years, ground-rent 6l. 745

By J. G. & A. PRESTON.

Stepney-green—1, 2, and 3, Oley-place, 55 years, ground-rent 10l. 10s. 780

4, 5, and 6, Oley-place, 55 years, ground-rent 10l. 10s. 775

By NEWBORN & HARDING.

City-road—12, Alfred-street, 39 years, ground-rent 4l. 5s. 420

Ilington—29, St. James's-street, 39 years, ground-rent 6l. 335

Kingsland—35, Balmes-road, 42 years, ground-rent 4l. 370

Ilington—4, Arlington-street, 40 years, ground-rent 4l. 4s. 425

Horton—50, Alma-street, 47 years, ground-rent 5l. 431

1, Newton-street, 49 years, ground-rent 6l. 280

Clerkenwell—7, 26 to 30, Thomas-street, 23 years, ground-rent 21l. 10s. 585

Barnaby—87 and 89, Bride-street, freehold. 820

Camden-road—100, Brecknock-street, 61 years, ground-rent 6l. 770

Haverstock Hill—42, Adelaide-road, 52 years, no ground-rent. 620

15, Provost-road, 36 years, no ground-rent. 780

By J. DAWSON & SONS.

Lincoln's Inn-fields—7, 8, 10, and 13, Portsmouth-place, freehold. 2,330

Lincoln's Inn-fields, Backyard—Freehold block of buildings, area 4,000 ft. 3,200

By FAIRBROTHER, ELLIS, & CO.

Hendon—The Midland Hotel, freehold. 7,700

2 to 9, Hamilton-terrace, freehold. 2,820

Cricklewood—The Cricklewood Tavern, freehold. 5,625

1 to 16, Cricklewood-terrace, freehold. 3,500

By RUMFORD & TREVES.

South Kensington—29, Queen's Gate-mews, 64 years, ground-rent 5l. 1,100

Wandswoth-road—An improved rent of 461, term 22 years. 545

By FORDE & CHAFFIELD.  
Poplar—1, 2, 3, and 4, Sophia-street; and 1, 2, and 3, Elizabeth-terrace, 79 years, ground-rent 83s. 325

Wood-green—13 to 17, Somerville-terrace, 61 years, ground-rent 22l. 10s. 365

Stoke Newington—15, Paintshop-road, 92 years, ground-rent 5l. 5s. 227

By E. OWENS.

Fulham—Ground-rents of 47l. reversion in 97 years. 1,010

Weymouth—1, Hampshire-street, 51 years, ground-rent 15l. 785

By TOLPIN & HARDING.  
Bayswater—10s, Porchester-mews, 51 years, ground-rent 2l. 600

#### MEETINGS.

MONDAY, DECEMBER 12.

Society of Arts (Lecture).—Mr. H. H. Statham on "The Elements of Architectural Design." 111. 8 p.m.

Leeds and Yorkshire Architectural Society.—Annual Dinner.

TUESDAY, DECEMBER 13.

Institution of Civil Engineers.—Mr. E. Hopkinson, M.A., on "Electrical Tramsways: the Bessbrook and Newry Tramway." 8 p.m.

Manchester Architectural Association.—The Rev. R. H. Snape, of Bolton, on "Scottish Cathedrals." 7:30 p.m.

WEDNESDAY, DECEMBER 14.

Society of Arts.—Sir Philip Magnus on "Commercial Education." 8 p.m.

Liverpool Engineering Society.—Address by the retiring President, Mr. J. J. Webster.

FRIDAY, DECEMBER 16.

Architectural Association.—Mr. T. G. Jackson, M.A., on "The Proposal to make the Architect a Close Profession by imposing the Test of Examination and Registration." 7:30 p.m.

Institution of Civil Engineers (Student's Meeting).—Mr. J. H. Parkin on "River-gauging at the Yrwyg Beerroot." 7:30 p.m.

Edinburgh Architectural Association.—Annual Dinner.

#### Miscellaneous.

Blair Convalescent Hospital, Turton.—Referring to the notice in our last of the Blair Convalescent Hospital, Turton, near Bolton, we are asked to mention that the whole of the ground floors have been laid with Lowe's Patent System of Wood Block Flooring.

#### Birmingham and Canal Communications.

The Birmingham Gazette states that since their appointment the Canal Inquiry Committee of the Town Council have been fully occupied in making inquiries and accumulating a large amount of information. They have devoted their energies to the best method of improving communication with London and other places, as well as to the consideration of the Severn plan or Bristol Channel scheme. It will be remembered that a circular was issued by the committee to the principal traders of the town and district, containing a series of inquiries as to the traffic between Birmingham and various large ports. Many replies were received, and the information thus conveyed has been carefully collated. At the same time the circulars elicited a number of contradictory opinions. A new proposal to connect Birmingham with Hull by way of the Tame Valley and the Trent, a bill to authorise which will shortly be laid before Parliament, will also have to receive the consideration of the committee.

The Metropolitan Board of Works.—The agenda-paper for the meeting of the Metropolitan Board of Works to be held this Friday, the 9th inst., contains the following recommendations of the Works and General Purposes Committee:—

That the resignation of Mr. W. Conquest, of the Engineer's department, be accepted as from Christmas next; and that, from the same date, a retiring allowance of 280l. 13s. 4d. a year, being forty-sixths of his salary of 500l. a year, be granted to him.

That the resignation of Mr. W. Groves, of the Engineer's department, be accepted as from Christmas next; and that, from the same date, a retiring allowance of 195l. a year, being thirty-nine sixths of his salary of 500l. a year, be granted to him.

That for the present no action be taken with respect to the resignation of Mr. J. McDougall, of the Engineer's department; and that the subject be further considered at the end of three months.

That the vacancy in the Architect's department, caused by the retirement of Mr. A. Clemence, be filled by the appointment of an officer in the third class, at a commencing salary of 120l. a year, and that it be referred to the Committee to prepare and issue an advertisement inviting applications for the post.

That the Architect do prepare a specification and schedule of prices for works and repairs to buildings that have become the property of the Board in connexion with street improvements and improvements under the Artisans', &c., Dwellings Acts; and that, to enable this to be done, the Architect be authorised to employ temporary surveyors at 31s. 6d. a week.

The Office of City Architect.—In addition to the candidates for this office whose names we mentioned last week, Mr. Herbert D. Appleton has come forward. The Court of Common Council, at its meeting last week, refused by a large majority to limit the age of candidates to fifty years, as proposed by the Officers' and Clerks' Committee. The proposal to suspend the 38rd standing order of the Court was also negatived by a large majority. In consequence of this, Mr. H. H. Bridgman, who is a member of the Court, will not be a candidate. The election will take place on Thursday next, Dec. 15, and will be by ballot.

Festivity at Exeter.—At Fair Park, Exeter, on Saturday evening last, Mr. Harry Hems entertained to supper his numerous employes, to celebrate the twenty-first anniversary of his arrival at Exeter.

The Slate Trade.—Stocks being at present low, and the demand very good, it was decided, at a meeting of the local quarry owners held at Carnarvon last Saturday, to advance prices from the 1st proximo.

#### PRICES CURRENT OF MATERIALS.

##### TIMBER.

		£.	s.	d.	£.	s.	d.
Greenheart, B.G.	.....ton	6	5	0	7	10	0
Teak, B.G.	.....load	8	0	0	10	0	0
Second, U.S.	.....foot cube	0	2	0	3	0	0
Ash, Canada	.....load	3	0	0	4	10	0
Birch	.....	2	0	0	3	10	0
Elm	.....	2	0	0	3	10	0
Fir, Baltic, &c.	.....	1	10	0	4	0	0
Oak	.....	2	10	0	4	10	0
Canada	.....	3	0	0	6	0	0
Fine, Canada red	.....	0	0	0	14	0	0
St. Petersburg	.....	2	0	0	4	0	0
Lath, Dautsio	.....fathom	3	0	0	5	0	0
Wainscot, Riga	.....log	4	0	0	6	10	0
Wainscot, Odessa, crown	.....	2	10	0	3	0	0
Doels, Finland, 2nd and 1st	.....std.100	7	0	0	8	0	0
Riga	.....4th and 3rd	5	10	0	6	10	0
St. Petersburg, 1st yellow	.....	8	10	0	13	0	0
" 2nd	.....	7	0	0	8	10	0
Sweden	.....white	6	10	0	8	10	0
White Sea	.....	0	0	0	0	0	0
Canada, Pine, 1st	.....	16	0	0	24	0	0
" 2nd	.....	10	0	0	15	0	0
" 3rd, &c.	.....	5	0	0	7	0	0
" Spruce, 1st	.....	8	0	0	9	0	0
" 3rd and 2nd	.....	5	0	0	7	0	0
New Brunswick, &c.	.....	5	0	0	7	0	0
Battens, all kinds	.....	4	0	0	10	10	0



TIMBER (continued).		
Flooring, Boards, sq. y. 1 in., prepared, First.....	£. s. d.	£. s. d.
Second.....	0 8 0	0 11 0
Other qualities.....	0 6 0	0 7 6
Cedar, Cuba.....	0 4 0	0 6 0
Honduras, &c.....	0 22 0	0 34 0
Australian.....	0 0 2	0 0 3
St. Domingo, cargo average.....	0 44 0	0 7 8
Mexican.....	0 0 3	0 0 3
Tobacco.....	0 0 34	0 0 6
Honduras.....	0 0 34	0 0 6
Maple, Bird's-eye.....	0 0 5	0 0 7
Balsa, Rio.....	0 0 0	11 0 0
Balsa.....	7 0 0	9 0 0
Ros, Turkey.....	5 0 0	12 0 0
Satin, St. Domingo.....	0 0 6	0 0 9
Porto Rico.....	0 0 6	0 0 9
Walnut, Italian.....	0 0 34	0 0 5

METALS.		
Iron—Bar, Welsh, in London.....	£. s. d.	£. s. d.
Iron—In Wales.....	4 5 0	4 10 0
St. Staffordshire, London.....	6 10 0	6 0 0

COPPER—		
Belted, cake and ingot.....	£. s. d.	£. s. d.
Best selected.....	71 0 0	72 0 0
Sheet, strong.....	75 0 0	0 0 0
Chili, bars.....	70 0 0	0 0 0
Yellow Metal.....	0 0 0	0 0 0

METALS (continued).		
Lead—	£. s. d.	£. s. d.
Pig, Spanish.....	15 5 0	0 0 0
English, common brands.....	15 5 0	15 10 0
Sheet, English.....	16 10 0	0 0 0
Spanish.....	17 10 0	18 0 0
Silesian, special.....	17 10 0	18 0 0
Ordinary brands.....	17 10 0	17 15 0
Tin.....	168 0 0	0 0 0
Swedish.....	168 0 0	0 0 0
Australian.....	168 0 0	0 0 0
English ingots.....	0 0 0	0 0 0

OILS.		
Linseed.....	£. s. d.	£. s. d.
Coconut, Coochin.....	30 0 0	31 0 0
Ceylon.....	23 13 9	0 0 0
Palm, Lagos.....	23 0 0	23 10 0
Rapeseed, English pale.....	26 10 0	27 0 0
" brown.....	25 5 0	0 0 0
Cottonseed, refined.....	20 10 0	21 0 0
Tallow and Oleine.....	25 0 0	45 0 0
Lubricating, U.S.....	5 0 0	6 0 0
" refined.....	5 0 0	12 0 0

TALLOW—		
American, in casks.....	£. s. d.	£. s. d.
Stockholm.....	0 15 0	0 0 0
Archangel.....	0 10 0	0 0 0

DARTFORD (Kent).—For repairs and improvements to twelve cottages, at Stone, Mr. S. Pierre Harris, architect and surveyor, 1, Basinghall-street:—  
 Hodges..... £425 0 0  
 B. W. Gilham..... 350 0 0  
 Knight..... 320 0 0  
 Hewitt (accepted)..... 289 0 0

HACKNEY.—For laying down new block flooring in the Infants' department of the Wilmet-street School (Hackney T.V.), and for diverting the rain-water drains, &c., for the School Board for London. Mr. T. J. Bailey, architect:—  
 M. C. Duffy & Son..... £237 13 0  
 T. Headon..... 650 0 0  
 E. Spencer & Co..... 630 0 0  
 Wood Block Flooring Co..... 438 10 0  
 T. I. Chappell..... 408 0 0  
 S. Frankenberg & Co..... 325 0 0

\* Recommended by the Works Committee for acceptance.

HAMPSTEAD.—For thorough repairs and sanitary improvements to three cottages in Elm-row, Hampstead, for Mr. F. W. Smith. Mr. H. Hardwick Langston, architect, 9, Great James-street, Bedford-row, London:—  
 Materials.....  
 Gray..... £248 0 0  
 Mac..... 228 0 0  
 Smith (accepted)..... 210 0 0  
 Risout..... 187 15 0

HARROW.—For the erection of a house, Bentley Priory, Harrow, Middlesex, for Mr. H. L. Fowell. Mr. J. F. Curwen, architect, Kendal, Cumberland. Quantities by Mr. J. Sargeant:—

Stiles & Son.....	£434 0 0
Arby.....	420 0 0
C. Miskin.....	418 0 0
J. Bentley.....	418 0 0
G. & J. Waterman.....	369 0 0
F. Larter.....	346 0 0
Turner & Co.....	347 0 0
A. & B. Hanson.....	372 0 0
Holliday & Co.....	348 0 0
J. T. Chappell (accepted).....	369 0 0
A. & E. Brad.....	365 0 0

For Stables to Bentley Priory.  
 J. T. Chappell..... 1,280 0 0  
 [No competition.]

HEMEL HEMPSTEAD.—For proposed alterations and additions to surgery, for Mrs. Ambler, Hemel Hempstead. Mr. G. Hubbard, architect. Quantities by Mr. J. Sargeant:—  
 Liberty Wm. Sear..... £1,416 0 0  
 Edward Horn..... 1,360 0 0  
 William Sear (accepted)..... 1,345 0 0

HIGHGATE.—For the enlargement of the "Whittington" School, Highgate-hill (Finbury BD) by 400 places, for the School Board for London. Mr. T. J. Bailey, architect:—

W. Goodman.....	£2,714 0 0
H. L. Holloway.....	6,708 0 0
W. Johnson.....	6,637 0 0
J. Holloway.....	6,578 0 0
Stumpson & Co.....	6,474 0 0
Wall Bros.....	6,354 0 0

\* Recommended by the Works Committee for acceptance.

LAMBETH.—For new counter and fittings at the Angel, Lambeth-walk, for Mr. J. Craigie. Messrs. Stock, Page, & Stock, architects, 9, Deans-street, London Bridge:—  
 J. Beale, Westminster Bridge-road (accepted)..... £458 9 0  
 [No competition.]

LONDON.—For alterations at 66 and 67, Aldermanbury, E.C. Mr. DeLissa Joseph, architect, 17 and 19, Basinghall-street, E.C.:—

A. & W. Marchant.....	£370 0 0
Gilbert Seal.....	346 7 0
George Harridge (accepted).....	325 0 0

Cast, Rolled, and Riveted Ironwork.

C. Williams & Co.....	£122 10 0
Messers Bro. & Co.....	112 12 0
M. T. Shaw & Co.....	168 0 0
Rowson, Drew, & Co. (accepted).....	99 0 0

LONDON.—For alterations to the Old Temple Club, Milford-lane, W.C. for offices, &c., for the People's Paper, for the Proprietors. Mr. Edward Clark, architect, No. 432, West Strand, W.C. Quantities by the architect:—

Grover & Co.....	£24,539 0 0
T. L. Green.....	4,254 0 0
Holliday & Greenwood.....	4,193 0 0
C. Pereira.....	4,179 0 0
C. F. Hewitt.....	3,960 0 0
Wilkinson Bros.....	3,948 0 0
J. O. Richardson.....	3,960 0 0
Fatman & Fotheringham.....	3,963 0 0

LONDON.—For erecting scene-painting room, at No. 67, Newington-causway, S.E., for Mr. James Pain. Mr. Edward Clark, architect, 432, West Strand, W.C. Quantities by the architect:—

Grover & Co.....	£239 0 0
Wilkinson Bros.....	357 0 0
T. L. Green.....	349 0 0
J. Oliver.....	323 0 0

[Architect's estimate, £331.]

LONDON.—For alterations at the Britannia, Kennel-road, W., for Mr. A. C. Duggan. Mr. Edward Clark, architect, 432, West Strand, W.C. Quantities by the architect:—

T. L. Green.....	£237 0 0
Grover & Co.....	530 0 0
Bansom & Co.....	498 0 0
J. Anley.....	458 0 0

## CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

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Chimney-Stack, &c.....	Midle End Vestry.....	J. M. Knight.....	Dec. 11th	ii.
Paving and other Works.....	Wandsworth, &c., Ua.	T. W. Aldwinckle.....	Dec. 16th	ix.
Erection of Infirmary.....	Eastbourne Union.....	F. G. Cooke.....	Dec. 16th	ii.
Mounting and Fitting.....	Graydon U.S.A. &c.	Official.....	Dec. 16th	ix.
Merbing and Channelling Works.....	East Barnet Valley L.B.	Official.....	Dec. 16th	ix.
Cast-Iron Parapet, Tower Bridge.....	Bridge House Estates Committee.....	T. Wolfe Barry.....	do.	ii.
Sewering and Making-up Roads.....	Brentford Local Board.....	Lacey.....	Dec. 20th	ii.
Brick and Pipe-Sewer, &c.....	Leicester Corporation.....	J. Gordon.....	Dec. 22d	ii.
Wood and Stone Paving.....	Met. Board of Works.....	Official.....	Dec. 23rd	ii.
Buildings, &c., Mill Dam.....	Hull Corporation.....	J. Kincaid.....	do.	ii.
Tubercle Clock Tower, Margate.....	The Committee.....	E. J. E. Bruce.....	Dec. 29th	ii.
Cast-Iron Pipe-Sewers, &c.....	Surbiton Imp. Com. ....	Stoner & Sons.....	Jan 3rd	ii.
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Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Clerk of Works.....	Willesden Local Board	3l. 3s. per week.....	Dec. 14th	xiv.
Drawing Master.....	Government of Victoria	800l.....	Dec. 16th	xiv.

### TENDERS.

[Communications for insertion under this heading must reach us not later than 12 Noon on Thursdays.]

ALNWICK.—For alterations and additions to the farm buildings, Low Hedgeley, for Mr. J. R. Carr-Ellison, J.P. Mr. Fred. R. Wilson, architect, Alnwick, Northumberland:—

J. D. Brown, Alnwick.....	£2,348 0 0
W. B. Collin, Whitcham, Newcastle.....	1,890 0 0
J. Towars, Alnwick.....	1,779 0 0
R. Yeaman, Swarland, Alnwick.....	1,772 0 0
J. Surtees & Son, Bolam, Morpeth.....	1,701 0 0
W. Dryden & Son, Ganton, Alnwick.....	1,614 12 0
W. Steel, Felton, Acklington.....	1,680 16 0
H. Elliott, Horncliffe, Acklington.....	1,671 0 0
W. Weatherill, Alnwick.....	1,606 0 0
T. Kirkup, Glanton, Alnwick.....	1,655 10 0
Dodds Bros., Fowburn, Alnwick.....	1,659 0 0
W. J. Smith, Alnwick.....	1,631 4 0
Jeffrey Bros., Glanton, Alnwick.....	1,620 10 0
J. Muckle, Thropton, Rothbury.....	1,617 0 0
Green & Douglas, Ambleside, Acklington.....	1,457 12 7

\* Accepted.

ALNWICK.—For alterations and additions to cottages, East Hedgeley, for Mr. J. R. Carr-Ellison, J.P. Mr. Fred. R. Wilson, architect:—

W. J. Smith, Alnwick.....	£455 6 8
W. Steel, Felton, Acklington.....	434 0 0
Dodds Bros., Fowburn, Alnwick.....	420 0 0
T. Muckle, Thropton, Rothbury.....	412 3 0
W. Weatherill, Alnwick.....	408 7 8
J. Surtees & Son, Bolam, Morpeth.....	398 0 0
John Powers, Alnwick.....	397 2 0
Jeffrey Bros., Glanton, Alnwick.....	388 0 0
T. Kirkup, Glanton, Alnwick.....	381 11 0

\* Accepted.

ALNWICK.—For alterations and additions to farm buildings, Fenwick, for Mr. J. R. Carr-Ellison, J.P. Mr. Fred. R. Wilson, architect:—

Dodds Bros., Fowburn, Alnwick.....	£236 0 0
Jeffrey Bros., Glanton, Alnwick.....	213 0 0
J. Surtees & Son, Bolam, Alnwick.....	203 16 0
W. Dryden & Son, Glanton, Alnwick.....	189 3 0

\* Accepted.

ALHAM.—For pulling-down and rebuilding the George Hotel, Balham Hill, Balham, for Mr. Thomas Crossley, G. Treacher, architect, 23, Carter-lane, St. Paul's:—  
 J. Beale, Westminster Bridge-road (accepted)..... £3,460 0 0  
 [No competition.]

BLOOMSBURY.—For the erection of new premises, in Duke-street and Little Russell-street, Bloomsbury, W.C., for the Dairy Supply Company, Limited. Mr. Robt. F. Whellock, architect, 45, Finsbury Pavement, E.C. Quantities by Messrs. Franklin & Andrews:—

Alley & Sons.....	£11,590 0 0
Alley & Turner.....	11,490 0 0
Holland & Haanen.....	11,277 0 0
Rider & Sons.....	11,188 0 0
S. Bush.....	11,120 0 0
Fatman & Fotheringham.....	10,893 0 0
Colls & Sons.....	10,780 0 0
Win Downes.....	10,620 0 0
Kirk & Randall.....	10,438 0 0
J. T. Chappell.....	10,380 0 0
J. Allen & Sons.....	9,945 0 0

BUCKHURST HILL.—For the erection of a house, at Palmerston-road, Buckhurst Hill, for Mrs. Thomas. Mr. H. Francis, architect, Palmerston-buildings, Old Broad-street:—  
 H. Baylis, Highbury (accepted)..... £965 0 0

CAMBERWELL.—For the erection of proposed Parish-hall, Camberwell, S.E. Mr. G. Hubbard, architect, 23, Finsbury-circus, E.C. Quantities by Mr. J. Sargeant, Grove-end-gardens, S.W.:—

Joinery in	Joinery in	Joinery in
Dual.	Sequoia.	Oak.
Patman & Co.....	3,543	3,645
Baslam Bros.....	3,085	3,337
Holliday & Greenwood.....	3,077	3,233
J. T. Chappell.....	2,904	3,130
A. & E. Brad.....	2,745	3,063

\* Accepted.

CROSSNESS (Kent).—For new surface condensers, &c. at the Crossness Sewage Pumping Station, for the Metropolitan Board of Works. Sir J. W. Bazalgette, engineer:—

Gwynne & Co.....	£6,618 0 0
Hunter & English.....	6,230 0 0
Reunie & Co.....	5,600 0 0
Reunie & Anderson.....	4,815 0 0
R. Moreland & Son.....	4,730 0 0
Waller & Co.....	4,450 0 0
W. & J. Yates.....	4,225 0 0
Watt & Co.....	3,457 0 0

CROYDON.—For making railway and sidings, at Waddon Flour Mills, Croydon, for Messrs. C. Brown & Co., Limited. Messrs. G. Elkington & Son, surveyors, No. 38, Cannon-street, London:—

Pilling & Co., London.....	£3,883 0 0
Perry & Co., London.....	3,691 0 0
Maged & Co., London.....	3,330 0 0
Kerry & Co., London.....	3,049 0 0
Thos. Rigby, Croydon.....	2,724 0 0
W. Langridge, Croydon (accepted).....	2,500 0 0



F. BRABY & CO. LONDON: 352 to 362, Euston Road. LIVERPOOL: 6 and 8, Hatton Garden. GLASGOW: 47 and 49, St. Enoch Square.

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## Archæ Architecture at Corinth.



AMONG the papers included in the volume recently issued by the Athenian Section of the German Archaeological Institute, great interest attaches to the report by the

present Director, Dr. Dörpfeld, on an accurate exploration of the ruins of the archæa Doric temple at Corinth. The work done here is worthy to be compared in interest with that of the Archaeological Institute of America at Assos, conducted, and admirably published, by Mr. J. Thacker Clarke. In some important respects it was not so well rewarded. No sculptured slabs were unearthed, and none of those details of frieze and cornice which enabled Mr. Clarke to reproduce the complete Doric order of the temple at Assos. In both cases the general plan was deeply encumbered with earth, but proved recoverable in all leading particulars when this was removed. The hexastyle of Assos revealed the greatest peculiarities and variation from the type which is elsewhere all but general. The Corinthian has the usual distribution of the cella between naos and opisthodomos, entered respectively from a pronaos and epinaos, each in antis. But at Assos there was neither epinaos nor entrance to the cella on the west, but the plain wall was carried across the rear at the same distance from the steps as upon the sides. Upon the elevation there were these anomalies: the sculptured design upon the architrave, and the drums of the columns so set that the arrises, and not the centres of the channels of the flutes, were in line with the axes of the plan. The slope of the profile of the echinus of the Corinthian example verges to the later and more erect type.

This temple was built of the porous limestone of the district, but a smooth surface was given to it by a very thin coating of exceedingly fine stucco. This method of producing the appearance of a nobler material was employed at Ægina and in many temples of later date, as, for instance, in the great temple of Zeus Olympius at Elis. The Corinthian is the earliest example preserved, and remote as must be its date, it proves that already marble had been used for temple structures, and with such delicacy of treatment and workmanship as to induce attempts to obtain the same effect by a system of imitation at the cost of considerable labour. The Roman colonists of the restored city evidently repaired the temple, which might

have suffered from mere lapse of centuries, apart from violence done to it in the devastating conquest by Lucius Mummius. Traces are apparent of their repair of the stucco coating, and a number of thick tiles bearing Latin impress show that they gave it a new roof. In later times it was exposed to those agencies of ruin, storm, earthquake, and despoiling for building materials, which have proved equal to overturning and all but entirely obliterating even such a colossal structure as the Temple of Artemis at Ephesus. Stuart, at the end of the last century, found eleven columns still erect, inclusive of one of the western pronaos and some architraves in position. The pronaos columns had disappeared when the French scientific expedition explored the site in 1820, and only the seven columns remained, which are still standing. These the Greek Government have caused to be secured by underpinning against ruin, which was otherwise too certainly impending.

The progress of excavation soon revealed that no general foundation had been prepared for the building, but that separate foundations were brought up from the solid rock at some depth below for each several column and for the various walls. These foundations had, indeed, been removed from the greater part of the area; their places, however, could nevertheless be determined by manifest traces of the preparations made to receive them. The uneven and sloping rock had not been reduced to a level, nor had the builders been content to simply make smooth surfaces; they sank distinct beds for their lowest courses, and thus inscribed their plan as on a sort of very uneven drawing-board. With this guidance it became demonstrable that the temple had been rightly conjectured by Stuart to be hexastyle; it proved, moreover, to have had fifteen columns on flank, and thus to have been a precedent for the beautiful temple of Apollo at Bassæ, erected at the best period of Greek architecture. Lines of foundation within the limits of the cella testified for interior columns, but did not afford more than a presumption of their exact number and spacing. In the opisthodomos, and near the line of the partition wall, was found preparation for a square solid base, directly opposite to the entrance. It is fair and natural to conclude that this supported the pedestal of a statue,—that of the god or goddess of the dedication. The assignment of this position agrees so far with that which Mr. Cockerell gives conjecturally to the statue of Apollo at Bassæ. Inasmuch, however, as at Corinth there was no door of communication between the two apartments, it seems probable that we have here, as in the case of the Erechtheum, a double temple, and that the eastern

naos was assigned to an associated divinity or hero. Pausanias, who mentions other examples of combined temples, unfortunately gives us no assistance towards the attribution of this. What is remarkable, in any case, here is that some superior distinction is given to the western and smaller apartment by the more important dimensions which are afforded for its epinaos, or ante-chamber, as compared with the eastern pronaos. It has a depth of 4.23m., as against 2.71m., a difference of some 4 ft. 6 in.

The only reference which Dr. Dörpfeld makes to an application of definite proportions in the design of the building is as between the relative lengths of the naos (16 m.) and the opisthodomos (9.60 m.), which, he remarks, compare exactly as 5 : 3. But the question is deserving of closer examination if we are to derive the most interesting information of all from the results of this excavation. In the appendix contributed to the splendid work of Mr. Cockerell on the temples of Ægina and Bassæ, will be found some deductions respecting the ruins, which were obtained by comparison of the dimensions furnished by Stuart. These were sufficient to establish that even at the very early date which the design must certainly be referred to, the same principles of adjustment of dimension by strict numerical proportion were in vogue which were developed to the last perfection by Ictinus at Athens and Bassæ. The recognition of the principle is distinct, though its application is naturally more crude. There is the same observance of a symmetry between the height and spacing of the columns, and of accurate proportion between lower diameters and void intervals. This lower diameter is too nearly one-fourth of the height of the column for the intention to be missed; and the upper diameter, lower diameter, and abacus have the same relative proportions of 3 : 4 : 5 which govern those of the two Æginetan examples.

It was by Athenian architects of the great age that the application of definite proportion to architecture was most profoundly studied as a theory, and most sedulously and scrupulously carried out in practice in executed works; but if genius in the arts, and indeed in philosophy also, culminated at Athens, it was not exclusively native there. It is highly probable that this particular subject may have been primarily dealt with in the flourishing but unrecorded days of archæa Corinth. This city was renowned from earliest times as the home of inventive genius, and did much to vindicate its repute in later historic times. Legend, as usual, was attached to a national characteristic, and it ascribed to the Corinthian hero Bellerophon



phon the invention of the bit and bridle,—hence his Pegasus on the wide-spread Corinthian coinage. Pindar adds as other “antique devices” to credit of the city, the origination of the highly-artificial structure of the enthusiastic dithyramb, and of the twin pediments as crowning members of the temples of the gods. On the grand archaic François vase at Florence we have an elevation of a proper Doric façade, distyle in antis, but roofed peculiarly, with no appearance of a pediment,—evidence not to be neglected of the late origin of an architectural feature which was afterwards found susceptible of such noble treatment. Thucydides credits Corinth with the construction of the first trireme,—a model which continued serviceable so long, but of which it has tasked the ingenuity of modern constructors to recover the particulars. It was a Corinthian who afterwards so modified this construction as to foil the onset and manœuvres of the trained Athenian seamen, and so contribute importantly to the rescue of the Corinthian colony of Syracuse.

Instructed by examples of other temples we look in the first instance for an accurate proportion of the length and breadth of the main plan. The dimensions are given as 53·30 m. : 21·32 m., which compare with absolute accuracy as 5 : 2; that is, a double square and a half. In the larger dimensions of the Parthenon the ground-plan of 4 : 9, a double square and a quarter, fails of like exactness,—though only by an excess of 0·124 ft. in a length of 228·141.

The echinus of the capital at Corinth exceeds one-tenth of the front top step by as much as 2 in., and no other plausible comparison presents itself. The abacus of the eastern front of the Parthenon is exactly one-fifteenth of the breadth (100 Greek feet) of the top step; the same dimension applies to the angle abaci of the west front, but there the intermediate smaller abaci are regulated by the proportion of 7 to 8 to the interval from one to another. In the Theseum the abacus is measured by one-twelfth of the top step.

The temple at Corinth follows the usual Doric rule of closing up the columns at the angles, out of regard to the position of the terminal triglyph above. It exhibits, however, a marked example of archaism in a considerable difference of both diameter and interval of columniation between the front and flanks. The architrave stones built into the old wall of the Athenian Acropolis are of such different lengths as to show that this was the case with the temple they belonged to or were intended for; and the same applies to the probably different temple, of which the plan has recently been laid bare close to the Erechtheum.

The difference at Corinth is between a lower diameter of 1·72m. on front, and 1·63m. on flank, or about  $3\frac{1}{2}$  in. in favour of the front. At the same time the more open interval between the columns is 2·28m. front, as against 2·07 m. on flank. This difference of full 8 in. was made subject to strict regulation. On the front the diameter of the column is to the void interval proportioned exactly as 3 : 4 (1·72m. ÷ 3 = 0·57 : 2·28m. ÷ 4 = 0·57). The like comparison on the flank brings out the proportion of 4 : 5 (1·63m. ÷ 4 = 0·407m. ; 2·07m. ÷ 5 = 0·41.)

A contrast so manifest was given up by later Greek architects as too sudden and harsh; that it should ever have been applied so strongly is a fact which seems to account for the extraordinary pains which the architect of the Parthenon thought it worth taking in introducing comparatively minute variations of dimensions which no eye could distinctly appreciate or even detect, but which were counted on to produce, nevertheless, an effect of relief of monotony and softening gradation. The stouter angle columns have naturally a broader abacus than those intermediate. Nothing could have been more simple and easy than to make all these others absolutely identical repetitions; instead of this we find that while the intermediate abacus of the eastern or chief front is adapted for the angle columns on the west; the smaller western abacus then exceeds those of the south flank, which are nearly uniform, while those on the north flank decrease

within moderate but not doubtful limits from east to west. The spread of the echinus of the capital follows the varying breadth of the abacus, but the diameters of the columns apart from those by the angle vary quite inconspicuously.

In the cursory examination which Mr. Penrose in 1846 was able to make he did not detect any curvature of the stylobate of the Corinthian temple, that is, any rise towards the centre upon the principle now so fully illustrated in the “Principles of Athenian Architecture.” Dr. Dörpfeld, however, with superior opportunities, certified the fact that even this refinement was among the *archaisia sophismata* with which Pindar credits the Corinthians. That the foundations rested undisturbed on the solid rock made it certain that the observable difference from the horizontal was not due to subsidence.

#### OUTFALL OF THE RIVER WITHAM.

**T**HE lowering of the water level of a river into which land is drained is, for drainage purposes, equivalent to raising the land by as much as the water level is lowered. A remarkable operation of this kind has been effected this year at Boston, in Lincolnshire, where the low-water level of the tidal portion of the river Witham has been lowered several feet at the outfall of four of the main drains of the country, by works executed under the direction of Mr. John Evelyn Williams, C.E., and the effect of this on the drainage of a large tract of low-lying land cannot be stated at less in importance than the virtual raising of that land several feet out of the water. The river Witham may be said to run in an eastwardly direction from Lincoln to Boston and thence to the sea, or rather to the great estuary called the Wash, which receives also the waters of the rivers Ouse, Nene, and Welland; but for practical purposes of drainage the tidal levels of the estuary may be considered to be those of the open sea. From Lincoln to Boston is thirty-two miles, and from Boston to the sea eight miles, reckoning the distances each way from the sluice upon the river called the Grand Sluice, situated about half a mile above Boston Bridge. Thus, between Lincoln and the sea the river is divided into two portions, an inland portion of thirty-two miles above the Grand Sluice and a tidal portion of eight miles below it. Into this lower portion of the river three of the main drains of the country have their outfall, through sluices called respectively the Black Sluice, about a mile and a half below the Grand Sluice, and on the right bank of the river; the Maud Foster Sluice on the left bank, about two miles below the Grand Sluice; and the Hobhole Sluice, about four miles below it, and also on the left bank of the river. The sills over which the water runs out of the drains are at the lowest possible levels to which in each case the water can be drained from the land, and every engineer places the sill of a sea sluice as low down as possible, having regard to the lowest level to which the water falls outside the sluice,—not necessarily quite so low as the lowest level to which the water falls, but always with some reference to that level.

The sills of these sluices on the tidal portion of the Witham are at various levels, and, making any necessary allowance for difference of opinion amongst the engineers who have from time to time carried out the former works of the Witham drainage as to the exact height above low water at which the sill of a sluice should be laid, the various levels at which these sills have been placed indicate very different conditions of the river at different times. Taking the low-water level of ordinary spring tides in the estuary as a general datum from which to reckon the levels of all the sills, the sill of Hobhole Sluice is 1·80 ft. above the datum, that of Maud Foster Sluice is 5·0 ft., Black Sluice 2·40 ft., and the Grand Sluice 6·80 ft. above datum. As this last is eight miles up the river, it would not be expected to be at the same height above the general datum level as the sill of Hobhole Sluice is, because the tide might very probably not ebb out so low at the

Grand Sluice as it does at the mouth of the river; but, as the original sills of the Grand Sluice are 6·80 ft. above the level of low water at the mouth of the river, the fact indicates an extraordinarily bad state of things in the river at Boston, for in that length of river, from the sea upwards, if it were in anything like a tolerable condition for navigation, the fall in the surface of the water at low water would not be more than 1 ft., and probably less, or even perhaps none at all. The “Grand Sluice” was placed there to prevent the tidal water passing further up the river. It is an old work, about which there has been much contention whether it should be removed or not. It has nearly ruined the shipping trade of the port of Boston, but the works recently carried out seem to have revived the trade. Either the removal of the sluice or the execution of the present works was absolutely necessary. The sluice was made in the interests of the owners of the fen lands, and the whole history of the Witham Drainage shows that there has been a continual neglect of the lower or tidal portion of the river, forming the navigable channel from the sea up to Boston, until now that this most important work at the lowest part of the outfall of the river has been done; a work which has been equally beneficial to the town of Boston, as a port, and to the neighbouring land in respect of drainage; but the “Grand Sluice” remains. It seems that nobody has been able to persuade the Drainage Commissioners to remove it. Most people say it ought never to have been placed there; but, being there, the Commissioners have hitherto let it remain. It has, however, been enlarged by the addition of another opening, and its discharging capacity has been made to correspond in some measure with that of the improved channel below it. Before these outfall works were commenced the engineer reported to the Witham Outfall Board, in 1878, that between Boston Church and the Grand Sluice the capacity of the channel for the discharge of ordinary floods was as much as one-fourth less than that of the Grand Sluice itself, and only one-half of the capacity of the river above the sluice, for carrying off a flood. He found, commencing at the lowest point of the outfall of the Witham Drainage, viz., at low water in the estuary, that a spring tide rose 21 ft. in Clayhole, but only 14 ft. 11 in. at Hobhole Sluice, and only 12 ft. 6 in. at the Black Sluice, and the same at the Grand Sluice. Thus the low-water level at Hobhole Sluice was 6 ft. 1 in. above that in the estuary. At the Black Sluice it was 8 ft. 6 in., and at the Grand Sluice 8 ft. 6 in. above the low-water level in the estuary, the reason being, plainly, that the river was full of silt. Upon this report being made, proceedings were taken to deal effectually with the long-standing question of the Witham Outfall, beginning, as every other engineer had previously advised, at the lowest point, and making the improvements gradually upwards.

In May, 1887, Mr. Williams reported that the works were then completed. The most important section of the works is the forming of the new outfall channel between Clayhole, in the estuary, and Hobhole Sluice, in the river, a work locally known as “The Cut through the Clays.” The first sod of this new channel was cut on December 14th, 1880; it is three miles in length, and is a mile and a half less in length than the old circuitous channel through the shifting sands. At each end, where the new cut joins,—at one end the sea at Clayhole, and at the other the river near Hobhole Sluice,—a piece of the ground was left in, and an embankment raised upon it high enough to exclude the tides from the workings inside. Between these two embankments the excavation was carried on by means of three powerful steam-navvies, eight locomotives, and numerous barrow and wagon roads, and the extreme ends were afterwards excavated by dredging. The total quantity of excavation was nearly two million cubic yards. Its sectional area is greater than that of either the Suez Canal or the Amsterdam Ship Canal. The first vessel passed through the new channel on April 7th, 1884, and the permanent closing of the old channel was then actively proceeded



with. To effect this it was necessary to form an embankment across it, about half a mile in length, which now joins the parishes of Fish-toft and Wyberton. The old channel was finally closed on August 29th, 1884, and the advantage of the shorter and deeper outfall to Clayhole was immediately seen in the increased velocity of the ebbing waters, and this improvement steadily increased with the advance of the work towards completion in the river above; for, besides this lower and most important portion of the new works, below Hobhole Sluice, the river upwards from this sluice to the Black Sluice has been very materially improved by dredging and the training of the channel by means of fascine work, and in that portion of the channel between the Black Sluice and the Grand Sluice the discharging capacity has been enlarged by dredging and the filling of barges by hand labour. The contracted section of the channel along the Church-street frontage has been considerably widened and improved by a new breastwork of timber piling. The navigable depth of the river has been increased 8 ft., and, whereas before the works were carried out the navigable capacity of the Port of Boston admitted vessels of 300 tons only, the formation of the new channel and the other work done in the river have had the effect of admitting vessels of 2,000 tons. With the old circuitous channel the scouring energy of the ebb tide was distributed and broken in struggling seaward through the shifting sands, the channel shifting sometimes a mile from east to west in a few weeks. The incoming tide swept over these broken sands and carried in suspension great quantities of sand and mud as far as the Grand Sluice. The estuary common to this river and those others we have named is a large bay, two thirds of which consist of beds of shifting sands, laid dry at low water. The depth of the estuary varies from 1½ fathoms to 18 fathoms. The foreshore of the coast, where the Witham debouches, is a hard, stiff clay, known by the name of the Scalp, which forms a long elbow. At this elbow the river Welland joins the Witham almost at right angles, and before the new cut was made, the waters of the Witham and the Welland met here and spread themselves out and lost their velocity, and with it the power to move the sands and mud in any defined channel, and the deposit of silt at this point was much increased by the stagnation caused by the two rivers meeting almost at right angles. With these unfavourable conditions of outfall it was impossible to avoid frequent and disastrous floods, as well as the uncertainty and difficulty attending the navigation at those times. On the completion of the new channel the combined scour of the land flood and the tidal waters was concentrated and utilised in maintaining the shorter and deeper outfall to Clayhole; and the incoming tide, instead of rushing up the river as before, heavily charged with matter in suspension, now flows gently in from the estuary, and comparatively clear. With respect to the benefit to the land to be derived from the lowering of the low-water level of the river opposite the respective outfall sluices, it cannot, perhaps, be taken to be actually as much, foot for foot, as this lowering is, because it is the extent of the lowering in dry weather; whereas, as Sir John Hawkshaw said, in a report to the Commissioners of the Witham Drainage in 1861, it is mainly on the depression of the low water in time of floods that the drainage depends. Nevertheless, with so great a depression in the low-water level of the tidal waters as has here been accomplished, that of the flood waters must necessarily follow to almost as great an extent. The absolute gain or depression already acquired on the low-water level at the several sea sluices is as follows, viz.:—At the Grand Sluice, 4 ft.; at the Black Sluice, 4 ft.; at the Maud Forest Sluice, 4 ft. 3 in.; and at the Hobhole Sluice, 5 ft. 6 in. The total expenditure, including Parliamentary expenses and land, has been 167,941l. The total area drained into the Witham Outfall is about 700,000 acres, but of this area only 194,649 acres contribute towards the cost of the improvement and maintenance of the outfall works.

## NOTES.

**T**WO returns relating to all authorised gas undertakings in the United Kingdom, the one comprising those belonging to local authorities, the other those other than those of local authorities, have recently been issued. Out of a total authorised capital of 73,069,670l., the sums of 36,639,856l. and 19,723,040l. have been paid up or borrowed, the first by the Companies, the second by the local authorities. The numbers of 1,133,897 consumers are supplied by the former, and of 996,480 by the latter. The large quantity of 8,657,731 tons of coal have been carbonised, yielding 87,931,537,054 cubic feet of gas. There are 19,443 miles of gas mains and 413,921 public lamps lighted. According to these figures rather more than 40,000 cubic feet of gas are supplied to each individual, but, while the Companies supply 49,000, the authorities only supply 26,000 cubic feet per consumer. We venture to question how far this part of the return is reliable. The number of consumers given appears to be incredibly small, whether compared with the population of the United Kingdom or with the quantity of gas manufactured, which is 9 per cent. more than the quantity sold. The consumers, we are told, are calculated according to the number of accounts. They thus represent families, rather than individuals, a consideration which would make the number of gas users, according to the average number of inhabitants per house, amount to between 11 and 12 millions of persons. But the number is no doubt larger, as the proportion of large houses using gas to small ones not using it must render an average unreliable. The local authorities do far less in the way of public lighting than the companies, the latter providing a public lamp for every 4·4 individuals, the former only one lamp for every 6·4 individuals,—counting them as consumers. The local authorities spent 3,127,047l.; paid 951,636l. in interest; and made a profit of 359,532l., during the last year. Corresponding returns are not made by the companies.

**T**HE agenda paper for the meeting of the Metropolitan Board of Works to be held a few hours after this number of the *Builder* is published, contains the following paragraph in the summary of the Works and General Purposes Committee's Report, viz.:—

"5. Reporting for the information of the Board certain circumstances which have now for the first time come to the knowledge of the Committee with respect to Mr. Hebb, the Assistant Architect, and recommending that Mr. Hebb be called upon to resign."

We notice this paragraph with much astonishment, not unmingled with regret, for we had hoped that, regarding the letters made public last Saturday, such an explanation would have been forthcoming from Mr. Hebb as should have led the Committee to take a less drastic view of the matter than they appear from their recommendation to be inclined to take of it. It is stated, however, that he has been condemned unheard. We confess ourselves surprised that the Committee should have so precipitately resolved upon their recommendation; and if the Board adopts it, after its halting determination merely to censure another official whose conduct, as it appears to us, was far more blame-worthy than that which is attributed to Mr. Hebb (so far as we are aware of the charge against him), we shall know what to think of the Board's sense of justice. That Mr. Hebb has been very indiscreet is evident; but it appears to us that the Committee proposes to visit that indiscretion with too severe a punishment, and we hope that the Board will take a more lenient view of the case.

**A** LONG paper on the subject of theatre construction (which is in everybody's mouth now) was read by Mr. T. L. Watson, on the 12th, before the Architectural Section of the Philosophical Society of Glasgow. In the course of the paper Mr. Watson drew attention to the New York Building Law in regard to theatres, which provides that every

theatre shall have one front to the street and a certain amount of free space on either side of the auditorium portion also:—

"Every such building shall have at least one front on the public highway or street, and in such front there shall be suitable means of entrance and exit for the audience. In addition to the aforesaid entrances and exits on the public highway, there shall be reserved for service in case of an emergency, in every and all such buildings, an open space equal to one-eighth of the width of the building, outside to outside measurement, and in no case less than 3 ft. in width in the clear in its narrowest part, on the side not bordering on the street, where said building is located on a corner lot, and on both sides of said building where there is but one frontage on the street or public highway."

"Said open space shall begin on the line of the proscenium wall, and shall extend the full length of the auditorium proper to the wall separating the same from the entrance-lobby or vestibule. A separate and distinct corridor shall continue to the street, from each open space, through such superstructure as may be built on the street side of the auditorium, said corridor to be reduced in width not more than may be required for the thickness of the outer wall forming one side of said corridor. The openings into and out of said corridor shall not be reduced in width more than 3 ft. less than the width of said open space, said openings to be provided with doors or gates opening towards the street."

An event mentioned in the latter portion of the paper may serve as a caution in regard to the "sprinklers" which are now so much recommended for stopping a fire on the stage. It is related that at the Ambigu Theatre in Paris, during the day, one of the scene-shifters made a mistake with the new apparatus for drenching the stage with water in case of fire. Some time before the doors opened the water inundated the ground floor of the theatre and damped the scenery, the ropes, and the new iron curtain. The consequence was that when the actors were on the stage the iron curtain remained immovable, and the performance was delayed half an hour. Mr. Watson accordingly recommends automatic "sprinklers." We should not trust overmuch to these. We have a strong impression that they would fail when wanted as often as not.

**W**E are glad to find that the inaugural address of the new Lincoln and Merton Professor of Classical Archaeology and Art at Oxford has been published in pamphlet form. Prof. Gardner took for his subject, "Classical Archaeology, wider and special," and the address has a special value just now, as it affords a sound basis for fixing the relation between classical archaeology,—still, so to speak, in its probation,—and those kindred subjects, classical literature and classical history, which are already well established as matters of University teaching. The distinction which Prof. Gardner so clearly establishes between the wider and the special archaeology has, no doubt, always been dimly felt, but till now has been inarticulate; and it is because of this mental confusion that much distrust of archaeology has arisen. The subject matter of both the wider and the special is the same, but they differ in point of view and method. "The wider archaeology takes its start from historical record, and never loses sight of its position as one of the handmaids of history; the narrower and more special archaeology claims, and has successfully established, a position as an independent branch of study, with methods and conclusions of its own." Oxford is not likely to neglect the wider view, and she is fortunate in having chosen for her new teacher a scholar who, highly-trained specialist though he is, yet never loses sight of these wider relations.

**A**T Pompeii the excavators have come upon a fountain decorated with a piece of mosaic of unusually fine workmanship. The fountain is in the form of a niche, on the ceiling of which Venus is represented just at the moment when she issues forth from the sea-shell. A little love-god is also rising from the water, and the goddess holds him by the hand. Beneath this group are a number of Nereids and boys with dolphins. On the shore of the sea two draped female figures are represented: one is standing, the other seated; both make gestures of amazement at the birth of the goddess. Opposite them is another female



figure, and a fourth, between them, turns her back to the spectator. The ground of the whole is blue, with a border of shells. It is reported to be the finest fountain mosaic ever discovered. The house in which it was found has not yet been completely excavated.

IT is proposed to restore St. Nicolas Church, Keyingham, East Yorkshire, at an estimated cost of 1,200l. The chancel was recently restored by the Ecclesiastical Commissioners, under the superintendence of Mr. Ewan Christian. It is stated that the nave and aisles have become not only dilapidated, but unsafe through the decay of the beams of the roof. The parish is a purely agricultural one, and an appeal has been made to the inhabitants of the East Riding of Yorkshire for assistance. The spire of the church serves as a landmark in the navigation of the Humber. A sum of 452l. has been promised towards the restoration.

WE are informed that the wooden doorway and hood formerly at Fairfax House, Putney,—a very pretty specimen of seventeenth-century design,—has been purchased by Mr. Seymour Lucas, A.R.A., who proposes to erect it in front of his house, New Place, Woodchurch-road, Hampstead. We gave an illustration of the house in our last volume, and a detail of the staircase [vol. liii, p. 263], and some further notes and sketches by Mr. J. Alfred Jones [p. 617].

THE Disney Professor at Cambridge (the Rev. G. F. Browne, B.D.) proposes to deliver six lectures on Tuesdays, January 31 to March 6, at 2.30 p.m.; the first lecture in the Senate House, the remaining five at the Museum of Archaeology, on the interesting subject of the Sculptured Stones of pre-Norman type in the British Islands. The subjects and lectures will be arranged under the following heads:—1, General Survey, Jan. 31; 2, Anglian Stones,—dated examples, Feb. 7; 3, Anglian Stones,—undated examples, Feb. 14; 4, Anglian Stones,—Runic and other Inscriptions, Feb. 21; 5, Anglian Stones,—the Christian Story and the Sagas, Feb. 28; 6, Anglian Stones,—Connexion with Rome, Ravenna, &c., March 6.

THE Winter Exhibition of the Society of Painters in Water Colours contains a number of beautiful things, pre-eminent among which is Mrs. Allingham's one contribution, "East and West" (174), a seaside scene where a beautiful English lady is seated in the foreground reading a letter from her husband in India, while her child with the Indian nurse is seen a little way off. As usual in Mrs. Allingham's works, the little bit of story in the picture is completely told, and the face of the principal figure is lovely. The whole represents the artist's highest style of work. Perhaps the work which will strike visitors most, next to this, is Mr. A. Goodwin's "Gate of Zoar" (198), a kind of sequel to a former picture. It represents the destruction of the Cities of the Plain, seen from a distance, a red rain descending from an awful and portentous mass of almost solid-looking sulphurous cloud. This kind of effort at imagining something beyond nature is a dangerous direction for an artist to wander into; the thing is very powerfully done, but it is not the kind of subject one would like to see very much of, even from an artist of Mr. Goodwin's imaginative power. Among the works which are really "sketches and studies" are some by Sir Oswald Brierley, and a frame of "Six Album Sketches" (121) by Mr. Walter Field; but most of the drawings, as usual, are as finished as those to be found in the Spring Exhibition. Mr. A. Goodwin sends a series of charming views of English towns,—Rochester, Worcester, Bristol, and others,—which bid fair to rival Turner's vignette illustrations of localities. We have only the fault to find of want of force in the one giving "Bristol," which is taken at the docks with the bow of a ship in the foreground; but it is a little too polished up for the subject: no one ever saw Bristol look as clean and bright as in that picture. Mr. Alfred Hunt is a rather larger

contributor than usual, and seems to be specially studying contrasts of the same scene under different lights; "Whitby" in morning and evening, for instance (85 and 127); "Robin Hood's Bay, Showery Evening" (35, a very fine work); and "Robin Hood's Bay, Afternoon" (163). Among others who are well represented is Mr. Cuthbert Rigby, whose "Early Morning, Beoley, Derbyshire" (34), is one of the freshest and brightest bits of morning effect we have ever seen in a drawing. Mr. H. S. Marks has several interesting figure studies marked by his peculiar humour; the best, perhaps, is that of the cynical old gentleman reading "A French Novel" (47); the Puritan "Secretary" (183), sealing a letter, with a face of business-like decision, is also very good; and there is a very delicate humour in the two entitled "Sunshine" and "Rain" (29 and 36), the same figure at the door of a house looking outward in the one and inward in the other,—a kind of reminiscence of the old form of weather foreteller with figures that move out and in. Mr. Nattef's works are exceedingly good, especially "On the Bench, Stundland" (135). Mr. Herbert Marshall has visited "Fowey" (53) with good results. Mr. R. W. Allan's drawings of towns have force and originality of style, but tend to exaggeration: in "Middelburg" (62) the shadow on one side of the street seems like some solid substance laid down on the roadway. Mr. Tom Lloyd's "Anxious Mother" (84) is one of his prettiest if not one of his finest works. In a drawing called "Lawn Tennis" (112), Mr. C. Robertson gives a foreground study of a profusion of flowers, brilliant, but as hard as if they were cut out in steel. Mr. G. H. Andrews' "Bad Weather in the North Sea" (133) is a large and rather remarkable study of a ship in a gale of wind; but the surface of the water is not "watery," though the tumultuous movement of it is well suggested. In "No Customers" (150), Mr. Arthur Hopkins gives a very highly-finished study of vegetables and green-grocery miscellanea, which is really a triumph in its way. A considerable number of the late Mr. Collingwood Smith's works are hung at the lower end of the room.

THE citizens of the "Burgh of Newport, Fife," seem to be an uncanny set of people (in their own estimation, at any rate), if we may judge from an official advertisement which appeared in the *Dundee Courier* last week. The advertisement is question, signed "Thos. Congleton, Clerk to the Commissioners of the Burgh of Newport," sets forth that "the Commissioners invite competitive drainage schemes for the burgh, with relative plans, and offer a premium of 20l. for the scheme with plan adjudged best, and 10l. for the second best, as these may be awarded by such person or persons of skill and experience as the Commissioners shall appoint, but only on the conditions following, viz.:—That the schemes and plans for which the premiums are awarded shall become the absolute property of the Commissioners, who shall have right to carry out same, in whole or in part, without employing the successful competitors, or any of them, or being liable to them, or any of them, in any fee, commission, or charges, in connexion therewith, or with the work done or otherwise." Even assuming that the "Burgh of Newport" is as small a place as the "premiums" offered are insignificant, and that consequently only a small scheme of drainage is required, the Commissioners ought to be told, by "such person or persons of skill and experience" as they say they propose to "appoint," that they cannot reasonably expect engineers of capacity and experience to compete. The smallness of the premiums offered is only equalled by the comprehensiveness of the "conditions following." We cannot imagine that any self-respecting civil engineer will respond to this invitation. Possibly a few tyros and people who are not engineers at all may compete, with the result that the Burgh Commissioners may find that, through being "owre canny," they have got a system of "drainage" with the levels all wrong and the falls all inclined upwards! Such things have

happened before now under similar conditions, and they have tended neither to economy nor healthfulness.

#### THE ROYAL ACADEMY STUDENTS' DESIGNS.

THE designs submitted by the students for the various prizes given by the Royal Academy were publicly exhibited at Burlington House on Monday and Tuesday last. The innovation of allowing the exhibition for two days instead of one only, as before, is an improvement which might be extended further, even to exhibiting them for a week: many would be glad to look at them if more time were allowed.

The following is the list of subjects and prize winners:—

Historical Painting: "Captives."—Gold medal and travelling studentship (200l.), Arthur Trevelchin Nowell. Landscape Painting: "Sunset after a Storm."—Turner gold medal and studentship (50l.), Arthur Trevelchin Nowell.

Landscape Painting: "An Old Water Mill."—Creswick prize (30l.), Stephen Briggs Carill.

Painting of a Figure from the Life.—Silver medal, 1st, not awarded; silver medal, 2nd, William Farran Litter.

Painting of a Head from the Life.—Silver medal, 1st, Minnie Jane Shubrook; silver medal, 2nd, Maud Porter.

Copy of an Old Painting: "Man in Armour," by Van Dyck.—Silver medal, 1st, Arthur Claude Cooke; silver medal, 2nd, Thomas Henry Jones.

Copy of a Landscape: "The Lock," by John Constable, R.A.—Silver medal, not awarded.

Cartoon of a Draped Figure: "Demosthenes on the Sea Shore."—Silver medal and prize (25l.), Alfred Bernard Styles.

Design in Monochrome for a Figure Picture: "Jehu and Jezebel."—2 Kings ix. 30-33.—Armistice prizes, 1st (30l.) and bronze medal, William Farran Litter; 2nd (10l.), Walter Stanley Pater.

Design for the Decoration of a Portion of a Public Building: "Summer."—Prize (40l.), Wm. Ernest Reynolds Stephens.

Drawing of a Figure from the Life.—Silver medal, 1st, not awarded; silver medal, 2nd, Herbert James Draper.

Set of Six Drawings of a Figure from the Life.—1st prize (50l.), Chas. Rodin; 2nd prize (25l.), Stephen Briggs Carill; 3rd prize (15l.), William Farran Litter; 4th prize (10l.), Percy Short.

Drawing of a Head from the Life.—Silver medal, 1st, Joseph Walter West; silver medal, 2nd, Mary Catherine Abercrombie.

Drawing of a Statue or Group.—The two silver medals for this were not awarded.

Drawing of a Statue or Group.—Prize (10l.), Lydia Bacon King.

Perspective Drawing in Outline (open to Painters and Sculptors only): "The Exterior of St. Paul's Church, Covent-garden."—Silver medal, Edith A. Cooper.

Line Engraving of a Drawing of a Figure from the Life.—No competition took place for the Gold medal and prize (25l.) given for this subject.

Competition in Sculpture: "An Act of Mercy."—Gold medal and travelling studentship (200l.), George Jas. Frampton.

Set of Three Models of a Figure from the Life.—1st prize (50l.), Wm. Goscombe John; 2nd prize (40l.), Wm. Ernest Reynolds Stephens.

Model of a Design: "An Episode of the Deluge."—1st prize (30l.), Wm. Goscombe John; 2nd prize (10l.), Arthur George Walker.

Design for a Medal: "A Prize Medal for a School of Art."—Silver medal, not awarded.

Model of a Figure from the Life.—Silver medal, 1st, John Rollins; silver medal, 2nd, Jas. Nesfield Forsyth.

Model of a Statue or Group.—Silver medal, 1st, Andrea C. Lucchesi; silver medal, 2nd, Chas. John Allen.

Model of a Statue or Group.—Prize (10l.), Wm. Henry Prosser.

Design in Architecture: "A Railway Terminus."—Gold medal and travelling studentship (200l.), Robert Weir Schultz.

Set of Architectural Drawings: "St. George's Church, Bloomsbury."—Silver medal, 1st, Percy Norman Gunning; silver medal, 2nd, not awarded.

Set of Architectural Designs (Upper School).—Prize (25l.), William Leck.

Set of Drawings of an Architectural Design (Lower School).—Prize (10l.), William Alfred.

Perspective Drawing in Outline (open to Architects only): "The Caryatide Portico of the Erechtheum."—No competition took place for the silver medal given for this subject.

The Landseer Scholarships in Painting and Sculpture, of 40l. a year each, tenable for two years, given for the best work done in the examination for passing into the Second Term of Studentship, have been awarded:—in Painting, to Ernest W. Appleby and Herbert James Draper; in Sculpture, to William Goscombe John and William Ernest Reynolds Stephens.

In Architecture, the Gold Medal and Travelling Studentship, for a design for a railway station, has been awarded to a very clever and original design by Mr. R. Weir Schultz,

the only one of these designs which travels much out of the beaten track of railway station architecture. The author has evidently set himself to consider fairly how a railway station can be expressed in architecture in a simple, suitable, and unpretending manner, discarding conventional architectural ornamentation and adopting a simple and bold treatment with little ornament; and what little there is has a definite meaning. The main portion of the end of the building is treated with a great gable with massive piers at the angles of the building,

\* Disqualified, owing to having received the same prize in 1885.



and a great semicircular window; the general idea is that of King's Cross improved upon. It is a pity that the author has stuck to the old system of dividing up his semicircular window with four perpendicular mullions cutting into the circle,—the worst way of dividing up a circular window, but one sanctioned by long habit. Over the keystone of the window a large clock is corbelled out, with a gablet over it, and flanked by bas-relief figures of Day and Night. The offices form a long low block running across the front, with a gateway in the centre with a deeply-recessed arch with carved soffit, the whole centre entrance forming a solid mass of masonry treated with a quasi-Doric cornice and an attic over, in which are medallion all-relief portraits of Brunel, Watt, and Stephenson. The range of offices on either side is treated with what may be called a Tuscan order in which the entasis of the columns is a good deal overdone: this portion might be improved in detail. The author has reproduced the figures from the Temple of the Winds over his central entrance, which is also flanked by two figures of lions on pedestals on either side. As a whole, the design shows originality and thought, and is decidedly the best of the set, though not so taking or effective in mere drawing as some others.

No. 331 is a design of considerable merit, more decidedly Classic in detail. The whole rests on a high rusticated podium, which runs all round the building, over which in front is a screen wall with an Ionic order, stopped by angle pavilions at either end; but as the author has used his Ionic columns rightly, not as angle columns, but as columns in a range terminating in piers or *ante*, why did he in his entrance pavilions use the corrupt form of the Ionic column with the volutes at an angle of 45°?

Are not students at the Royal Academy taught that this form is only a corruption invented to facilitate the use of the Ionic column in all positions? Whereas the true form with the flat volutes was meant to be used exactly in the kind of position in which the author has the order here; so that he has thrown away his opportunities in this detail. There is a prettily designed clock tower on the left; but a defect of the design is that the effect of the large semicircular window at the end of the main building is lost, as only a little bit of the curve appears above the screen range in front. The author has suggested that he is up with the times by labelling his design "electric railway terminus." No. 332 has a good idea in his front, with the deeply-recessed arch round the great window carried down to the ground in front; but unfortunately the plan shows that this bold front composition has no reference to what is in the rear of it. No. 333 shows the iron roof with no screen between two towers, which are kept as solid as masses below, with elegant cupolas above; but the design of the lower buildings in front is fragmentary, and seems to have no relation to the whole. No. 336 has placed a hotel block in front of the station, falling back in an elliptical recess in the centre, the lower portion of the recess containing a top-lighted waiting-hall, the outer line of which projects, and completes the ellipse. This is an idea, but not a good one; it weakens the centre, and is of little practical advantage on plan. No. 337 takes somewhat the same leading idea as the prize design, but with less refinement of feeling, and more pretentious detail; and the same may be said of No. 338, which is the better one, however, and the perspective drawing is a very good and effective one.

The elevation by Mr. Leek of a London street front, to which the prize of 26l. has been awarded, is a picturesque design with some good bits of detail about it, and a corbelled out angle bay which develops into a circular lunette above, with some pretty decorative treatment. The semicircular-headed windows on the first floor are here again divided by the upright mullions cutting into the circle, which, to our eye at least, are so disagreeable. No. 352, a coloured elevation of a design of somewhat the same type, has a good deal of merit; so has No. 350, but it is spoiled by the ugly scrolls standing out on the slopes of the gablets. Among various designs for "a monumental fountain," most of which are not very successful, the best, perhaps, is one in a style we have little sympathy with, No. 345, a Roman one with an architectural background, showing a heavy rusticated Doric order, the details well

put in. Most of the designers have attempted to make the fountain too much of an architectural erection with a fountain attached to it, rather than a fountain pure and simple.

The sketches abroad by the Travelling Student for 1886 (Mr. Maclaren) are in every way to his credit, in number, choice of subjects, and execution. They comprise pencil sketches and a good many studies of coloured detail. The pencil sketches in England by the Travelling Student of 1887 (Mr. E. H. Sedding) are more slight, but very good of their kind.

Perspective, which is illustrated in the same room, does not seem to be an attractive subject to Academy students; only two or three seem to have gone in for it; the prize has gone to a lady for a drawing of St. Paul's, Covent-garden (the subject set, apparently), which does not strike us as a very successful effort. Only one competitor, apparently, has appeared for the prize for measured drawings; the drawings of St. George's, Bloomsbury, which he has submitted, are clear and complete, not very finished in execution, but showing the facts well.

The prize for the sculpture composition, the subject being "An Act of Mercy," has been rightly awarded to Mr. Frampton for a very well-modelled and expressive group of a young girl giving water to a prisoner who is bound. The contrast between the youthful figure of the girl and the wrinkled and haggard expression of the captive is finely felt, and the whole is a well-modelled and well-composed group. Among the other designs submitted we may mention No. 292, a wounded soldier tended by a man and woman, and 293, a large group of the Angel of Death releasing the captive; the recumbent figure of the dying man is a fine one, and there is a noble conception in the work.

Of the designs for a tempera painting for wall-decoration,—subject, "Summer,"—the one selected for the prize is the only one that is really and in the full sense decorative work, and therefore the award cannot well be questioned; but the composition is not very interesting: it is a kind of echo of Mr. Albert Moore, and represents some listless young women with no particular expression, lying about on a marble seat in various attitudes of *dolce far niente* enjoyment. We cannot care for such a work; decorative painting on a large scale is, or should be, an opportunity for realising a great idea; here there is little or no idea to speak of; still, the group is well designed for its purpose as far as effect and manner of treatment are concerned. No. 157, a Florentine scene of the Renaissance time, has merit of the same kind; and No. 156, a rustic scene, is good as a picture, and the single figure cartoon is a very nice one, but the composition fails in a decorative point of view from want of massing of the figures; the outline of the group being ragged, so to speak, two figures standing up above the rest at two points, and then a great gap between them. It is one desideratum in decorative figure painting, as in decorative bas-relief, that the group of figures should fill the space pretty evenly, and harmonise with the lines of architectural composition and construction. In this respect the prize design is a success, and most of the others are not.

The subject for the cartoon study of a draped figure is Demosthenes practising his voice on the sea-shore; and here the cartoon to which the prize is awarded at first strikes one as by no means the best; it is theatrical in effect, and, to our thinking, not so well drawn as one or two of the others. But it has the merit of being a *bona-fide* attempt to realise the subject. The other figures merely represent a man posed in a certain attitude, with his drapery blown about by the wind; one competitor has hit on an original treatment in showing us Demosthenes with his back to us facing the sea, which forms an element in the drawing. There is something to be said for this way of treating the subject, in the way of dramatic and picturesque effect; but it is not treated so as to make the most of the expressive action of the figure whose face is hidden from us. In Mr. Sykes's figure there is no "posing." Demosthenes is in full shout against the noise of the sea, with his mouth wide open, in the evident exercise of great exertion; that is a realisation of the subject; the others are not.

Having looked at the architectural drawings first, we are going backwards through the collection, and come now to the two rooms of oil-paintings, which are hung first in order in the rooms. The paintings for the Turner Medal are a curious collection. It seems to be an

understood thing with the competitors that they are to be Turner-esque or nothing, and the attempts to give sunset à la Turner result in the most tremendous displays of crimson and yellow, alarming to contemplate. The prize work by Mr. A. T. Nowell (who has also gained the prize in historical painting) is far away the best, and, in fact, has hardly any rival among the others, and it is free from the sensational colouring which characterises so many of the others. There are one or two that deserve note, however; No. 25 shows a fine study of sunlit clouds, and No. 30 an effect of clear light and open sky over a dark hill, which is certainly fine, though the author has not quite accomplished what he aimed at. In regard to the historical paintings we feel a little doubtful about the verdict. The prize painting (subject, "Captives") represents a scene where a young man, clad in a leopard skin, is bound to a tree, and a young woman in the foreground is being bound by a soldier and a monk. The subject suggests the story of Leon and Cythna in the "Revolt of Islam"; we know not whether this was the intention. The woman, who throws herself forward with outstretched arms towards her companion in affliction, stretches out a most tremendous length of right-leg behind her into the foreground, reminding one of the style of Fuseli's figures; we should like to see Mr. Harry Furniss's version of that figure; it would not leave him much room, however, for "happy exaggeration." There is some good painting in the picture, but it is too sensational, and we were disposed to think there were finer qualities in the painting numbered 5, with the old captive Gaul sitting in the foreground and the Roman soldiers looking on. The best after this, perhaps, was the modern treatment of the subject, the handcuffed "Captive" in a railway carriage; but it makes a very disagreeable picture.

The exhibition of the designs was largely attended, and seemed to attract a good deal of public interest.

#### THE SPHERE IN PERSPECTIVE.

The following letter and diagram forwarded by Mr. R. Phené Spiers arose out of our remarks on a passage in his book on "Architectural Drawing" (p. 762, *ante*), and will be of interest to many of our readers, though it will be seen that practically Mr. Spiers's view does not differ much from ours:—

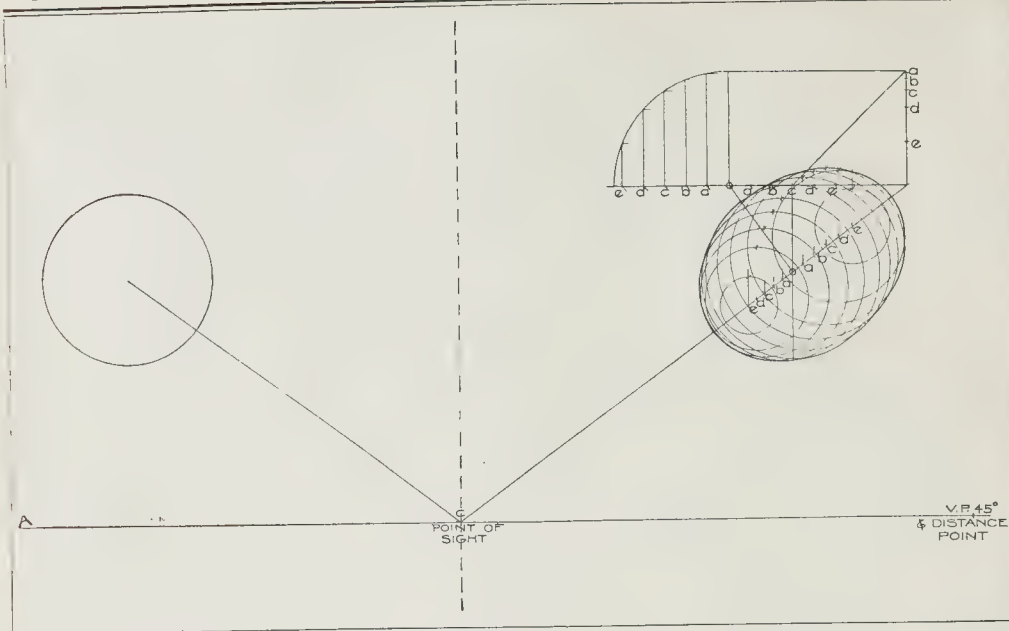
Sir,—I am obliged to you not only for your favourable notice of my work on "Architectural Drawing," but for the opportunity you give me of explaining more clearly the objects I had in view in referring to the projections of spheres in perspective.

The paragraph you have quoted must be taken in context with the previous paragraphs, and then, I think, will not seem so strange.

If I understand your question rightly, you do not take exception to the actual fact, viz., that the sphere can only be mathematically represented as a circle when its centre is on the point of sight, but to its application in the making of perspective drawings.\* In that case I am in accord with you, and the illustration I enclose will, I think, more fully explain my meaning. I have in this illustration drawn a sphere on the left, as I consider it always should be drawn (with one exception, which I will refer to later on), and on the right a sphere projected, as regards its main form, mathematically; as regards its outline approximately only because I have desired to show the method by which I arrived at its projection. I have assumed the sphere to be intersected by a number of vertical planes (parallel with the picture plane for convenience of projection), and I have put in perspective each section of the sphere. This shows as a matter of fact that if projected mathematically the sphere becomes an ellipse when not on the point of sight. In the illustration, A B is the horizontal line, C the point of sight, and C D represents the distance of the spectator from the picture plane. Now if this drawing be held at a distance, C D, from the eye the projection on the right should appear circular, that on the left elliptical; I say *should*, because it happens unfortunately in this particular instance, having taken a distance point too close to the picture plane, and a sphere too much out of the range of vision, the

\* That was our meaning.—Ed.





eye is unable to embrace the point of sight and the sphere at the same time; and therefore it is necessary to look askance to see the sphere, thereby changing position of the picture plane; but even looking askance at the projection I have given of the sphere, if the drawing be brought to within about two-thirds of the distance C D, it will be seen that the figure on the right has the appearance of being circular, whilst that on the left looks elliptical. It follows, therefore (and this was the exception I desired to make) that if a drawing is being prepared which will always be seen from one point of view (as in a peep-show, for instance) it is necessary to take cognisance of the fact and project the various features exactly, even although in its preparation the spheres should come out as ellipses. It also suggests to the draughtsman: firstly, the great importance of selecting his point of view so as to avoid great distortion (in the drawing of a dome or circular vase, for instance, to make it come, if possible, on the vertical plane intersecting the picture plane in the point of sight); and, secondly, the invariable necessity there will always be of "cooking" or correcting certain features, because the representation of a building on a vertical plane is not always the way in which the building might actually be viewed except at a long distance off, and also because the drawing will not necessarily be looked at from the point of view from which it is actually drawn. This explanation will, I hope, serve to place the subject in a clearer light before your readers.

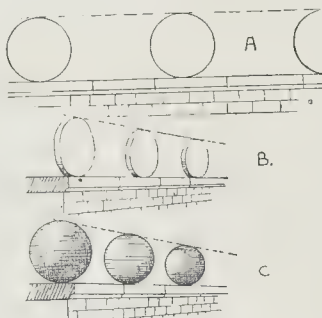
R. PHENE SPIERS.

Carlton Chambers, 12, Regent-street.

N.B.—There is one other passage in your notice which I should be glad to refer to, viz., the use of drawings in France with the shadows projected at  $45^\circ$ . They are not sent to the contractor as working drawings, but used only for the purposes of study; in fact, they take the place of our perspective drawings, and guide the architect in his design, whilst they serve also as competition or exhibition drawings. As a rule, the French do not make perspective drawings, and their architecture, I think, loses in consequence.

\*.\* There is another point, however, in regard to the theoretical distortion of the sphere in a perspective drawing, which we have not seen alluded to, and which suggests the idea that after all there is a screw loose in the theory of perspective, as set forth by those whom we may here call the "distortioners." When drawing circles in perspective, which appear on the paper as ellipses, we are not merely concerning ourselves with projection on the plane of the

drawing; we are drawing them as we see them. Let A represent a geometrical elevation of three circular bodies, either circular discs or spheres, placed in succession on any level base, such as the top of a wall. In the geometrical elevation, their outlines, whether they are spheres or discs, will alike be circles. Move to one side so as to



take them in perspective, and if they are discs, we shall see them, as at B, as a series of ellipses; observe, we do not merely draw them or project them so, but we see them so, as may be practically proved by holding up a divided scale at a fixed distance between the eye and the object, and measuring its apparent length and breadth by the scale. But if the three objects are spheres, when we take them in perspective they are spheres still,—their apparent outline and perspective are perfectly unaltered, and they appear as at C. It is true that we do not see actually the same horizon-line on any of them that we saw when we were in front, and the horizon-line of each sphere is, in the case of C, in a different plane in reference to the base-line on which the spheres are standing; but we see them all as true spheres just the same as before.

Whereupon we put two questions:—(1) Is there not something illogical in a system whereby we are to draw circles in perspective as we actually see them in fact, and spheres as we never see and could not see them? And (2) Would any painter who had to introduce a spherical object into a picture,—say, a globular termination to a gate-pier,—venture to draw it in an elliptical and distorted form because it was on one side of his picture and out of the line of sight?

#### SIR F. LEIGHTON ON THE ARTISTS OF THE RENAISSANCE.

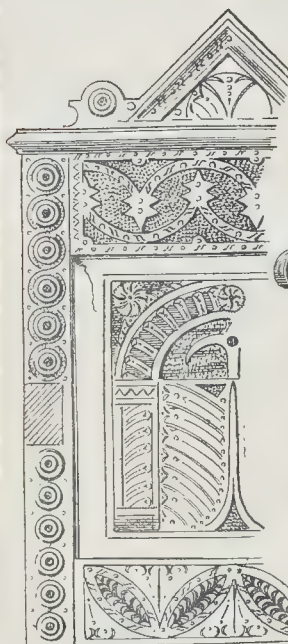
THE following is a portion of the address delivered by the President of the Royal Academy at the distribution of prizes to the students on Saturday last:—"The production, both in sculpture and painting, of the middle period of the thirteenth century has a character of transition. In painting, the works, for instance, of Cimabue and of Duccio are still impregnated with the Byzantine spirit, and occasionally reveal startling reminiscences of classic dignity and power to which justice is not, I think, sufficiently rendered. In sculpture, the handiwork of Nicolo Pisano is full of the amplitude, the rhythm, and virility of classic art. I see in it, indeed, the tokens of a new life in art, but little sign of a new artistic form,—it is not a dawn; it is an after-glow, strange, belated, and solemn. In the art of Giotto and the Giottoesque the transformation is fulfilled. It is an art lit up with the spirit of St. Francis, warm with Christian love, pure with Christian purity, simple with Christian humility; it is the fit language of a pious race endowed with an exquisite instinct of the expressiveness of form, as form, but untrained as yet in the knowledge of the concrete facts of the outer world; an art fresh with the dew and tenderness of youth, and yet showing, together with this virginal quality of young life, a simple forcefulness prophetic of the power of its ripper day. Within the outline of these general characteristics individually found sufficient scope. Awe of the doom of the wicked and a sense of inexorable retribution inspired in minds of a certain stamp works full of a Danteque severity and force; to others militant Christianity and theological allegory furnished a grateful field. Local particularities of temperament were reflected in local artistic production; in the work of the Florentines we trace that grave sobriety which so strongly marked them in the early days of their republican freedom, and of which, later on, Pandolfini was to draw an interesting picture. Among the Siennese, on the other hand, the love of splendour and luxury peculiar to them translated itself in the gay profusion of gold ornaments which, in their pictures, bespangled and enriched the gorgeous raiment of their virgins, saints, and angels. The main external characteristics of this early phase of art, however, are, I repeat, a keen sense of the expressiveness of form, which translates itself in beauty and flow of line, ignorance of the facts of nature resulting in drawing empty as well as inaccurate, and, we must add, a com-

plete indifference to landscape, with which, in fact, it deals symbolically rather than by imitation. Soon, however, the agencies which made themselves felt also in art. You will remember that I pointed out to you a two-fold current in the intellectual evolution. On the one hand, a reaction against the fetters of monkish rule and the doctrine of the inherent depravity of humanity, together with a growing interest in man and in the phenomena of Nature; and, on the other, an ever-increasing interest in the achievements of the pre-Christian ages, and especially the age of the supremacy of Rome. Now these two agencies merged to a great extent one into the other in the general intellectual movement; but in Art, at least in the arts of painting and sculpture, for some lapse of time only one of them made itself felt,—to their great gain,—namely, the impulse to study man and the world he inhabits; the impulse, in fact, to study Nature. The humanists, in their almost superstitious reverence for the masterpieces of classic literature, were pursued by the temptation to repeat, like parrots, words which clothed ideas not their own, and expressions which corresponded to nothing in their minds. The artists were more fortunate; of ancient painting nothing, of ancient sculpture little only, was before them; and after the date of Nicolo Pisano that little seems for a considerable period to have exercised small influence on them. And so it happened that while men of letters were thrown into the pursuit of knowledge which they found clothed in a perfect artistic form at a time when their heads were, so to speak, hardly strong enough to carry the intoxicating draught, artists, unhampered by the crushing example of a past perfection, were flung straight on to the bosom of Nature,—where safety is. Other circumstances also helped to shape their course. One of the most distinctive features in the economy of the Italian Republics was the free and unchecked development of the individual. The age was one in which every individual was gauged exactly according to his intrinsic worth; every capable man got the full value of his capability; and every capable man all things were open. Accordingly, the study of the individual forced itself upon the artist, and the acuteness of observation, which was innate in the Tuscans, became manifest in a marvellous subtlety in the rendering of individual character. Such portraits as those of Mellini and Palmieri, the medals of Pisanello, and the frescos of Massaccio and Ghirlandajo will at once occur to you. Whether they use the pen, the pencil, or the chisel, the Florentines of the Renaissance are unsurpassed in their vivid portrayal of individual men. In its turn the scientific spirit took possession of the Arts. The once forbidden, now frequent, representation of the nude human form led to a desire for the knowledge of its marvellous mechanism and its secret structure. Anatomy, accordingly, was pursued with zeal. Perspective, too, was keenly studied: a science especially indispensable to men whose love of architecture as an adjunct to figures amounted almost to a passion, and was, no doubt, in great measure, the outcome of the haunting impression of architectural grandeur produced in them by the sight or by the accounts that reached them of the stupendous ruins of ancient Rome. And in the train of perspective the cognate mysteries of foreshortening claimed their votaries and exercised a fascination, of which, indeed, the results were sometimes not a little ludicrous. The prophet of foreshortening was Paolo Uccello. There is in Florence, among other works of his that might be described to much the same effect, a battle-piece, in which a strictly foreshortened warrior and his charger, foreshortened for the last time, for they lie stark and dead in the forefront of the canvas and the fight, a horse kicking the spectator, and a pile of lances disposed upon the ground, with unblushing intent to display the artist's science, have an altogether comic effect. By the side of this scientific fever the joy in re-discovered Nature manifested itself in a new delight in landscape. The summary indication of earth and vegetation which sufficed to the school of Giotto soon gave way to an almost un disciplined exuberance of treatment. Who does not remember the riot of hill and dale, of tree and shrub, of vineyard and pleasure-lands, of birds and beasts, in which, on certain walls of the Campo Santo of Pisa, Gozzoli, for instance, celebrated the joyous spectacle of the world?

And when to this spirit of simple gladness is added the spirit of science of which I have spoken, we get such amazing studies of leaf and flower as Leonardo loved to draw. Thus to Tuscan artists the new movement brought the love of nature and the light of science. I have said that the revived classicism for some considerable period affected but little the outer form of their art. It did, however, at an early date largely modify the subject matter with which artists dealt. Mythology had laid a powerful hold on the humanists. The objects of Pagan and of Christian worship were mixed in a strange promiscuity within their minds. The attributes of heathen gods were given to the Almighty, of whom they loved to speak as Jupiter Altitonans, high-thundering Jove. But over the artists also the heathen fables cast their spell; gods and goddesses, satyrs and fauns, dryads and nereids invaded their fancies and once again impelled their hands; and Pagan myths took their place in the studio by the side of Christian verities, objects of equal homage. You foresee, however, that under Tuscan pencils these pagan themes will assume a thoroughly changed complexion; and it may be interesting to compare, in passing, one with another, by a special instance, the treatment of kindred subjects by a Florentine painter and a Florentine poet. Some portions of the famous picture of "Spring," by Botticelli, in the Gallery of the Belle Arti in Florence, recall certain stanzas in the "Giotra" of Poliziano so vividly as to suggest that the painter must have had them in his mind when he conceived the picture. Yet, see how wholly different they are in the order of emotion they evoke! How luminously joyous, how serenely sweet, and, in this sense, how classic is the sentiment exhaled from the music of Poliziano's lines! How full of twilight and of subdued strange sadness is this loveliest of Botticelli's works! The matter is classic, the spirit modern and Christian. The Renaissance has laid a stronger grip on the poet than on the painter. But, as is natural, the action of this complex movement on artistic development varied in its conflict with the Medieval spirit according to the human stuff on which it worked. Before the close of the fourteenth century the exclusively religious and didactic phase of art had spent itself. The days were past when the doctrines of the Faith, its comfort and its terrors, the science of government, and the precepts of morality, spoke to the masses, in urbane but lofty artistic language, from the walls of church and council chamber. Giotto had clothed in forms of art the spirit of St. Francis, and had gone to the grave. Simone Memmi, the champion of militant orthodoxy, hot with the fire of St. Dominic, and the far greater painter Ambrogio Lorenzetti, whose solemn frescos in the Communal Palace of Siena are a great sermon on the virtues which build up a well-ordered State, both these had ceased to live; and now a period had begun in which worldly subjects and classic mythology were to invade Art; a period in which it lost for a time much of its ethical elevation, but during which the nourishing elements of knowledge were being eagerly absorbed and assimilated, which alone could equip it for its final and its highest triumphs. Yet even when the flood-tide to which Petrarch had opened the gates of Medieval civilisation was, as it seemed, sweeping everything before it, the old flame of religious fervour was not everywhere spent. Even in the middle of the fifteenth century you might, turning aside from the turmoil of the streets of Florence, have seen, in his silent cell, a pious monk, absorbed in his work, catching no echo of the outer din, gazing with rapt eyes on a world of love and ecstasy, the radiant creation of his own pure and reverent soul. And if the ecstatic spirit survived in Beato Angelico alone, perhaps, in this undimmed serenity, the graver spirit of religion, the Christian sadness, still touched and tinged the mind of a Signorelli, a Botticelli, a Perugino; cast a tender light over the first youth of Raffaele Sanzio, and at last found its fullest expression in the sublime creations and its saddest cry in the rugged sonnets of Michelangelo Buonarroti. But, perhaps, the various operation in the province of art of the two main motive forces of the Renaissance,—the impulse towards the scientific study of nature and the impulse to reinstate the classic spirit,—may be best illustrated by more special reference to the work of three typical artists whom I have already named,—Leonardo da Vinci, Raffaele, and

Michelangelo. Of the scientific impulse we see the fullest expansion in that miracle of many-sidedness,—Leonardo. A never-sated hunger for knowledge in every form, a desire ever burning to lift up the veil from every secret of Creation, possessed and marked him through life. The hidden structure of the bodies of men and of animals, the structure of plants, the ways of rushing waters and of wandering winds, and every riddle in the book of Nature, were objects of his ardent curiosity and unwearied study. How far beyond the horizon of his day his prescient spirit carried him along the fields of science in which art is not involved, others, better than I, can tell you. But we cannot, in this strange man, separate the scientific investigator from the artist. In his moody and fitful spirit, unrestlessly straining forward in the quest of some intangible new perfection, it was the same haunting sense of mysteries unsolved that led him, now towards scientific prophecy, and now to the creation of a type of human beauty more subtle and complex than any the world had seen before. The influence of the revival of classicism, both in its spirit and as a form of aesthetic expression, is seen at its meridian in Raffaele. To him the knowledge of such masterpieces of ancient sculpture as were brought again to the light in his day came when his precocious gifts were already about to reach maturity; and their example found a fruitful soil in his singularly well-poised genius, filled as it was with a stately sense of beauty and chastened by a mind of rare refinement. Whatever was best in the classic spirit was absorbed and eagerly assimilated by him, and imparted to the work of his best day that rhythm, that gentle gravity, and that noble plenitude of form which are its stamp, and proclaim the brother of Mozart and of Sophocles. In these two artists, then, we see the affluence of the Renaissance in two distinct forms,—in its avidity of research with Leonardo, in its classic serenity with Raffaele. It remains for me to speak of one, the greatest, far, of all, on whom, as an artist, the old world had no direct hold or influence, though it coloured his intellect by blending into his Christian orthodoxy some tinge of that Platonic mysticism which, since Marsilio Ficino first taught it, had fascinated the choicest spirits of the age. I speak, of course, of Michelangelo. His contact with the Renaissance as an artist is traceable only in the scientific spirit and its interest in man; for to the artist Michelangelo, who saw in the human form a dim reflection of the Divine beauty, man was the all-absorbing and exclusive object of study. All else was indifferent to him; to him a plain mass of green or gray sufficiently signifies the earth. Only once, and because the subject,—the temptation of Eve,—demands it, does a melancholy-looking trunk, with a few leaves, intrude into his work to represent the green glory of the forest. Giotto himself is not more scornful of its charms. And this I wish you to note of Michelangelo as distinguishing him from Raffaele,—the type of human form which he lifted to the fullest expressional force is the last development of a purely indigenous conception of human beauty, whereas the type which we know as Raffaelesque is a Classic ideal warmed with Christian feeling. Sublimely alone as Buonarroti's genius stands, towering and unapproached, like some unscaled, heavenward, mountain peak, it does but mark the highest summit reached, in the magnificent continuity of its evolution, by the purely native genius of Tuscan art. Reaping, with full hands, all the knowledge of his day, and conscious of its worth, Michelangelo flung that knowledge as fuel into the furnace of his Medieval ardour, and in him we see, at the height of the Renaissance, the supreme type of a Medieval artist, yet, be it remembered, a type which without the Renaissance could not have been. As firm in his faith, and of a soul as high, he was the spiritual son of Dante and his peer; a Tuscan, a Christian, and, in the language of his art, an immortal poet. In his grave the art of Tuscany was buried; no flower grew over it. When he died in 1564, one Florentine of genius was still alive,—wild Benvenuto, to whom a short span was yet allowed. For a few years longer a Venusti, a Bronzino, a Daniele da Volterra remained to show how dull a thing art may become when the soul has gone from it and rhetoric replaces feeling. For a few years yet good Giorgio Vasari, King of Chroniclers, strutted in garments which he believed to be his master's; and then final night closed over





DETAIL OF BACK.

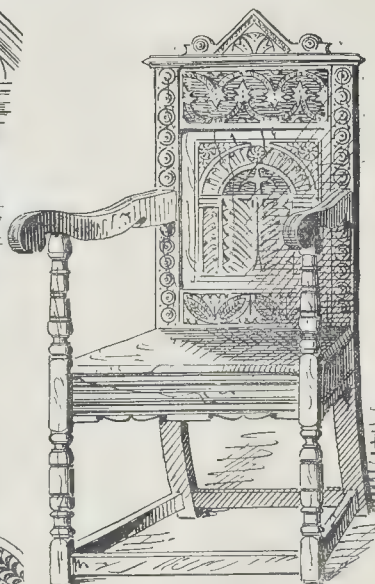


Fig. 1.

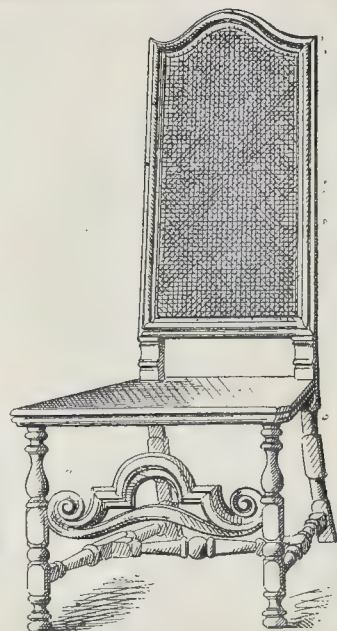


Fig. 3.

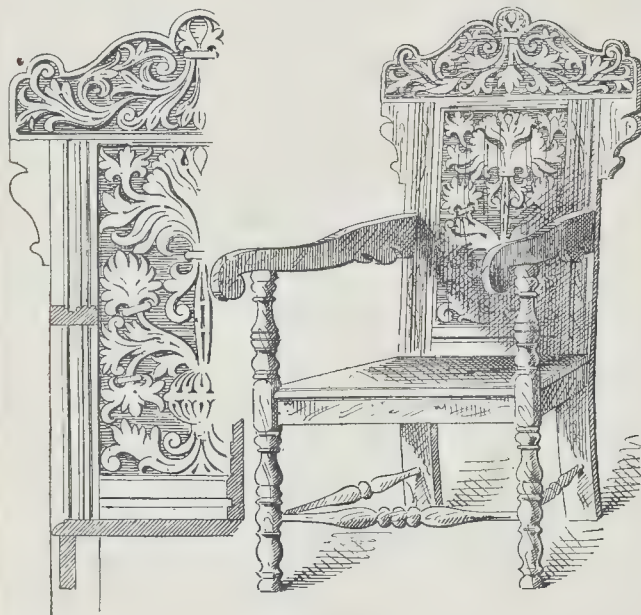


Fig. 2.

the art of Florence. The light of Italian art passed from the valley of the Arno to Venice, the city on the sea."

**Home of Industry, Bethnal Green.**—The new Home of Industry, Bethnal Green-road, E., was opened on the 18th of November. A building has been purchased and fitted up at a cost of 8,000l., for the purpose of training boys for emigration, and for other philanthropic work carried on by Miss Macpherson. The architect was Mr. George Baines. The contractor was Mr. H. L. Holloway, of Deptford.

#### SOME OLD ENGLISH CHAIRS.

Of the three chairs illustrated, fig. 1 represents an old oak chair in St. Mary's Church, Guildford. The back is covered with elaborate ornament, carved, incised, and applied in roundels. The church contains some carefully-preserved examples of old fresco decoration.

Fig. 2 represents an old oak arm-chair in East Horsley Church, Surrey. It is of the Jacobean period, and the curious flowing ornament on the back panel and at the head is given in detail.

The church also possesses some other interesting examples of woodwork of this period.

Fig. 3 is a sketch of an old chair in Little Bookham Church, Surrey. The church contains some interesting examples of Norman work, and also some good specimens of oak panelling, with incised ornament.

#### THE NEW METROPOLITAN SEWAGE WORKS AT BARKING OUTFALL.

As we have from time to time informed our readers, the Metropolitan Board of Works is now engaged in the construction of extensive works at Barking Outfall, with a view to the deodorisation, to some extent, of the sewage of the northern half of the metropolis. That some such palliative or curative measures are urgently called for, the foul state of the Thames in the neighbourhood of Woolwich during recent summers has amply demonstrated; whether the chemical treatment resolved upon by the Board will be effectual we have strong doubts, and have already given expression to them. As the works now in progress at Barking are to be completed next year, and as they will be, we fear, comparatively useless unless the chemical process adopted be at once economical and effective, we cannot but think that the subject is one deserving the widest and fullest discussion. Yet what do we find? The Board is to be asked, at its meeting to be held a few hours after these lines are published, to assent to the following motion:—

"That it be an instruction to the Works and General Purposes Committee to print, for circulation amongst the members of the Board only, the report presented to them by Sir Henry Roscoe, M.P., F.R.S., upon the deodorisation of the sewage at the outfalls, and the state of the Thames."

Why should this important report, by an eminent scientist, be circulated "amongst the members of the Board only"?

It is not our purpose here, however, to discuss the chemical aspect of the question, but rather to chronicle the progress of the very elaborate works now in course of construction at Barking, which we had an opportunity of visiting two or three weeks ago. They have been designed by the Board's Engineer, Sir Joseph Bazalgette, and the contract was let to Messrs. John Mowlem & Co. some nine months ago. The amount of the contract is 406,000l., and probably we shall be within the mark if we say that the cost of the works when completed will be 500,000l. Half a million of money is a large sum to spend upon what many competent



chemists and engineers regard as a mere experiment. If the experiment turn out successful, so much the better for the long-suffering ratepayers. If it fail, they will be in for further heavy expenditure to carry the sewage down to Canvey Island or elsewhere.

The works included in the contract consist of precipitation reservoir or tanks; sludge settling channels; pier and jetty for discharging the sludge into ships and for general purposes; engine and boiler-houses for lifting the sludge and the effluent water; iron water station; settling pond for river water; superintendent's house and twelve workmen's cottages; liming station; and tramways and pipes for various purposes.

The sewage will be conveyed from the northern outfall sewer into precipitating tanks placed on the north side of the existing reservoir. There will be thirteen of such tanks, and the sewage will be admitted into each of them in succession and allowed to remain in a quiescent state to admit of the deposition of the sludge. When the solid matters in the precipitating channels are deposited, the effluent water will be run off into the river direct if the state of the tide is favourable; but otherwise into the existing reservoirs, to be stored there until the tide has fallen sufficiently to admit of its discharge. The sludge will be run off into sludge-settling tanks to be placed on the west side of the sewer, near the river, where it will be allowed to settle again, so as to allow of the removal of more of the liquid. This liquid will be drawn off and will be used for mixing the lime water, which will be admitted into the northern outfall sewer nearly half a mile above the precipitating tanks, where there will be stores for the lime and chambers for mixing it. The settled sludge will be run into stores under the tanks, and will be lifted and passed through pipes to a pier to be constructed in the river for the purpose of being loaded into ships and carried to sea.

There is a supplementary store for sludge in case of the sludge ships being delayed by stress of weather, and there are stores for the iron, and sheds for its manipulation and introduction into the sewage.

There will be engine-houses with engines for lifting the sludge and effluent waters, and for lifting the water containing the iron and lime; coal stores; a settling pond for purifying the river water for use in the various operations, and residences for the superintendent and some of the workmen. Tramways will be laid for conveying coals from the river to their various destinations in the works.

The works now in progress consist of excavations, concreting, and brickwork for the precipitation reservoir, liming station, and sludge-settling channels; foundations for engine-house and boiler-houses, and a jetty for loading steamers. Two chimney-shafts, service-tank for river water, twelve workmen's cottages, and a dwelling for the superintendent have been completed.

The old channel at Gallon's Sluice has been diverted into a new channel, which has been recently formed. Embankments have been formed from spoil for the purpose of receiving tramways in connexion with the various works. The principal works at present carried out consist of excavations, concrete, and brickwork foundations for the structural works.

The works have now been in hand, as already mentioned, about nine months, the first two months of which the contractors were engaged in building temporary jetties in the river Thames and Barking Creek, sinking pump and getting plant on to works. In the remaining seven months they have excavated upwards of 220,000 cubic yards of ground, principally in long trenches for the walls of the sludge-settling channels, and in holes 6 ft. square for the brick piers to carry the arching over; they have used more than 135,000 cubic yards of concrete, and built 2,600 rods of brickwork, the works so far executed being of the estimated value of 170,000. The works cover an area of about eleven acres.

The number of men employed on the works at the present time amounts to about 2,200, and the quantity of permanent material unloaded amounts to 1,300 tons per day, and there are over forty boilers under steam.

The whole of the works are under the personal superintendence of Mr. G. Marshall, Assistant Engineer to the Metropolitan Board of Works; and of Mr. J. Jackson, General Manager, and

Mr. W. Bowell, Engineer, to the contractors. There is, it goes without saying, some admirable plant on the works, some quick-travelling steam cranes being especially effective and easy of manipulation.

#### GLASGOW INTERNATIONAL EXHIBITION.

THE contractors have now been at work for fully six months, and the building, including its 475,000 square feet of roofing, is already almost completed in the rough. The great central dome, with its four flanking towers, is almost the only portion still awaiting much of finishing work on the outside, and even here the ribbing and piecing operations are far advanced, promising a full crowning of the edifice within the space of a few weeks. The architectural effect of the design,—a strictly Oriental one in its more prominent features,—is not unpleasing; but the position or site which has been assigned to the erection is far from setting off its good points to the best advantage. On two sides,—east and south,—the houses of the city impinge quite closely on the building, the only separation being the breadth of a not very wide streetway. These houses are of the "flat" order common in the large towns of Scotland, compact and of considerable height; and a glance at once shows that this unfortunately close overlooking of a large and wide-spreading, but relatively not at all lofty structure, has the effect of crowding and dwarfing the latter to a somewhat damaging extent, while at the same time diverting attention from the graceful lines which the elevation undoubtedly possesses. The situation of last year's Edinburgh Exhibition was much happier; in grounds exclusively its own, and sufficiently remote from the nearest city buildings to escape all injury likely to arise from the harshness of an abrupt contrast. As regards the Glasgow exhibition, extraordinary effort is being put forth to reinforce the main building with extraneous attractions, and to a large extent the open or park side to the north, with the river Kelvin crossing Clydeside on an easy curve, lends itself very freely to this end. The Kelvin is being deepened to a uniform depth of 6 ft., and next year, over the two or three furlongs of its course in the immediate vicinity of the Exhibition building, fancy craft of all kinds, including steam and electric launches, working ship models and torpedo boats, will be found moving briskly to and fro. A chronic foulness has long afflicted this once crystal tributary of the Clyde; but the evil will at least be mitigated if not removed by the cleansing expedients now being energetically taken in hand, these consisting of an extension of the left bank sewage culvert right down to the Clyde, and certain up-stream restrictions governing the inflow of refuse matter. Other extramural attractions are comprised in a timber and plaster reproduction of Glasgow's ancient episcopal palace, to be utilised in housing the Antiquarian Section of the Exhibition, an electric fountain of 120 ft. base diameter, a switchback railway, a terra-cotta fountain, 85 ft. high, presented by Doulton & Co., Lambeth, &c. The rather unhappy financial results lately attending one or two similar Exhibitions elsewhere have been exercising the minds of the guarantors not too pleasantly; but, in any case, the event of next year, regarded simply as a display, is almost certain to rank as a high success. Considering the plethora of grand exhibitions which the present and recent years have produced, Glasgow's effort may have been dated just a little too late for a signal financial triumph; but having put its hand to the plough, it is not likely that the City will grudge either pains or outlay to secure a creditable issue. The works contract now in course of fulfilment involves expenditure to the amount of about 60,000.

#### ARCHITECTURAL SOCIETIES.

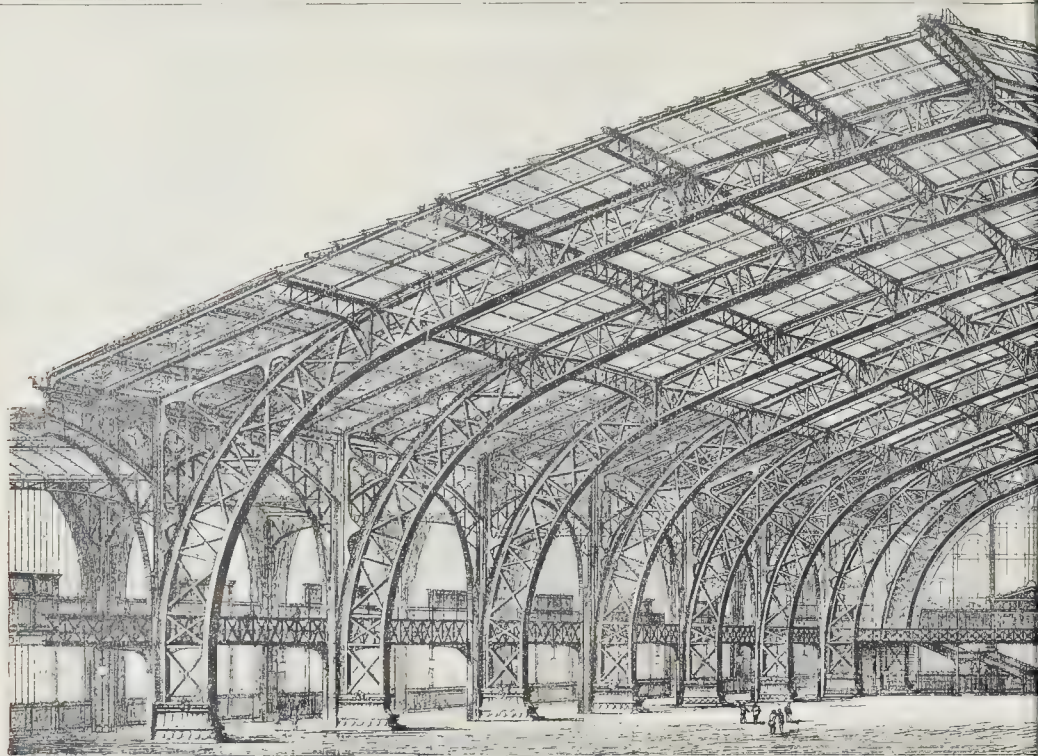
*Birmingham Architectural Association.*—The third ordinary meeting of the current session was held at Queen's College on Tuesday evening last. Mr. W. Doubleday (vice-President) took the chair. A paper was read by Mr. Whitworth Wallis, F.R.G.S., on the "Temples, Forum, Theatres, and Tombs of Pompeii." The lantern views illustrating the lecture were of the most interesting description. Temples, theatres, tombs, frescoes, statuary, &c., succeeded each other in an almost bewildering

variety. The City of the Dead became, indeed, for the time a city full of life and vivacity. The drapery of the statues which have lately been unearthed rival those of the best Greek period. A vote of thanks, proposed by Mr. W. Doubleday and supported by Messrs. Newton and Victor Scruton (hon. sec.), was unanimously accorded to Mr. Wallis for his very interesting lecture, and after a response from that gentleman the meeting terminated.

*Manchester Architectural Association.*—The last ordinary meeting was held at the Diocesan Buildings on the 13th instant, Mr. A. H. Davies-Colley (President) in the chair. The Rev. R. H. Snape read a paper on "Scottish Cathedrals." He prefaced his remarks by saying that as he had spent several of his earlier years as an architect and had visited the whole of the English as well as the Scotch Cathedrals, he claimed some right to speak on this subject. Our views of cathedrals must be very much modified when we come to Scotland, as they are more correctly speaking simply kirks, numbering in all about fourteen. Transepts, cloister courts, and crypts are non-existent except in a very few cases; towers and spires are also few and very irregularly placed. The round arch is to be found in nearly every style, but the Perpendicular has hardly an example. The crypt of the Glasgow Cathedral is the finest in England or Scotland. The abbey more than rival the cathedrals. A discussion followed in which Messrs. J. T. Hodgson, H. M. Mee, T. Chadwick, Ward, and the chairman took part.

*Edinburgh Architectural Association.*—The usual fortnightly meeting of the Association was held on the 8th inst., in the Architectural Hall, 42, George-street; the President, Mr. Hippolyte J. Blanc, occupied the chair. After the usual preliminary business and admission of new members, Mr. John Wallace read a paper on "Italian Monuments." After an introduction explanatory of the scope and object of the paper, in which precedence was given to the Early Renaissance tombs of the fifteenth century, not only as being of singular interest from their intrinsic excellence and suitability for their purpose, but as throwing valuable light on the rise of Renaissance art and the influence this department of design had on architecture proper, the Gothic tombs of the thirteenth and fourteenth centuries were referred to in detail. The tombs of the Scaligeri at Verona were described and instanced as being, *facile princeps*, of supreme importance, because giving dated examples of the best Gothic work during the whole time of its prevalence in Verona. The earliest examples of Renaissance tombs,—those of the quattrocento period,—were next spoken of, Tuscany being the home of their birth and most perfect development. The Florentine school of sculpture being at its strongest at that time, and the best masters of the craft devoting their best energies to this class of work, it was not to be wondered at that for combined architectural and sculptural effect these tombs stood unrivalled. The love of pomp and ostentation was shown to have gradually produced decadence and prevented the healthy development that might otherwise have been expected from the early promise of Renaissance art,—combined, however, with increased robustness of character,—to be commended had the standard of refinement and excellence in sculpture been preserved. The decay of taste during the cinquecento period, with its grandiose effects, were traced to the same insidious influence, only partially assisted by the genius of Michelangelo, whose well-known tombs of the Medici family in the church of St. Lorenzo at Florence were claimed to rank with the best works of this master. The vagaries of the Rococo School were then referred to, and instances given of the debasement of art by this licentious school, till, by the middle of the seventeenth century, the last degradation was reached. Reference was then made to the modern Italian tombs, as exemplified in the Campo-santo at Genoa, regret being expressed that effort should be so misdirected; ignoble realism in the dexterous representation of lace and ribbons, and the trivial accessories of modern dress being aimed at, to the exclusion of the higher qualities of sculptural design. The value of a study of these ancient monuments was expressed with a view to improvement in this department of design in modern work. The paper was illustrated by a collection of photographs. At the close a hearty vote of thanks was awarded to the lecturer.





THE GALERIE DES MACHINES

#### THE "GALERIE DES MACHINES" FOR THE 1889 EXHIBITION.

We give a view of this immense iron structure, but a small part, however, of the vast show with which Paris is preparing to astonish the world in 1889. The "Galerie" is being erected at the south side of the Champ de Mars, parallel with the Avenue Lamoignon.

The architect for the work is M. Dutert, assisted in the iron details by M. Constantin, engineer-in-chief for the metallic construction of the Exhibition.

The gallery is 420 metres in length, and 43 metres in height, and 115 metres wide; in other words, a span of nearly 380 ft.

It is intended that the structure should be completed during the course of next year; the total cost will be about three millions of francs.

#### Illustrations.

##### CATHEDRAL, CHALONS-SUR-MARNE.

**M**ITCHELL'S fine drawing of the interior of this cathedral; we have now the pleasure of giving two more drawings by him, one showing the exterior of the cathedral (some description of which will be found on page 770, ante) and the carved capital of one of the nave piers, a fine and interesting example of Early Gothic work, with reminiscences of Greek detail in parts.

##### CHURCH OF ST. AUGUSTINE, HEDON.

THE borough of Hedon, though now only small and insignificant, was formerly of some considerable importance, and dates far back into history, having had a charter granted to it by King John. We are told that when Hull was but a fishing village, Hedon was a thriving seaport, enjoying the benefit of an extensive maritime commerce. Possessing at one time three churches, it is now reduced to one, which we must confess constitutes the only

object of interest in the town. However, its dignified appearance, purity of detail, and convenient size, eminently fit it to be a worthy model, which may be studied with profit again and again. It is yearly becoming better known to architectural students, a number of whom, of late years, have taken full advantage of easy access to such a fine example of Mediaeval art, and no doubt will soon be known as "a measured building."

As will be seen from the perspective view, it is cruciform on plan, and exemplifications of every style of Gothic may here be found, from Transitional to Late Perpendicular. The earliest part of the fabric is the south transept, the door of which is round-arched, with fine bold mouldings. This transept was almost entirely rebuilt some years ago, by the late Mr. G. E. Street. A fine rose-window from his design fills the gable. The chancel and north transept follow in point of time, appearing of about the same date, and being of pure Early English. The front of the north transept presents as fine a study as can be found in a moderately-sized church. It is shown in a geometrical drawing given on another plate, along with sections of the mouldings. The nave is of five bays, the four adjoining the tower of the Geometrical period; the remaining bay and the west front of the ensuing period of the Later Decorated style. The tower is about 130 ft. high.

The nave, north transept, and chancel were restored about ten or twelve years ago by a since-deceased local architect. Before this, the whole of the roofs were of flat pitch, and covered with lead, the gables having been taken down to the eaves level, and the west window was filled with tracery of a most atrocious design. The chancel still retains a good Perpendicular window.

Nothing remains of the Lady-chapel except a part of the east wall, which has been incorporated in a vestry of the Late Gothic period.

##### CANDELABRA FROM ITALIAN MUSEUMS.

THESE two examples of Italian candelabra are from drawings by Mr. R. A. Briggs. That

marked A is a fine work in bronze, standing about 6 ft. high, and is in the Bargello at Florence. It bears on the base the device of the Medici, a shield studded with little round knobs, which are supposed to represent pills. The one marked B is executed in marble, and is in the Museo Nazionale at Naples.

##### THE NEW LIBRARY FOR LAMBETH.

WE give an illustration of the new library building which is being erected in the South Lambeth-road, S.W., for the Lambeth Libraries Commissioners. The entire cost of the building and site is being defrayed by Mr. Henry Tate.

The materials used in the construction will be red bricks, with Portland stone for dressings, green slates for roofs, and copper domes to turrets. The interior facings of reading-rooms, &c., will be of stock brick, relieved with red bands and arches, the roofs being open timbered, and with skylights over. The floors of the public lobby, &c., will be of wood blocks, and the corridors tile-paved. The front part of the building shown on our illustration is a house for the librarian. The general dimensions of the various rooms are:—Newspaper and periodical room, 48 ft. by 27 ft.; reference-room, 27 ft. by 28 ft.; lending libraries and book-store, 48 ft. by 23 ft.; women's reading-room, 13 ft. by 13 ft.; private room, 13 ft. by 12 ft.; public lobby, 20 ft. by 20 ft. In the basement is a heating-chamber and book-room, &c. The architect is Mr. Sidney R. J. Smith, and the builder Mr. Nightingale.

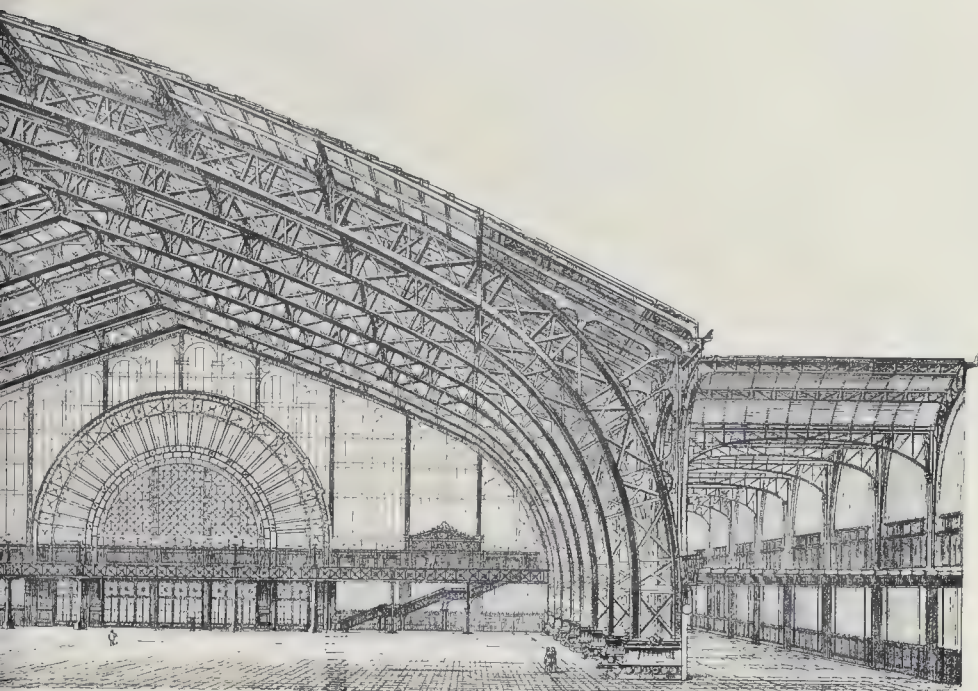
##### HOREHAM HURST, SUSSEX.

THIS country residence, recently erected in Sussex, is situated on an elevated site in park-like grounds at the extreme corner of Hellingly Parish, adjoining the Horeham Manor Estate.

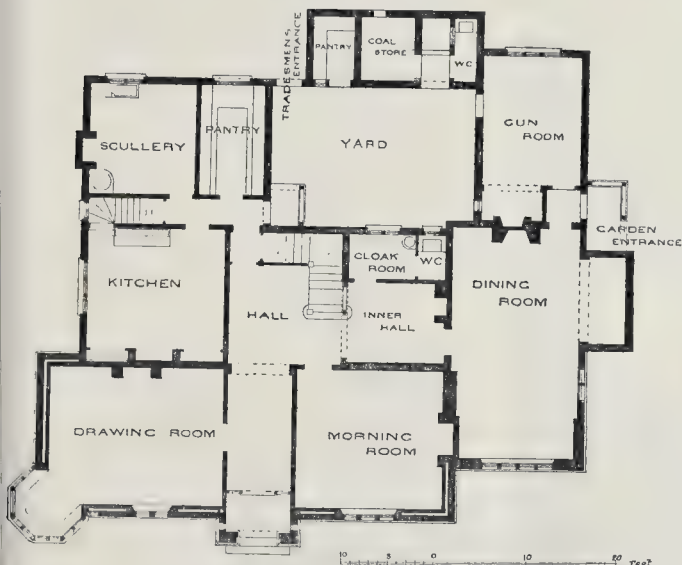
It commands in all directions lovely views of the county scenery and also a view of the sea beyond Eastbourne.

In designing the elevations the main object in view was to produce a comfortable home in character with the old Sussex style, and this has





THE PARIS EXHIBITION OF 1889.



Plan of House, Horeham Hurst, Sussex.

the kitchen and dining-room was unavoidable.

The work has been carried out by Mr. Daniel Ashdown, builder, of Horeham-road, Sussex, under the superintendence of the architect, Mr. H. Percy Monckton.

#### ELECTION OF CITY ARCHITECT.

THE election of a City Architect and Surveyor to the Corporation of London, in the room of the late Sir Horace Jones, took place on Thursday afternoon last, at a meeting of the Court of Common Council. The following were the candidates:—Mr. H. D. Appleton (age 34); Mr. Charles Barry (63); Mr. Francis Chambers (58); Mr. Goymour Cuthbert (38); Mr. W. H. Crossland (52); Mr. T. Milbourn (52); Mr. C. N. McIntyre-North (50); Mr. Alexander Peebles (47); Mr. J. H. Smith (34); Mr. B. Tabberer (56); and Mr. J. Tanner (53).

A proposal was made that the voting should be by ballot, and this was eventually agreed to, and it having been announced that Messrs. Chambers and Smith had withdrawn, the voting was proceeded with, with the following results, viz.:

Appleton, 2 votes; Barry, 45; Cuthbert, 6; Crossland, 31; Milbourn, 4; McIntyre-North, 8; Peebles, 85; Tabberer, 4; Tanner, 0.

As none of the candidates had a clear majority of votes cast, the three standing highest in the list were again voted for, when there were for Mr. Barry, 43; Mr. Crossland, 20; and Mr. Peebles, 107.

Mr. Peebles was accordingly declared elected.

**Lectern, Tunstead Church.**—A carved oak eagle lectern, a replica of one supplied to the English Church at Neuilly, near Paris, has recently been executed for Tunstead parish church, by Messrs. Jones & Willis.

**Proposed New Theatre for Edinburgh.**—We learn from the *Scotsman* that in the Edinburgh Dean of Guild Court plans have been lodged for the erection of a theatre on ground immediately to the south of West Nicolson-street, Edinburgh.

been obtained by facing the building externally to the first-floor level with dark red bricks and Bath stone dressings, the floor above that height being constructed with massive horizontal and vertical timbers placed about 2 ft. apart showing externally and filled in between the double lath and plastering, with 3 in. cavity, and finished

outside with solid cement and rough-cast shingle of a warm yellowish tint, the roof being covered with dark brown tiles and bright red ridge tiles. The house is approached from the entrance lodge (which is of similar design) by a winding avenue of oaks. Owing to the utilisation of existing buildings on the site the relative position of



## THE APPRENTICES' EXHIBITION.

The Apprentices' Exhibition, opened at the People's Palace, Mile End, on Saturday last, by H.R.H. the Prince of Wales, is, on the whole, a creditable display of work, and though it contains nothing particularly noteworthy, it may be visited with advantage by those for whose special behoof it has been opened, viz., young workmen, and apprentices, and lads about entering upon apprenticeship. There is much in the exhibition to interest the general public, of course, and the exhibits of the students of the Polytechnic and similar institutions serve to show that, while there is, and has been, much talk of late years about technical education, some little amount of practical work is being done; but, to our thinking, one defect of the exhibition is that the consecutive processes of the various trades represented are not in all cases so fully shown as they might be. The exhibits fill two long and well-lighted galleries, parallel to each other. In the one to the left hand of the entrance some of the building trades are tolerably well represented, and there are a few exhibits pertaining to the same trades in the other gallery.

The students of the School of Art Wood-Carving show a number of specimens, most of them exhibiting much merit, considering the age of the pupils, and giving promise of greater achievements in a year or two.

A few of the Cabinet-making students of the Polytechnic Young Men's Christian Institute exhibit a number of articles of furniture which are, as a rule, well designed (we do not understand that in any case the designs are by the makers of the articles), and constructively far superior to much of the "shoddy" work which is to be seen on sale in the Tottenham Court-road and elsewhere. A dressing-table by John Slade, a cabinet by Albert Atkinson, and tables by O. R. Burke and W. T. Wilkinson (all apprentices), may be named as examples.

Some of the students of the Plumbing Classes of the same excellent Institution show a very fair collection of specimens of craftsmanship, under the appropriate motto "Nothing like Lead." John James Green, Thomas C. Fenn, and H. E. Belton are exhibitors of some good examples of pipe-bending and wiped joints, and there are also several examples of bossed leadwork, the most successful and practical of which is a lead finial by Thomas Miller Ross, an apprentice of six years' standing. The portrait-busts executed in the same manner also exhibit much skill, but lead is a material which does not lend itself to agreeable effects when used for portrait busts. There was little or nothing in this collection, by the way, which was illustrative of the principles upon which plumbing work should be done, which is the more to be regretted, inasmuch as skilled workmanship in execution will not only not atone for work planned on wrong principles, but may, in conceivable cases, intensify the evils and dangers resulting therefrom.

Several students of the same Institution exhibit good specimens of modelling in plaster, but there is nothing noteworthy about them; like the specimens of metal-chasing and *repoussé* work adjoining, also by students of the Polytechnic, they are fairly good, and that is all. Mr. E. King, a die-sinker, who has been three years at his trade, receives a special award for a panel bearing an expressively modelled lion in relief. Another student of the same Institution, John Smart, a stone-mason, aged 23, exhibits a well-executed though somewhat heavily designed window; and adjoining, Horatio Canwick, aged 22, and Alfred Horne (age not stated) exhibit specimens of fine-jointed brickwork, such as is the vogue in "Queen Anne" work.

Among the best specimens of wrought-iron work shown by the students of the Institution several are marked "not for competition" (why, we are not told); but not coming under this restriction is a lantern by Albert Higgins, age 19, which exhibits some very delicately-executed work.

Some other students of the same school exhibit panels of carved wood, many of them very good in execution. J. Davis, aged 20, a joiner, exhibits his skill in staircase work.

Passing now to exhibits not by students of the Polytechnic School, we may mention as meritorious the staircase models shown by A. J. Down (aged 20), E. C. Davis (age not stated), and J. Irving. Passing by some more specimens

of plumbing work of no special interest, we come to a screen containing drawings executed by the students of the People's Palace Art School, and to another screen containing mechanical working drawings executed by students of the Polytechnic Day-school; some of the last-named drawings are models of what mechanical working drawings should be, with dimensions, &c., clearly figured. Next is a screen containing a number of well-executed drawings giving details of building construction by Robert Sinclair, in which we noticed some points that appeared open to criticism; for instance, in the drawing showing a queen-post roof-truss, the projection of cornice shown in a large-scale section of the outer wall seems to be greater than would be safe in execution.

Messrs. Perry & Co., of Tredgar Works, Bow, the well-known builders, exhibit a carpenter's shop, occupied by E. P. Trent and P. N. Smith, two of their apprentices. Here the various processes of mortising, tenoning, scarfing, sawing, &c., performed by hand, as in pre-machinery days, are exhibited in the execution of actual work. The apprentices here, as at several of the other stands, are habited in Mediaeval costumes similar to those which were to be seen at the shops in "Old London" at the recent South Kensington exhibitions.

J. J. Thompson, aged 18, a pattern-maker, who has been four years at his trade, exhibits a well-made model of an iron roof suitable for a railway station; but this should not be exhibited with the carpentry exhibits, as it was when we saw it.

Bookbinding, printing, coopers' work, silversmiths' work, meteorological glass-blowers, surgical instrument makers, watch and clock makers, opticians, drawing-instrument makers, organ-builders, lead glaziers, electric-lighting apparatus makers, tinsmiths, brass-finishers, powderers, japanning, wire-working, fret-cutting, and potting (some of Messrs. Doulton's apprentices sending some vases of good outline), shoe-making, basket-making, carving, upholstery, and weaving are among the other trades exhibited.

Exclusively women's industries do not seem to be so largely represented as we had expected in an exhibition held in the East End of London; but of needlework and articles of clothing, executed by young girls apprenticed to milliners and dressmakers, there is a small but representative show.

Some of the pupils of the Jews' Hospital and Orphan Asylum, West Norwood, are exhibitors of simple articles of joinery made as the result of technical instruction received in the workshop of the Institution for four hours weekly. The exhibits are by boys of thirteen or fourteen years of age, who have only received technical instruction for the few hours named during periods of from four to twelve months. Though the articles exhibited are of a very ordinary kind, they certainly give good evidence of what can be accomplished with tools by boys in school workshops; and the knowledge of the use of tools is likely to be of no slight value to the boys when they leave school, whatever trade or calling they may choose to follow.

The Exhibition is to remain open until the 31st inst.

## THE INSTITUTION OF CIVIL ENGINEERS.

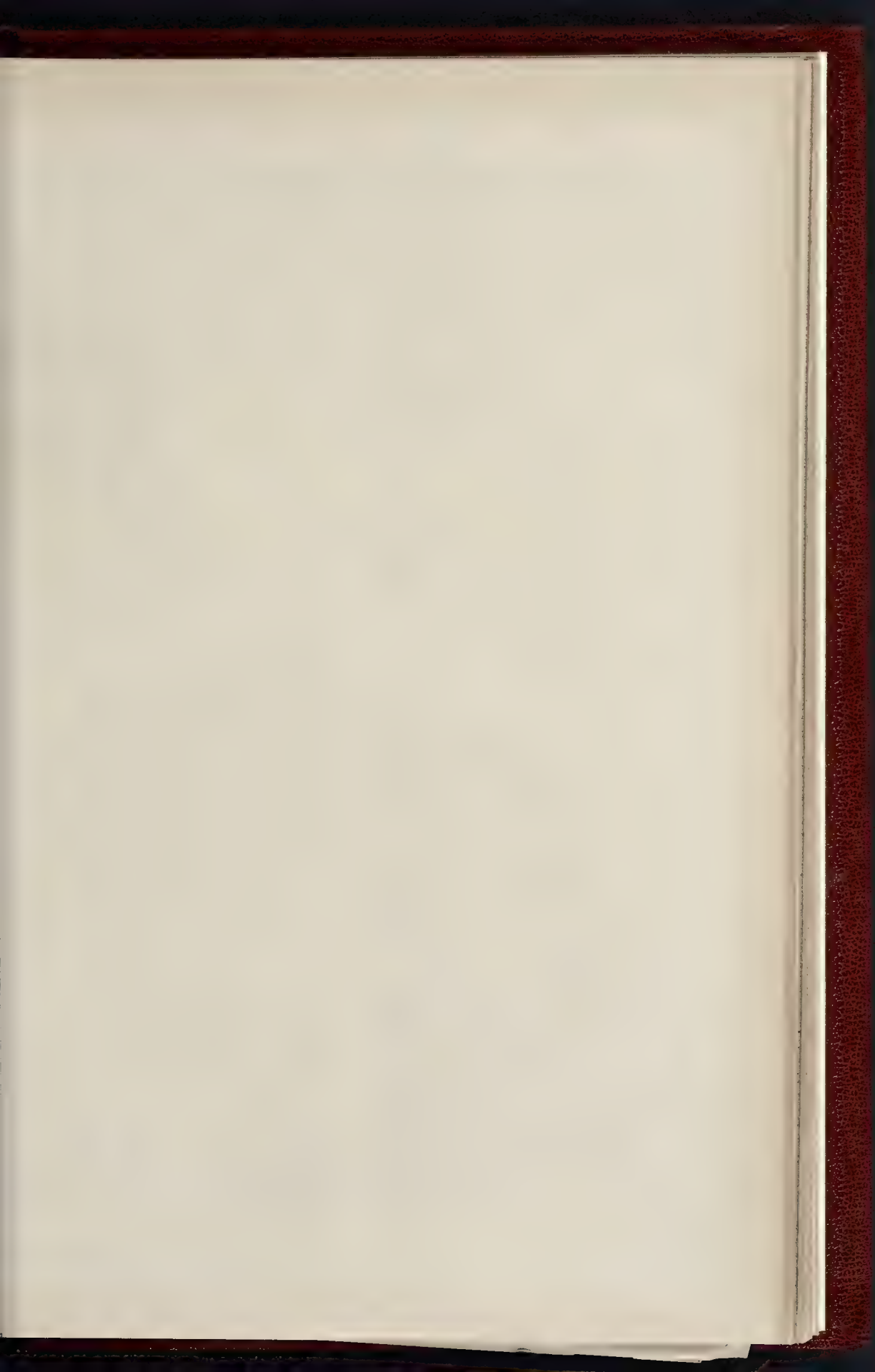
At the ordinary meeting on Tuesday, the 6th of December, the paper read was on "Electrical Tramways: the Beesbrook and Newry Tramway," by Edward Hopkinson, M.A., D.Sc., Assoc. M. Inst. C.E.

Although a number of electrical tramways had been constructed in the United Kingdom during the last few years, there had hitherto been no attempt at the regular haulage of minerals and goods, nor at the operation of cars larger than the ordinary tramway type. Probably in no case had the effective power of any single motor exceeded about 4-horse-power. The principal object of the present paper was to describe the construction and to discuss the working of the Beesbrook and Newry Electrical Tramway, which had been designed for the haulage of heavy goods as well as for passenger traffic. The length of the line was rather more than three miles, with an average gradient of 1 in 86, the maximum gradient being 1 in 50. According to the conditions of the contract, ten trains were to be run in each direction per day, providing for a daily traffic of 100 tons of

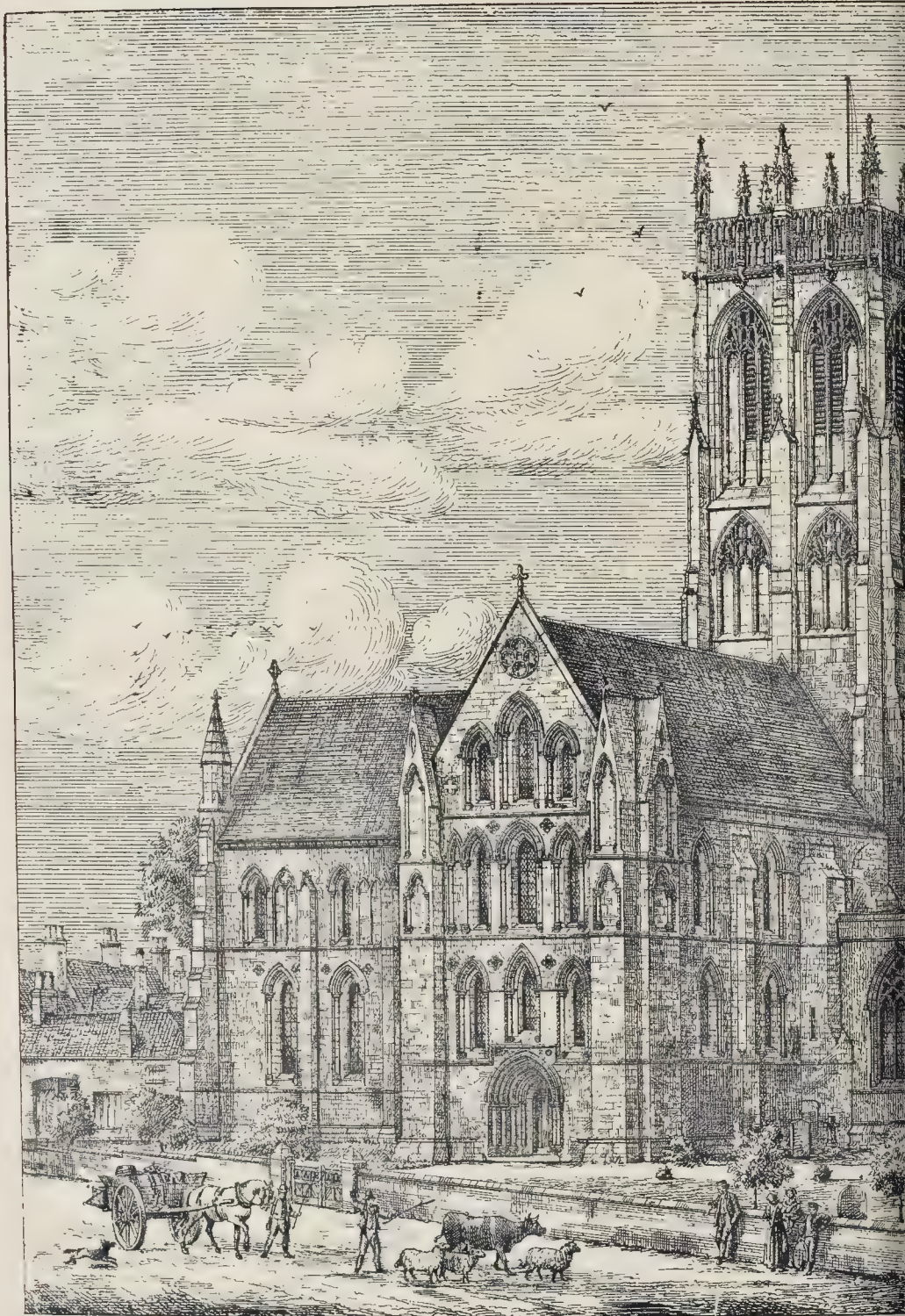
minerals and goods, and capable of dealing with 200 tons in any single day, in addition to the passenger traffic. The electrical locomotive was to be capable of drawing a gross load of 18 tons on the up-journey, in addition to the tare of the car itself and its full complement of passengers, at an average speed of six miles per hour, and a load of twelve tons at an average speed of nine miles an hour. Also, the cost of working, as ascertained by six months' trial, was not to exceed the cost of steam-traction on a similar line. The line was formally taken over by the company, as having fulfilled the conditions of the contract, in April, 1886, and had since been in regular daily operation. It was worked entirely by water-power, the generating station being adjacent to the line at a distance of about one mile from the Beesbrook Terminus. There were two generating dynamos of the Edison-Hopkinson type, driven by belting from the turbine-shaft, which was extended into the dynamo-shed for the purpose. The turbine could develop 62-horse-power, and each dynamo was intended for a normal output of 250 volts, 72 amperes, though they were capable of giving a much larger output. The current was conveyed to the locomotive-cars by a conductor of steel, rolled in the channel form, laid midway between the rails, and carried on wooden insulators nailed to alternate sleepers. The conductor was not secured, but was simply laid upon the insulators which fitted into the channel, and while allowing for longitudinal motion to compensate for changes of temperature, held it laterally. At one point the line crossed the country road obliquely, the crossing being 150 ft. in length. In this case the conductor on the ground level was not feasible, and an overhead conductor on Dr. John Hopkinson's system was substituted, by which the collector on the car consisted of a bar only, which passed under the supports of the overhead wire, and made a rubbing contact with its under surface. This system had been found to give very satisfactory results in practice.

The locomotive equipment of the line consisted of two passenger-cars, each provided with a motor. The body of the car was carried on two four-wheel bogies, the motor being fixed on the front bogie, so as to be entirely independent of the body of the car. The longer of the two locomotive-cars was 33 ft. in length, and was divided into three compartments, the front one covering the motor, and the two others forming first and second class compartments, together accommodating thirty-four passengers. The front bogie carrying the motor had an extended platform projecting beyond the body of the car, and communicating by a slide door with the dynamo compartment, thus giving the driver direct access to all parts of the driving machinery, which were at the same time entirely boxed off from the passenger compartments. The weight of the locomotive, including the dynamo, was 8½ tons.

Apart from the electrical working of the line, an important and novel feature was the plan by which the wagons used on the line could also be used on the ordinary public roads, so avoiding the necessity of trans-shipment, and enabling goods to be loaded at the wharfs and drawn to the line by horse-power and again delivered where required. The plan was originally suggested by Mr. Alfred Holt, M.Loc.C.E., of Liverpool, and was embodied in the Lancashire Plateways Scheme, for which a Bill was lodged in the autumn of 1882 and subsequently withdrawn. The idea had been worked out in a practical form with great success by Mr. Henry Barcroft, of Newry, one of the directors of the Tramway Company. The wheels of the wagons were constructed without flanges, with tires 2½ in. wide, which was sufficient for use on ordinary roads. Outside the tramway rails, which weighed 4½ lb. per yard, second rails were laid, weighing 23-75 lb. per yard, with the head ½ in. below the head of the larger rails. The flangeless wheels ran upon these lower rails, the ordinary rails forming the inside guard. The front part of the wagon was supported on a fore-carriage, which could either be pinned or allowed freedom of motion as in an ordinary road vehicle. There was a single central coupling arranged to engage in a jaw on the fore-carriage, so as to guide it when not pinned. Shafts were attached to the fore-carriage when the wagon was to be used on the ordinary roads. The wagons were of sufficient strength to carry a load of 2 tons, and their weight without the shafts was 23½ cwt. Experience had







CHURCH OF S. A.

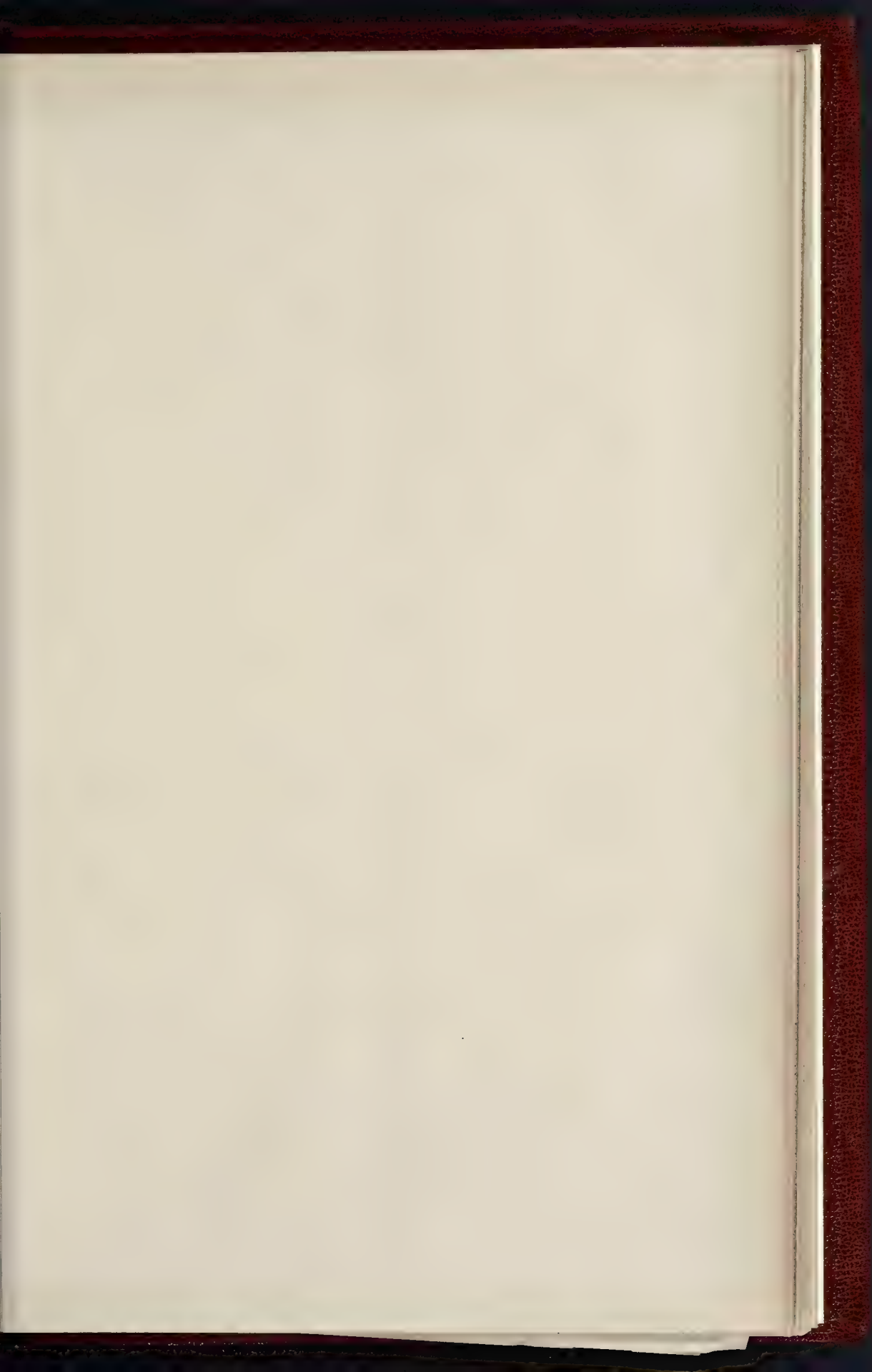




STINE, Hedon

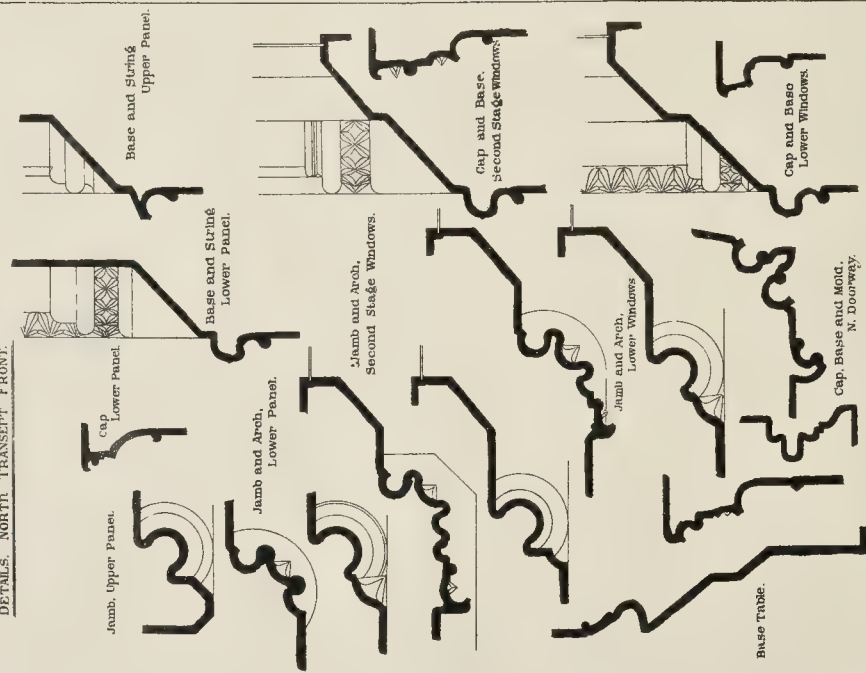




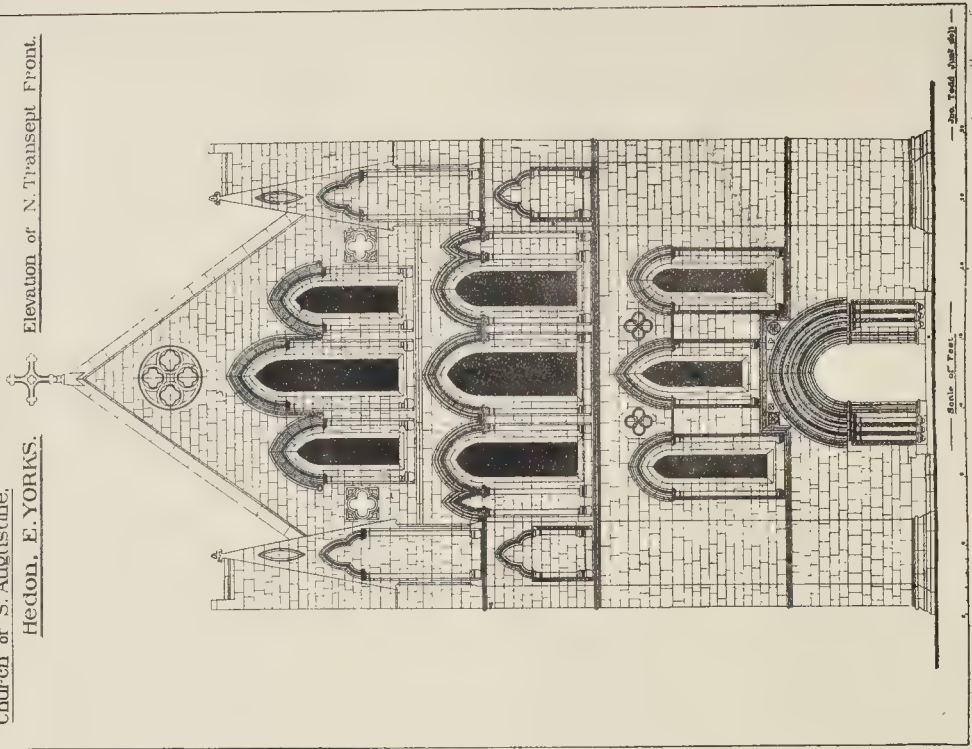


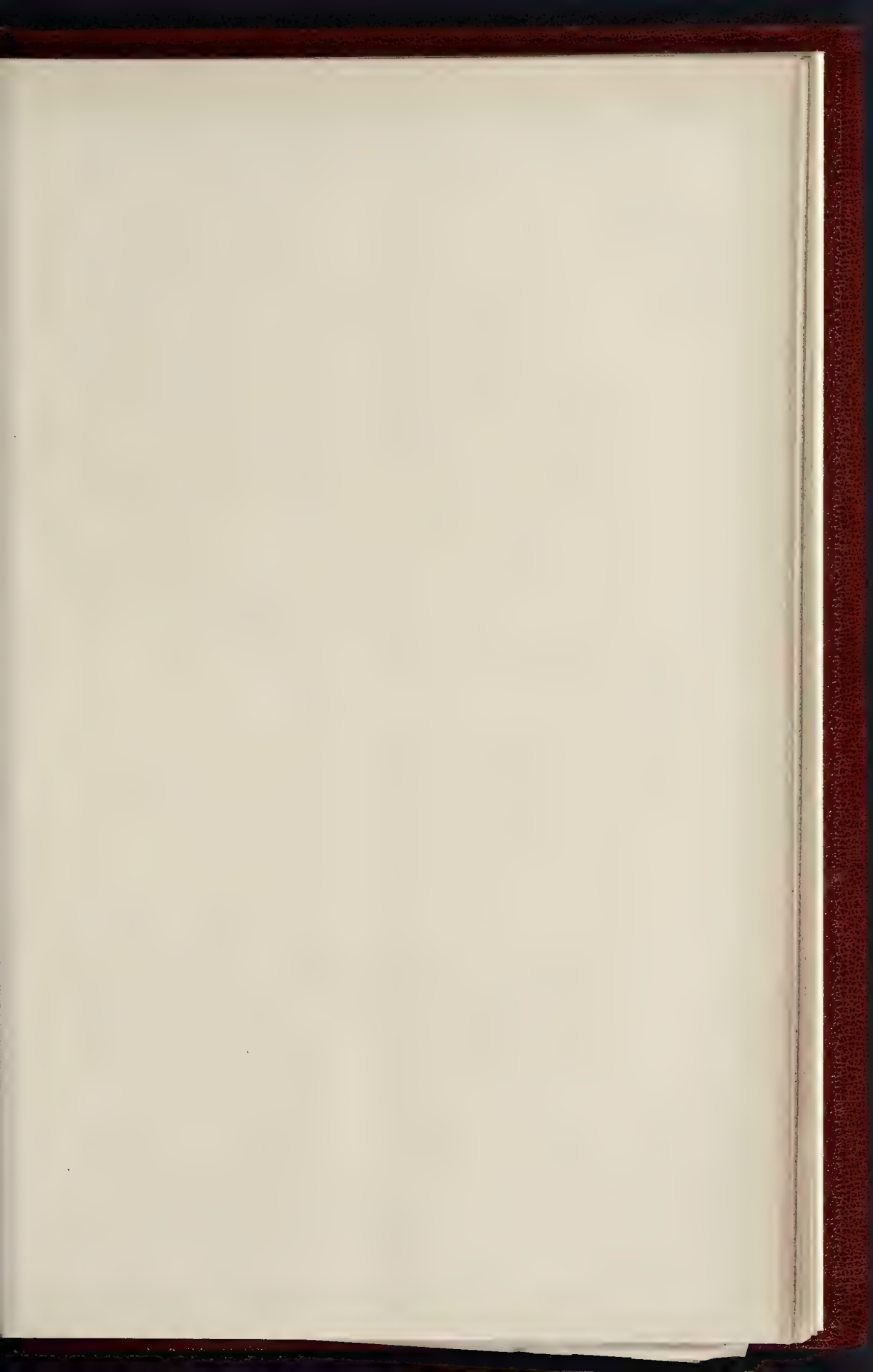


— CHURCH of S. AUGUSTINE, —  
— HEDON. —  
DETAILS, NORTH TRANSEPT FRONT.



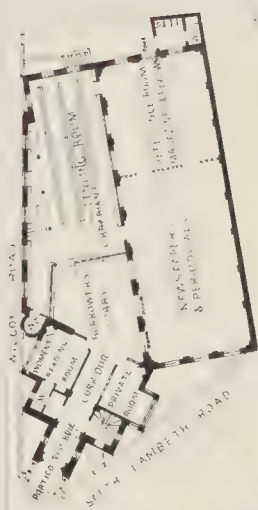
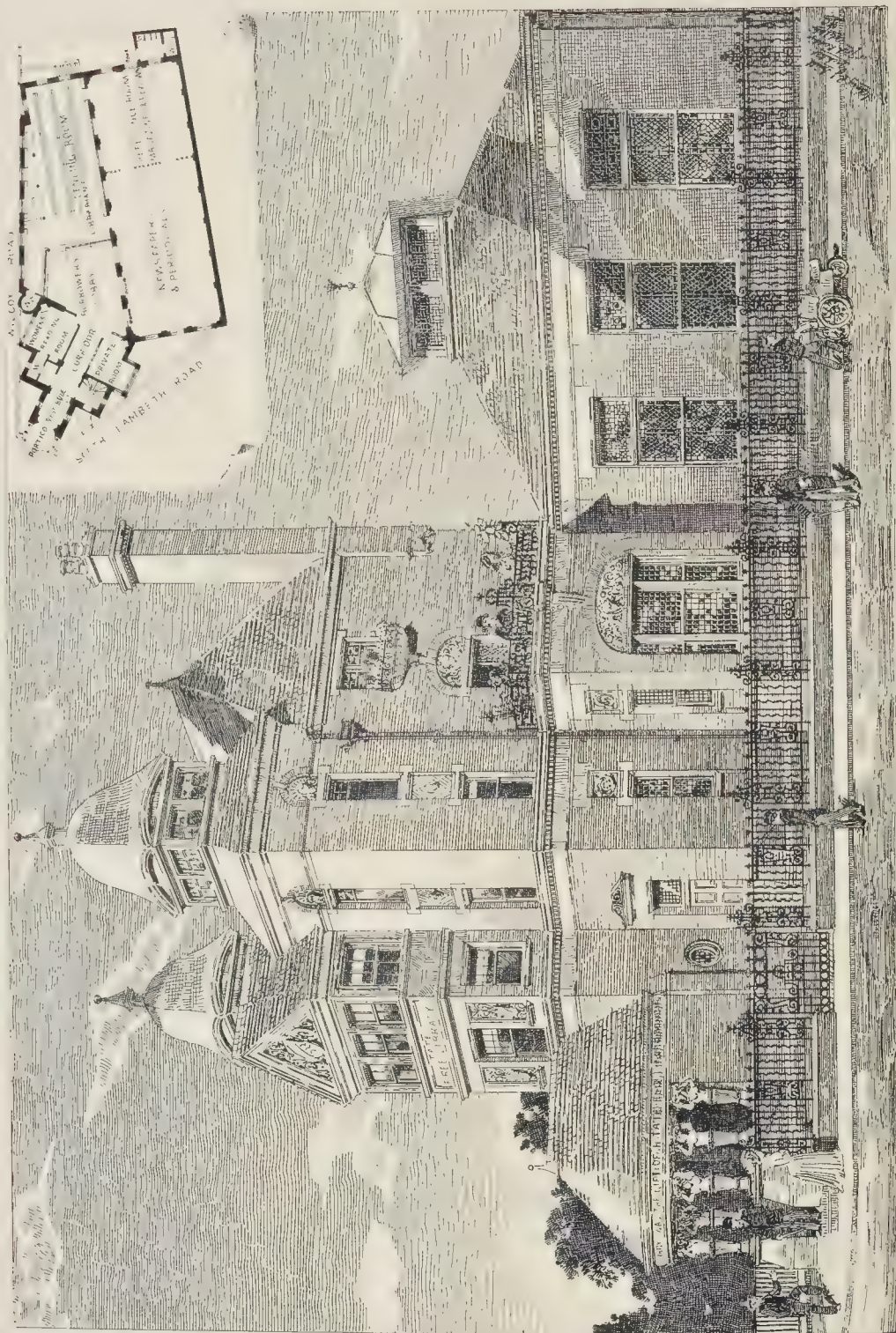
Church of S. Augustine,  
Hedon, E. YORKS.  
Elevation of N. Transept Front.





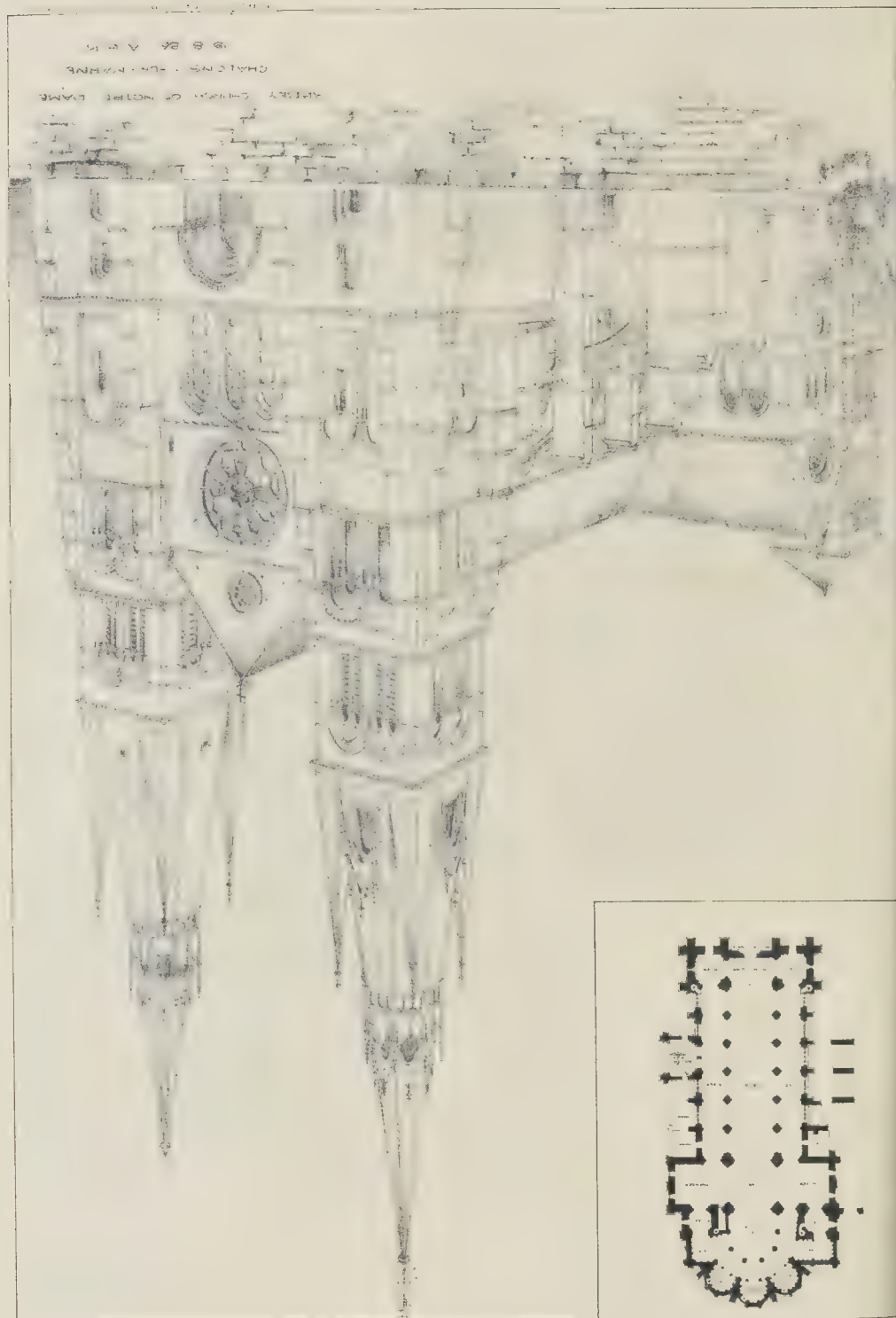


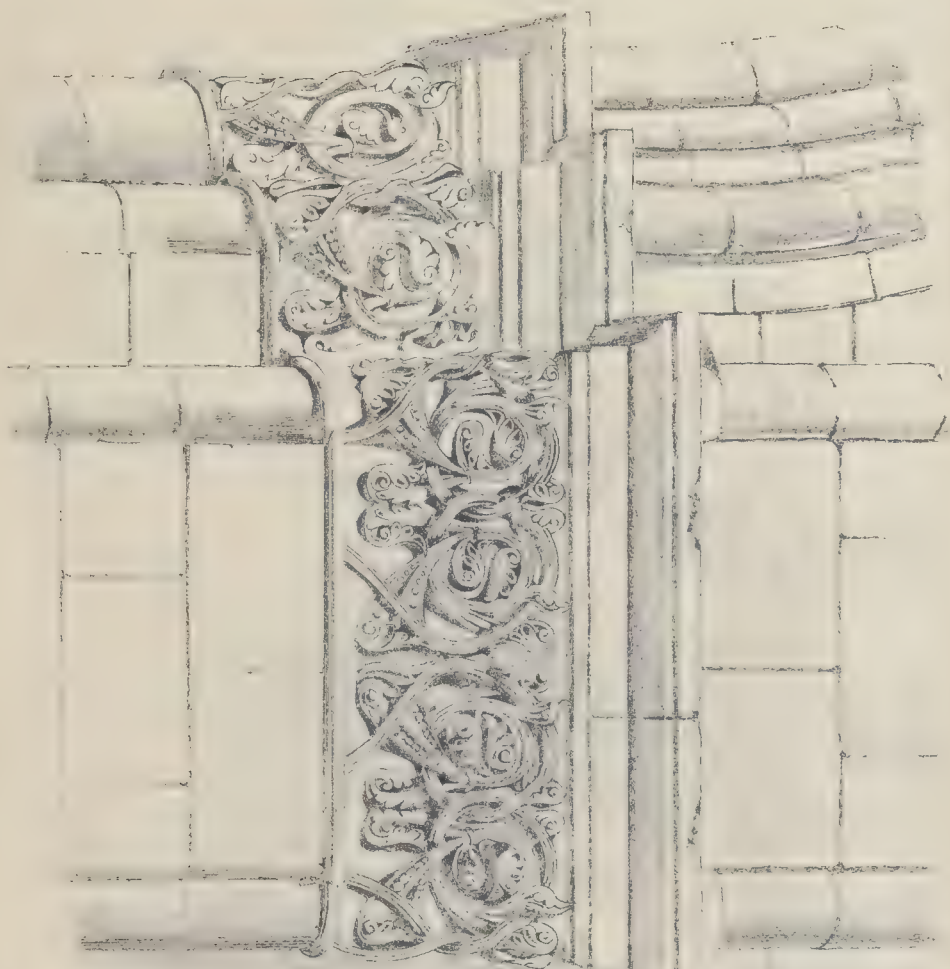
THE BUILDER, DECEMBER 17, 1887.











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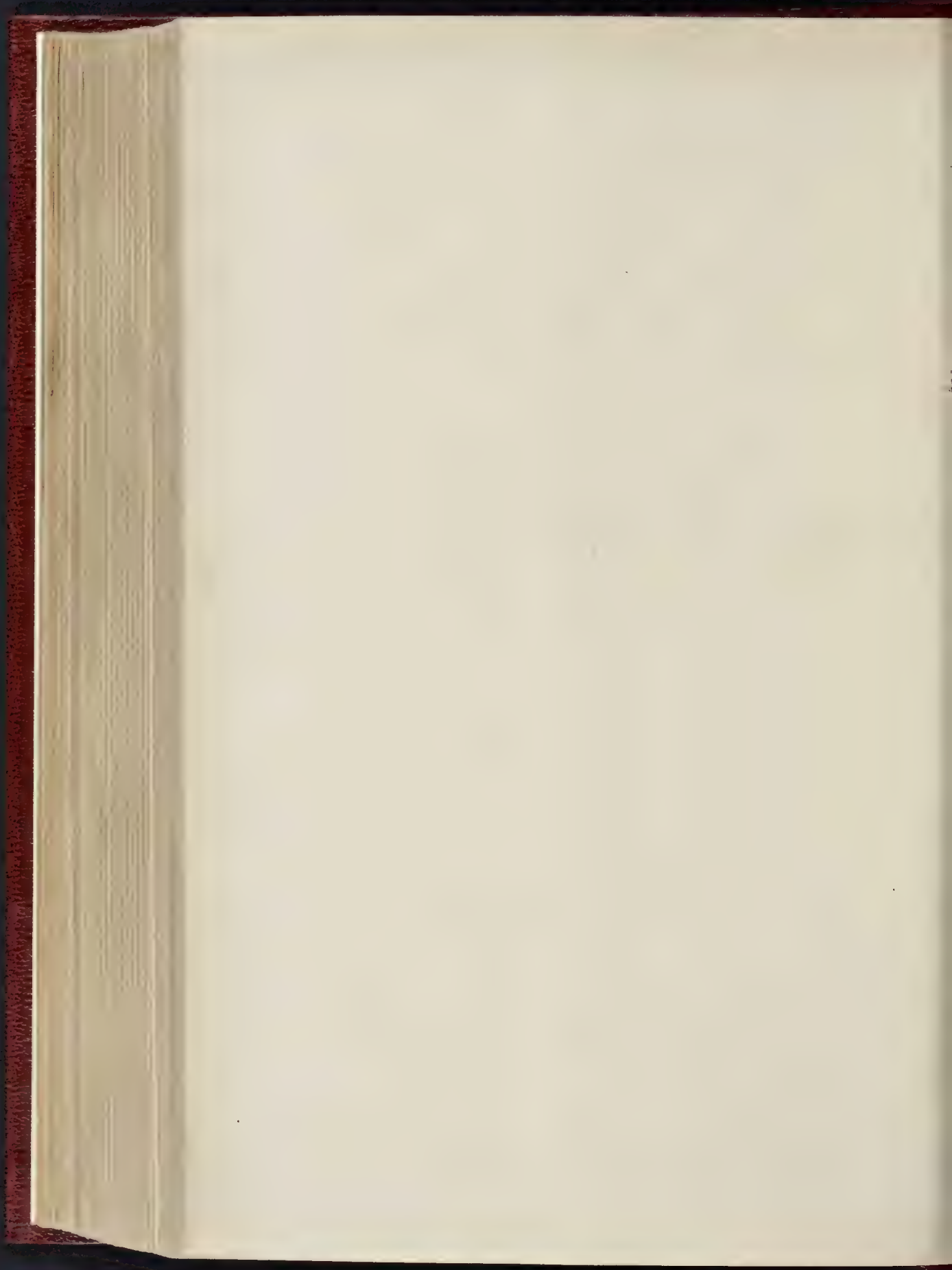
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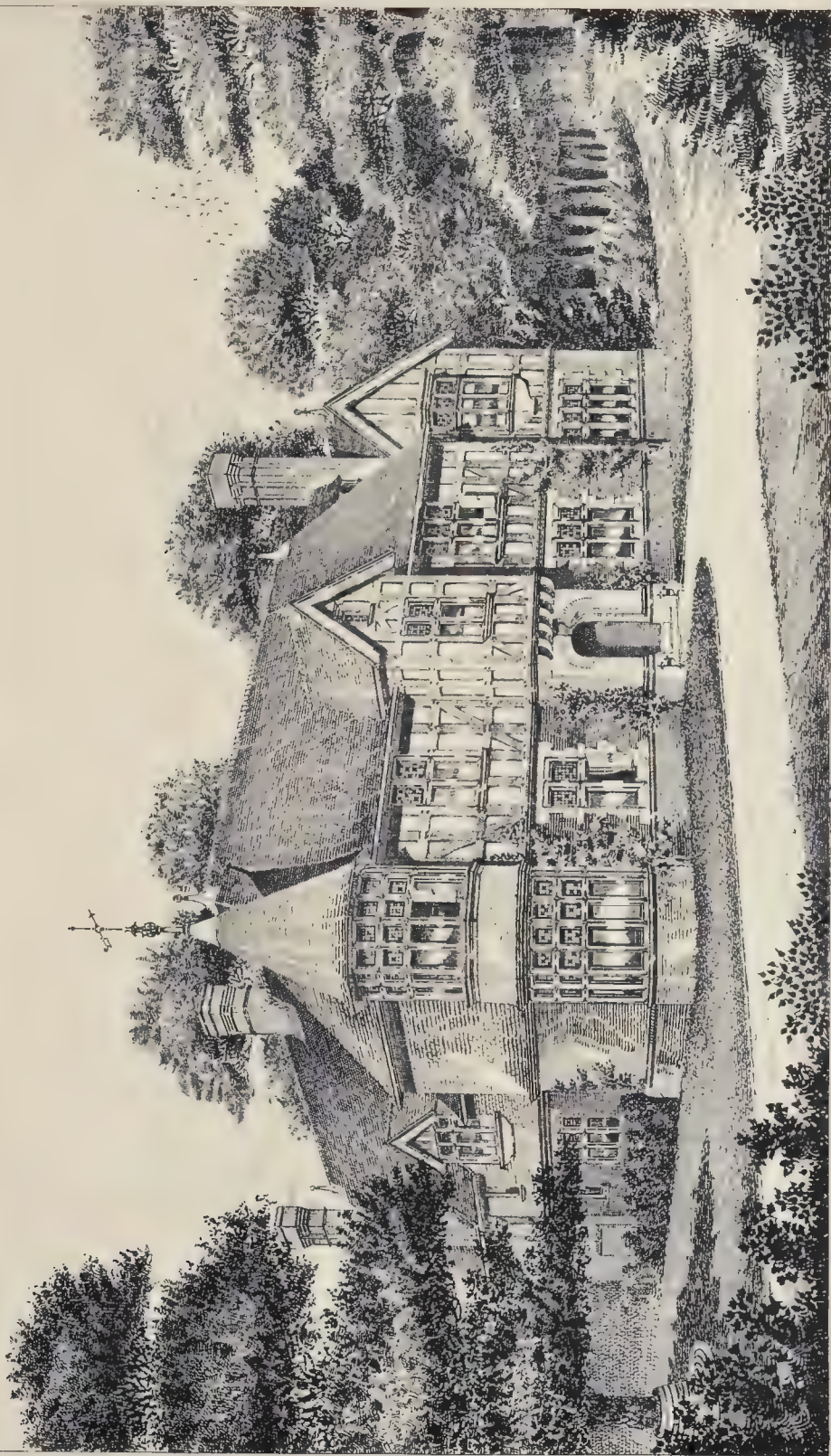
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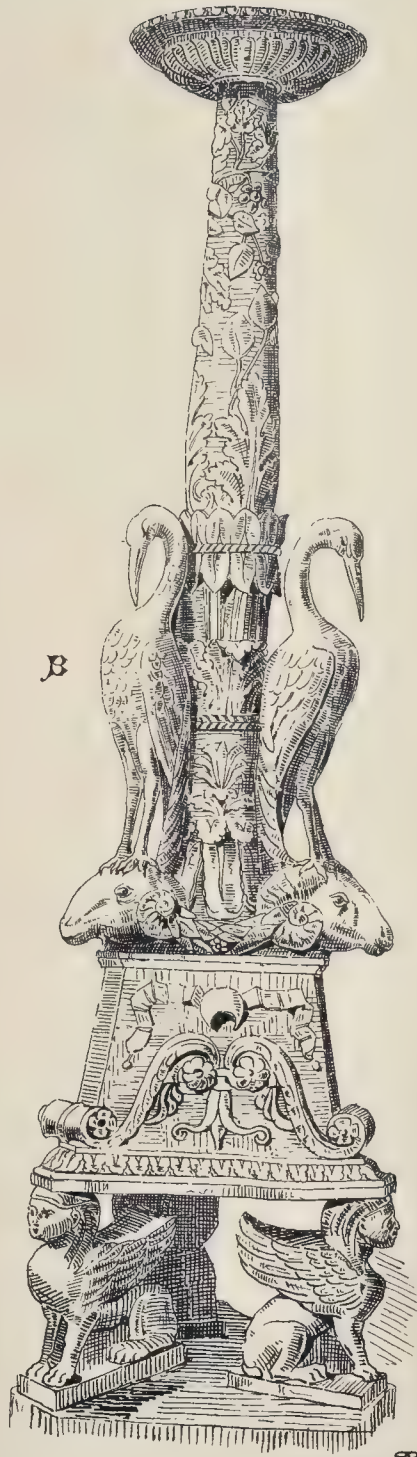




HOREHAMHURST, SUSSEX.—MR. H. P. MONCKTON, A.R.I.B.A., ARCHITECT.







CANDELABRA FROM ITALIAN MUSEUMS.—FROM SKETCHES BY MR. R. A. BRIGGS.









struction of machinery generally would be much advanced by its careful adoption. Though technical education has made such strides in the last few years, there is still much to be done. We have several first-rate engineering laboratories, but they are not open to the profession; the Institution of Mechanical Engineers have made inquiries into the strength of materials, of riveted joints, and other questions of interest; but, speaking generally, the carrying out of experiments is confined to manufacturers, contractors, and others, who have large means at their disposal. As a rule, the makers of experiments are quite willing to publish them; but, in my opinion, it should be possible for all men to experiment at a merely nominal expense in establishments provided at the public cost and under the guardianship of the scientific institutions of the country. The making of experiments is not a simple mechanical matter, to be done by any one; not only is the greatest care required in correcting and tabulating results, but a direction is also necessary. A man may have every facility to hand and give his life to the work, and yet produce little or nothing worth recording; while another man who has not these facilities might, if he had them, afford very valuable information to the world. Experiments, if made at the public expense, would, of course, be public property. Exhaustive information is required in ventilation, which is little understood, on the behavior of materials as affected by fatigue, on the flow of fluids, and many other subjects. All these questions are, no doubt, being investigated by individuals; but such investigation by single persons is very apt to be directed only to support some already preconceived idea, and experiments carried on by several experimentalists in a public laboratory would, in my opinion, afford a more satisfactory and reliable result in a shorter space of time.

A meeting was held a short time back at the rooms of the Society of Arts to discuss the advisability of the promotion of technical education, when amongst the speakers were Lord Hartington, Lord Rosebery, Sir Lyon Playfair, Mr. John Morley, Sir Bernhard Samuelson, Sir John Lubbock, Mr. Acland, Professor Stewart, and others, and the conclusion arrived at by all the speakers was, that if we are, not only to retain, but to extend, our hold on the commerce of the world, greater facilities must be given for technical education. It was stated at the meeting, and my own information on the subject fully bears out what was said, that although English workmen are, as a rule, fully as well educated for their several occupations as their fellows on the Continent, yet technical education there is progressing relatively more rapidly than it is here, and that wherever its standard is highest, there also is the rate of wages increased; and therefore if we wish to maintain and improve our commercial position, so also must we improve our own technical knowledge and that of our workmen, both for their sakes and our own. As regards commercial technical knowledge, the opinion expressed is not so favourable to this country as that already recorded; it is said that our manufacturers are not as ready to adapt themselves to the requirements of different countries as are those on the Continent; that they do not provide full information as to their manufactures in the language of the country where they wish to make sales; that their agents are frequently ignorant of the language of the country and the business habits of the natives; that they do not exert themselves to the same extent or live such steady lives as the agents of German houses, for instance. One consequence of this is that English houses have employed German agents abroad, who have worked well for their employers for a time, but who have, when they got firm hold of the business, transferred their services to their own countrymen resident in their own country. This remark is worthy of notice; for I understand that German firms doing business in England are subject to exactly the same treatment as their English rivals, and that they now find that they, as well as the English firms, cannot safely employ Germans as their agents; if they do, they are liable to find their business transferred to the Fatherland. With regard to the technical education of workmen, it is right and necessary that even greater facilities should be afforded for their information; but the best results will not be obtained until the trades unions recognise the fact that to bring men to one uniform level of wage, whether that level be high or

low, is not the way to benefit their constituents nor the country; nor does it conduce to obtaining or retaining good workmen. If there be a uniform rate of wages in any branch of any business, the tendency must be to produce stagnation; no man has any inducement to excel in his work; and if his personal character be such that he feels he must excel, whether he be paid for it or not, he naturally looks out for some other country where his abilities may have free scope, and we thus lose our best men and only keep those who are mediocre. If a man might look to rise to be foreman or manager through the excellence of his labour, this might be sufficient inducement to cause him to do his best; but a good handicraftsman is not necessarily, or even frequently, a good foreman or manager.

When the trades unions, or the men who compose these trades unions, are alive to the fact that to insist on one uniform level rate of wage is to destroy and enervate the energies of the men, to make the prime cost of manufacture higher, and therefore the rate which manufacturers can afford to pay for wages, lower,—that the only stimulus which it affords is to the manufacturer, to cause him to produce or obtain machinery which will do the work as well as the men will, and which can be managed by labourers at a further reduction in the wages rate,—when they see that it is to their interest, and is, in fact, necessary to their existence, that better work should be done at the same or a lower price, though possibly at a higher wages rate, in order to increase the output by improving our markets,—then we shall not only pick up any leeway we may have lost, but shall more than retain our commercial position amongst the nations, but not sooner.

The same remarks apply to a uniform number of hours worked: this practice must also produce stagnation, for the strong man gains nothing by his strength, just as with a uniform rate of wages the clever man gets nothing for the use of his brains, or the industrious man for his industry. Working fewer fixed hours must also reduce the wages rate, for no manufacturer can afford to pay the same wages when his machinery runs only for eight hours as he can when he can run it for ten hours or longer. Mechanics in America no doubt receive higher wages than are given in this country, but they work far longer hours for this wage than our workmen do, and in most places the cost of living is far greater than it is here.

#### ENGLISH BRICKMAKING PLANT IN GERMANY.

THE HENNIGSDORF BRICK AND TILE WORKS, NEAR BERLIN.

THE following is a translation from the *German Brick and Tile Gazette* of November 11th:—In the 25th number of our Journal for the year 1884 we gave a description and prospective sketch of the Hennigsdorf steam brickfield. For the benefit of those of our readers who have not seen that number, we give a short *résumé* of the article referred to. The Hennigsdorf brickfield lies about ten miles north-west of Berlin, on the right or western bank of the navigable river Harvel. The raw material which is used in these works is a hard marly clay, and cannot be used without being washed. The yearly make of the brickfield is at the present time about six millions of ordinary German bricks, of which two-thirds are hard-burnt and selected qualities for ordinary buildings, and one-third are facing and moulded bricks of a lemon yellow colour. The bricks are burned in two newly-built ring-kilns with eighteen chambers each, and in two German kilns; and the manager, Mr. A. Sandner, has been able to reduce the number of waters in the ring-kilns (which, with these light-coloured bricks is always very high unless great care has been exercised) to from  $1\frac{1}{2}$  to 2 per cent., and the breakages to from 0.7 per cent. to 1 per cent. The bricks are manufactured partly by hand and partly by machinery, the washed clay having been previously prepared in pug-mills, of which there are seven in one long row. The material which is fed into these pug-mills is taken from the slurry-backs, of which there are 120, each having a capacity of 300 cubic yards. Before the material is dry enough for use it must remain in the backs from six to eight weeks, as the water is removed entirely by the action of sun and air, though the sandy bottom materially assists in

the process. The clay, obtained from a distant clay-pit, has until now been washed on the brickfield by six ordinary wash-mills. The plant is so arranged that the four kine, with their coal sheds, lie nearest the Harvel, leaving ample room, however, for stacking the finished bricks on the water's edge. To the westward of the kilns or further from the Harvel are twenty-one drying-sheds, each capable of containing 30,000 bricks. These sheds are built parallel to each other with their ends towards the river, and in the centre of them stands a massive machine pressing house, the upper part of which also carries the shafting and pulleys for transmitting power from the engine to the pug-mills. North and south of this pressing house are respectively three and four pug-mills, which are spaced 66 yards apart, and are arranged parallel with the gable ends of the drying sheds. About 100 yards further westward are the engine and boiler houses, and to the north and south of these stand the wash-mills, three on each side, in a parallel line to the pug-mills, and about the same distance apart. Power is transmitted entirely by wire ropes from the engine to the wash-mills, and also to the pug-mills, through the press-house, as already described. The clay-pit, of colossal dimensions, whence the raw material is obtained, lies four miles to the north of the brickfield, and is connected with it by a narrow-gauge railway. The filled trucks were drawn by a small locomotive, built by Krauss & Co., of Munich, to the brickfield, where the material was stored near the wash-mills, for further use, as required. The great cost which this mode of transport involved, and which was chiefly due to the fact that the Government only allowed the line to be used in the winter months, and to the heavy repairs to the permanent way, caused the owners of the brickfield, at Mr. Sandner's suggestion, to remove the washing plant from the brickfield to the clay-pit, and to bring the washed material in a pipe line direct to the slurry backs at the brickfield. The new slurry plant in the clay-pit, including the pumps, has been supplied by Messrs. Taylor & Neate, of Rochester, England, who make a speciality of the erection of such machinery, and has now been successfully at work for three weeks. Accepting the kind invitation of Mr. Sandner our correspondent visited the brickfield and clay-pit on October 31st last, and the following description of the new machinery is compiled partly from personal observations and partly from information kindly supplied by Mr. Sandner. After a short inspection of the brickfield a special train, consisting of a small open omnibus drawn by the above-mentioned locomotive, took us to the clay-pit in thirty minutes. The slurry plant itself consists of a single wash-mill erected on the lowest point of the clay-pit, similar to that illustrated by us on p. 549 in 1886, only the Hennigsdorf mill has six horizontal arms and three harrows slung by chains, the tynes of which drag through and stir up the clay. The diameter of the wash-mill pit in which the harrows revolve is 20 ft., and its depth is 4 ft. 3 in. The material is shot into the mill from barrows, while water is added in a continuous stream, and so regulated that the slurry to be transported consists of one part clay and two parts water. This slurry passes through a fine grating, which keeps back the coarser portions, &c., and then runs into a large sand trap which lies a little lower than the wash-mill floor where it deposits the finer particles of sand, and then flows on to the suction pit of the pumps. The wash-mill normally makes twelve revolutions per minute. The slurry is then forced by the three-throw pumps through a cast-iron pipe line four miles 670 yards long. The pumps, which are of the plunger type, have a normal speed of twenty-one revolutions per minute, and a 15-in. stroke; a pressure gauge is fixed in connexion with the air vessels, which registers the pressure in the pipes. The pressure with slurry of the above-mentioned thickness (that is 1 part of clay to 2 parts of water) amounts to between 120 and 135 pounds per square inch, but a larger proportion of clay increases the pressure, and a less proportion of clay reduces it. A specific gravity tube is used to determine the proper consistency of the slurry and should register "12 B" when the correct thickness is arrived at. The motive power for the whole plant, that is for the slurry pump, water pump, and wash-mill is furnished by a semi-portable compound engine by R. Wolf, of Magdeburg, and is



transmitted by leather belts. At the present time the actual output, which can at any time be considerably increased, is 390 cubic yards of slurry, or 130 cubic yards of solid clay per day, or 39 cubic yards of slurry per hour, and the velocity in the pipe line is 30 in. per second. The pipe line, which is 5 in. diameter, has been laid so that the gradient changes from rise to fall every 550 yards throughout the whole distance. Rather more pressure is required for this arrangement, but it has the advantage that in case of breakage a small section only need be emptied, and for this latter purpose inspection pipes with two doors each have been fixed in strong brick pits every 550 yards. At the end of this pipe line are a series of distributing pipes with sliding sluices, so that the slurry can be sent to the north or south divisions of the slurry back as required. The new plant has now been working perfectly satisfactorily for three weeks, the few small difficulties incident to every new undertaking having all been overcome, and having been chiefly due to the bursting of defective pipes. The entire cost of the plant, including the pipe line, has been about 3,700*l*.

## COMPETITIONS.

**Baptist Church, Mossley-road, Birmingham.**—After a year's consideration, and with professional assistance, the committee of the above church have, we are informed, selected Mr. Ewen Harper, architect, of Birmingham, to carry out the work, at a cost of about 4,000*l*. The other competitors were Mr. J. A. Cossins, Messrs. Ingall & Son, Mr. Hughes, Mr. Sutcliffe, and Mr. Newton.

**Heating and Ventilation, Congleton Town-hall.**—In the competition for heating, ventilation, &c., of these buildings, the plans of Messrs. Sagden & Son, architects, Leek, have been awarded the first premium.

**Wesleyan Chapel, Blackpool.**—A new chapel is to be built for the Wesleyans at South Shore, Blackpool, and a number of architects were selected to submit designs for the same, the result being that the drawings prepared by Mr. J. H. Burton, of Ashton-under-Lyne, were adopted by the unanimous vote of the Trustees.

## "TOBOGGANING SLIDES" AND THE BUILDING ACT.

ELKINGTON V. SMER.

This was a case heard in the High Court of Justice, Queen's Bench Division, before Mr. Justice Wills and Mr. Justice Grantham, stated by Mr. Biron, the magistrates sitting at Lambeth Police Court, and raised the question whether a "tobogganing slide," erected in the grounds of the Crystal Palace, was a building within the effect of the Metropolitan Building Act, 1855, so as to make it necessary for notice of the erection of the structure to be given to the district surveyor under section 38 of that Act. The respondent was the builder of the slide, and the contention on his side was that the slide was not a "building" within the meaning of the Metropolitan Building Act, or, if it was, it was exempted from the operation of that Act by section 21 of the Crystal Palace Company's Act, 1881, which provides that "the main building, conservatories, and waterworks of the company, and the conveniences, and other works immediately connected therewith shall be exempted from the operation of part I of the Metropolitan Building Act, 1855." But the section adds, that "this exemption shall not extend to any dwelling-house or building except as aforesaid upon any part of the property of the Company." The tobogganing slide was erected by a company called the Tobogganing Company, under an agreement with the Crystal Palace Company, by which the former company received a bare licence to enter on the premises and erect the slide, the Palace Company receiving one-tenth of the net receipts. The slide and the structure connected with it were detached from the main building of the palace, and comprised besides the slide, 426 ft. in length, a pavilion at one end, 63 ft. long, part of which was occupied by an engine-room with brick walls and concrete foundations and roof, containing the engine used to work up the empty sleighs. The magistrates held that the structures were "buildings" within the meaning of the Metropolitan Building Act, but were also within the exemption of section 21 of the Crystal Palace Act. He accordingly dismissed the summons against the respondent for not giving the notice above-mentioned.

Mr. Horace Avery appeared for the appellant; and Mr. Murphy, Q.C., and Mr. Wilkey Wright for the respondent.

After some argument upon the terms of the Acts, The Court allowed the appeal, holding that the

structure was within the Metropolitan Building Act, and not within section 21 of the Crystal Palace Act. The case was accordingly remitted to the magistrate.—*Times*.

## THE PERSPECTOGRAPH.

SIR,—Mention being made of the above instrument, I would, under your permission, make a few remarks on the subject.

I have used an apparatus of this kind during the last four years, and made a considerable number of perspective outlines with it. I have it in daily use still, and shall be glad to explain its working to any one who takes an interest in this matter.

The Perspectograph produces a pencil outline, which, of course (in common with all outlines), "must be finished by an artist." A very clever perspective draughtsman may do the outline just as good, but not better, as the outline made by the instrument always is perfectly accurate, and no one can do it as quickly without sacrificing a great amount of accuracy.

Although the Perspectograph is neither so complicated as is generally thought, nor difficult to work, it has the disadvantages of being delicate, expensive, and requiring much floor-space, for which reasons it is not suitable for general office use.

C. W. ENGLISH.

## PROVINCIAL NEWS.

**Birmingham.**—We hear that extensive additions and improvements to the Queen's Hospital, Birmingham, are to be made, at a cost of 5,000*l*. to 6,000*l*., and that the committee have called in the assistance of Mr. Ewen Harper, architect, of Birmingham.

**Farnborough.**—The Farnborough Hydro-Therapeutic Establishment was formally opened a few days since. The baths, which are attached to the Queen Hotel, Farnborough, are designed for the treatment of chest diseases, rheumatism, gout, and kindred complaints, on the Pine system, now so much in vogue at Reichenhall, Ischl, Baden-Baden, Homburg, and other German spas. The building consists of special inhalation rooms, robing rooms, and baths, for the treatment of the various diseases for which Pine extracts are used. Attached to the establishment are complete Russian vapour and Turkish baths, fitted up with special douche and spray arrangements. The cooling room or lounge is divided into cubicles for the use of bathers who desire privacy. The steam-heating, water supply, and pumping arrangements, as well as the special fittings were entrusted to and carried out by Mr. John Smeaton, of Great Queen-street, London. Messrs. McWilliam & Sons, of Bournemouth, were the builders. The baths are formed of glazed brick throughout.

**Moreton-in-Marsh.**—On the 2nd inst., the Rt. Hon. Sir Michael Hicks-Beach formally opened a public hall in Moreton-in-Marsh as a memorial to the late Earl of Redesdale. It is the gift of Mr. Freeman Mitford, C.B., and is Tador in style. It is built of local stone, from the quarries at Bourton-on-the-Hill. The hall is 70 ft. by 25 ft., and is panelled with oak up to the height of about 4 ft. At the north end is a dais a few inches above the floor level, and at the other end the approach from a solid oak staircase is shut off by a carved oak screen, while above is a small gallery. The roof is supported by carved oak beams, and is roofed with Dean Forest slabs, and in the centre there is a clock-tower surmounted by a vane. The architects were Messrs. Ernest George & Peto, of London, the builders being Messrs. Peto Bros., also of London.

**St. Helens.**—The extensions of the St. Helens Corporation Gasworks are so far completed that on the 16th ult. gas was being made in the new retort-house. Prior to the commencement of these extensions, gas was made in a house containing seven arches, each arch having fourteen retorts capable of producing altogether 800,000 cubic feet of gas per day. From the retort-house the gas passes through a condenser to be cooled, then through a scrubber into the purifying-house, and through meters to the holders, from which it is distributed by mains throughout the town. The new works, so far as they are completed, include a retort-house 183 ft. long by 65 ft. wide, which will hold 212 through retorts, the generator furnaces for which have been erected from the designs of Mr. C. C. Carpenter, of Vauxhall, London. There are 424 mouthpieces. They are charged by West's patent machine. When in full operation it is estimated that 1,250,000 cubic feet of gas per day will be made, and the old retort-

house will be converted into a purifying-house, the present one being inadequate. Up to the present the cost has been about 15,000*l*., which is lower than the original estimate. The remainder of the works, which will cost about 8,000*l*., will not be completed until next year.

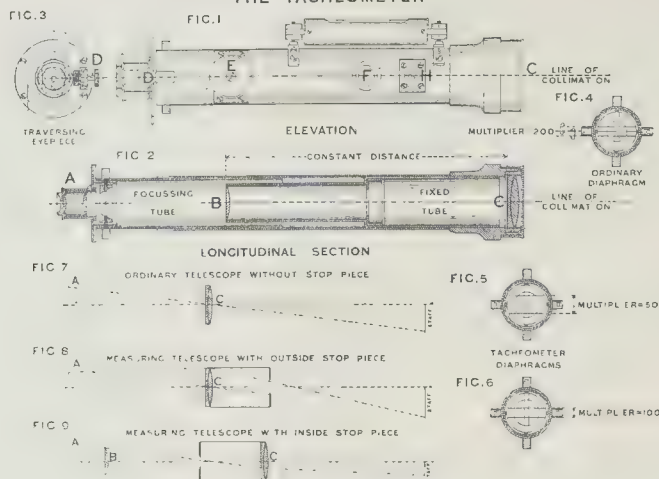
**West Bromwich.**—Last year plans were prepared for rebuilding the receiving wards of the Union workhouse, and for providing a new building for the accommodation of vagrants as well as for a new Board-room and Union and relief offices. These buildings have just been completed, at a cost of about 11,000*l*., and were formally opened on the 18th ult. The recent works included the removal of the old dilapidated receiving and vagrant wards, by which space has been obtained for the new receiving wards and for the opening out of a roadway along the front of the master's residence, from which easy access is obtained to the several departments of the workhouse. The receiving wards for men and women are placed on either side of the porter's lodge, adjoining the principal entrance from Hallam-street. Each contains receiving, day, and sleeping-rooms, bath-room, lavatory, and clothes store. The vagrant department is now entirely detached, and placed on the Lyndon side of the workhouse premises. It includes a residence for the labour master, he and his wife respectively having control of the male and female vagrants, who are accommodated in distinct buildings, on the combined separate cell and associated ward system. The new Board-room, union and relief offices occupy a position slightly to the south of the main entrance, and are a prominent feature in the Hallam-street front. They form a detached block of buildings. Gas is laid on throughout these buildings, the fittings being specially made by Messrs. Best & Lloyd, of Cambray Works, Handsworth. The furniture throughout has been manufactured by Messrs. Marris & Norton, from designs by and under the superintendence of the architects, Messrs. Henman & Timmins.

**Working Hours on the Railway.**—It is a matter of notoriety that some of the most pronounced examples of overwork have been, and continue to be, furnished by the experience of railway employees. That accidents occur from time to time which are more or less directly attributable to mismanagement in this particular is not remarkable. The wonder rather is that we do not often hear of them. We are not ignorant that on the railway the observance of a settled scale of working hours is at times a somewhat difficult matter. The length of journeys, unexpected delays from weather and the like, the utility of special aptitudes possessed by particular men and required at a given time, are some of the circumstances which may render the due allotment of time for purposes of work a matter for careful consideration. When, however, we find men employed on trains in the most responsible positions for more than thirty hours at a stretch we are surely justified in crediting their superiors with most culpable negligence. Necessity is said to have no law, and on this principle it seems to be assumed that the driver of a locomotive should be virtually a part of his machine. We fail to see the point, and the public, we are assured, will hardly allow that the personal risk which they incur by such a proceeding can be excused by the maintenance of a solid dividend for the benefit of shareholders. What is wanted is a larger staff of subordinate officials, who shall be available to relieve one another at reasonable intervals. An ordinary working period of twelve hours per day, is we take it, sufficiently long for this class of workmen, as well as for artisans engaged in other occupations.—*Lancet*.

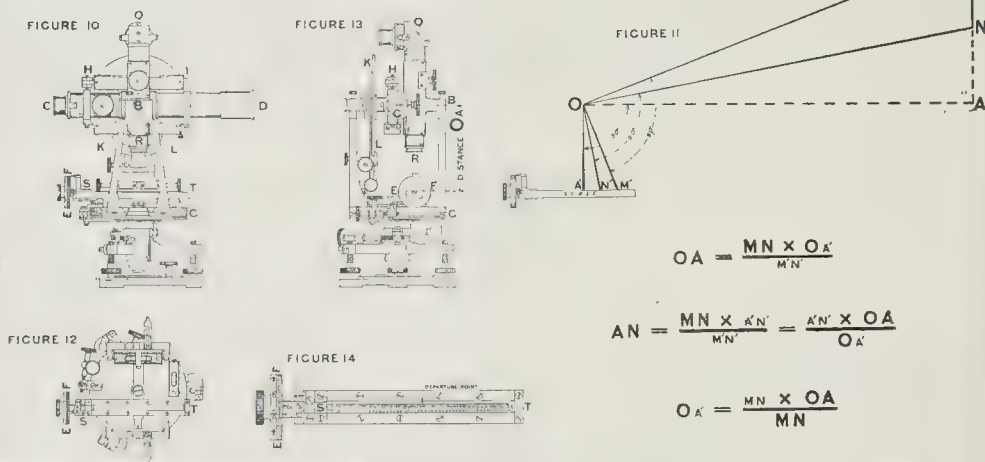
**The Electric Light in India.**—The electric light has been introduced into the East Indian Railway collieries, at Giridih, by the manager, Mr. Walter Sais, M.Inst.C.E., F.G.S., and marks the opening of a new era in Indian mining. The machine used is a 30-horsepower dynamo, worked by a 24-horsepower vertical engine, which is supplied by steam from the pit-winding engine boilers, so that the cost of working is practically nil. The lamps are of the usual incandescent form, with carbon filaments in hermetically sealed vacuum globes, which give a brilliant, steady light. The miners are said to be delighted with the innovation, and go to their work with greater confidence than before.—*Indian Engineer*.



## THE TACHEOMETER



## ECKHOLD'S OMNIMETER



## The Student's Column.

## LAND SURVEYING AND LEVELLING.

## XXV. DETERMINING DISTANCES.

**T**HE Tacheometer (figs. 1 to 6) and the Omnimeter (figs. 10 to 14) enable the surveyor to determine the horizontal distance of a point from either instrument by means of a vertical measurement read off a level-staff. In the tacheometer two parallel horizontal wires are placed in the diaphragm at a given distance from each other and at equal distances from the central horizontal cross wire which appears in a level. If, as in fig. 6, the distance apart of the two parallel wires from each other be one-hundredth of the focal length of the object-glass, every foot which is read upon the level staff will represent 100 ft. of horizontal distance when the instrument is set up and its telescope adjusted in a level position. In the same manner, 2 ft. read upon the staff would represent 200 ft. of distance. Figs. 1 and 2 show the special form of construction recommended for tacheometers, but it is manifest that the diaphragm arrangement could be easily added to any levelling instrument simply by inserting two extra cross-hairs at the correct distance apart. The diaphragms in figs. 5 and 6 omit the central horizontal cross-hair used for taking levels, as shown in fig. 4. In fig. 4 the

cross-hairs are fixed so as to record a horizontal distance of 200 times the height read upon the staff; fig. 5 is set to record 50 times, and fig. 6 100 times the distance. The eye-piece, as shown in fig. 3, is fitted with a slide and rack so as to be traversed up and down to the positions shown by the dotted lines, by turning the milled-headed screw, D. The diaphragm itself remains fixed. A tacheometer is almost invariably made with a three-screw tribach, because they are generally sold upon the Continent, where a three-screw base is preferred.

Fig. 7 shows an ordinary telescope without a stop-piece, in which the angle between the inclined line and the horizontal has not a constant value for different relative positions of the eye-piece and the object-glass. The introduction of the stop-piece in figs. 8 and 9 serves to maintain a constant value, but by thus choosing certain rays and rejecting others, the effective power of the object-glass becomes diminished: hence the object-glass is made large in order to balance this defect by allowing more light to enter the telescope. The measurement is calculated from the centre of the instrument in both the tacheometer and the omnimeter.

The Omnimeter (figs. 10 and 13) has a powerful microscope, Q R, permanently fixed at right angles to the telescope, C D. Both microscope and telescope move upon the same axis at right angles to one another in every position. Thus the line through the centre of O D is always perpendicular to the line through the centre of

Q R. Hence, in fig. 11, if M A represent the central portion of a level staff, the distance O A can be calculated from the readings given by the scale (fig. 14), coupled with the difference of the divisions read upon the staff (fig. 11), thus:—

$$OA = \frac{MN \times OA'}{M'N'}$$

$$AN = \frac{MN \times A'N'}{M'N'} = \frac{A'N' \times OA}{OA'}$$

$$OA' = \frac{M'N' \times OA}{MN}$$

The scale (fig. 14) is placed in fig. 10 at S T (see plan in fig. 12). This scale is usually 4 in. in length, divided into 100 equal parts, the principal divisions being pointed out by numerals engraved over or near them, so as to be readily read by the microscope Q R, and each of these 100 parts is halved by an un-numbered line, so that the whole scale is divided into 200 equal parts. By the addition of a micrometer screw, E F, the scale can be moved backwards and forwards exactly one of these 200 subdivisions. The circle E F of the micrometer screw is further divided into 100 equal parts by lines properly marked and numbered. Each of these 100 parts is divided into five equal parts by means of an attached vernier (see fig. 14). Hence the 4-in. scale S T is accurately and visibly divided into 100,000 equal parts.

## Books.

*Vestiges of Old Newcastle and Gateshead.* By W. H. KNOWLES and J. R. BOYLE. Newcastle: Andrew Reid. (In progress.) This is the first number of a publication intended to be completed in twenty parts, giving sketches and historical notes of buildings of old Newcastle and its neighbourhood. The vignette shows a charming bit of picturesque street building, "No. 37, The Side." This quaint name originated from the street being on the side of the hill on which the castle stands. Three full-page plates are given, including one of the well-known "Black Gate" leading into what was once the castle precinct. The notes of local history and tradition are interesting and well written.

*A Handbook for Steam Users, being Rules for Engine Drivers and Boiler Attendants.* By M. POWIS BALE, M.I.M.E., A.M. Inst. C.E. London: Longmans, Green, & Co. This book consists of a number of rules or hints on various subjects connected with steam machinery. The whole is arranged in four chapters, but each subject is treated separately and independently under a distinctive heading. There is a legitimate scope for such a book, and the author has executed his task in a satisfactory manner. Even practical men of long experience, who know all about the matter to begin with, may find in glancing through the pages of the book useful reminders on things not often put in practice, even if known. There would be far fewer machinery accidents if the teachings enforced by Mr. Powis Bale were more scrupulously observed.

*The Brassfounders' Manual.* By WALTER GRAHAM. London: Crosby Lockwood & Co. This is a seventh edition of a small manual which first saw the light over twenty-five years ago. In the year 1861, no doubt, it was a meritorious publication, but it has not been brought up to date in the last edition.

*Pneumatics, including Acoustics and the Phenomena of Wind Currents.* By CHARLES TOMLINSON, F.R.S., F.G.S. London: Crosby Lockwood & Co. 1887. This is a fourth edition of a small handbook that has been for some years before the public. It is of an elementary character, and possesses the merit of being expressed in clear and simple language, which renders it especially fit for the instruction of young persons. A large part of the book is naturally devoted to the barometer, the necessary points to be observed for obtaining a good and reliable instrument being set forth. The causes of winds and atmospheric phenomena are also discussed. Another section of the book treats of the propagation of sound, and its reference to musical intervals. An appendix deals in detail with such matters as the anemometer, air-pump gauge, the glycerine barometer, and the Springle pump. There are also some remarks on weather forecasts. There are several illustrations of the usual type, but no index.

*The Portable Engine's Construction and Management.* By WILLIAM DYSON WANSBOROUGH. London: Crosby Lockwood & Co. This is an interesting little book, treating of a subject of no little importance, with which the author has a practical acquaintance. It is intended for "owners and users of steam engines generally," and Mr. Wansborough states creditably to his text without wandering too far into those more abstruse problems that may be supposed to appeal more especially to manufacturers and designers. The historical data contained in the preface are interesting. The credit of originating the portable engine is accorded to Richard Trevithick; although the creation of the versatile Cornish miner bore little resemblance to the modern portable than the engines of the *Comet* to those of a propeller boat.

The book opens with an elementary description of the high-pressure steam-engine and the locomotive boiler. All we have to do with in this is the terms. For the expression "high-pressure" should be substituted "non-condensing." Now, when we have marine condensing engines working at an initial pressure of 140 lb. to the square inch, it is time the use of "high-pressure" should become obsolete as a distinctive defini-

tion of engines often working at lower pressures. Many non-technical readers, especially, no doubt, those of agricultural pursuits, will thank the author for his explanation of mechanical draughtmanship by aid of such familiar objects as a cup and saucer and tea-spoon. "Units of Connection" is the title of an excellent chapter full of information for the tyro. Under the head of "Construction" the engine and boiler are dealt with in two separate chapters also capable of instructing any person of ordinary intelligence on the main features of the subjects treated of.

Perhaps, however, the bucolic section, which should supply a large contingent of Mr. Wansborough's readers, may find " $d = \sqrt{\frac{8D}{C}}$ "

a little puzzling, but application to the nearest schoolmaster would, doubtless, put matters in a clearer light. But when we come to "the slide valve and its action," and find ourselves plunged into Zeuner's graphic theory, it is, perhaps, necessary to qualify what has been said above about the author sticking to his announced intention. We fear that here the average village schoolmaster will hardly be able to pull our agricultural friends through, but they can take refuge in a comforting alternative of skipping without, perhaps, losing much of practical importance; although, of course, we by no means wish to undervalue Zeuner's beautiful expositions when in their right place. A short chapter on the indicator diagram follows, and the book concludes with "Hints to Purchasers."

There are a great many excellent illustrations. In these a preference is shown for the designs emanating from a limited source; but they are, doubtless, none the less valuable on this score.

## RECENT PATENTS.

## ABSTRACTS OF SPECIFICATIONS.

176, Ventilating Apparatus. T. S. Wilson and H. T. Johnson.

According to this invention an improved apparatus is fixed in the chimney-breast for ventilating apartments. The combination with one or more gas or atmospheric burners with a chimney open at both ends, and enclosed in a cylindrical shell open at the bottom, and with its upper part bent backwards and opening into the fire, the whole being enclosed in a casing fitted in the chimney-breast, is claimed. Open louvres or perforations admit the air from the apartment, and an aperture at the back near the top allows the exit of air into the flue.

437, Chimney Cows. J. D. Thompson.

Double cones, with annular sheet metal ring cones, are the chief features of this invention, which is for the purpose of preventing blow down in shafts or chimneys.

743, Ventilating Apparatus. E. J. Dive.

This apparatus is composed either of two plates capable of sliding one upon the other, or of a panel provided with a certain number of holes which can be uncovered at will by means of a plate actuated by a cord, the said panel being placed at any point, to establish communication with the outer air. The holes which convey the air from the outside are placed in an oblique direction, so that the air rises to the ceiling and becomes slightly heated before spreading in the apartment.

6,307, Improved Water Tap. E. Zahn.

The outlet is either in the shape of a V or half-ball, and the spindle of the valve is placed directly over it. The valve itself is of the same shape, and the valve spindle and handle are attached to each other, and move in a horizontal position. The upper part of the spindle passes through a stuffing-box. The means employed to open the tap are wheels or rollers attached to the valve, which, by a turn of the handle, will carry the valve out of its resting-place, the wheels rolling up in a groove in the outer case.

10,636, Draught Regulators. T. Baker.

The draught regulators are made so as not only to come down from the top of the fireplace as an ordinary blower, but two side fan-like pieces are fitted which, when drawn forward or downward, induce so great a draught that even inferior coals may be burnt with a bright glow. The appliance thus fitted also answers as a fireguard, and a convenient and simple covering to the fireplace when it is not in use during the summer months.

12,473, Wood Block Flooring. A. Harrison.

A groove is cut on all four sides, making the lower portion of the block narrower than the upper. As the means of bonding the blocks together, a metal tongue, such as may be made out of ordinary hoop-iron, for instance, is inserted.

## NEW APPLICATIONS FOR PATENTS.

Dec. 2.—16,577, J. Tourtel, Automatically Closing Doors.—16,573, S. Bennett, Hoists and

Lifts.—16,601, O. André, Glazed Roofs.—16,610, R. Adams, Opening and Closing Swing Windows, Ventilators, &c., and fastening same at any desired angle.—16,619, S. Wilding, Lift or Elevator for Staircases.—16,621, J. Larnman, Moulding, Pressing, and Drying Tiles having inlaid patterns. Dec. 3.—16,677, E. Numan, Metal Laths for Building Purposes.

Dec. 5.—16,697, J. Davies, Fastening Door-handles, &c., to Spindles.

Dec. 6.—16,746, W. Watson and J. Judge, Machine for Dressing and Finishing Bricks, Flooring Tiles, &c.—16,769, R. Melhuish, Joiner's Parallel Vice.—16,772, J. Macdonald, Electric Bells.—16,796, H. Lake, Preventing the Slamming of Doors.—16,804, A. Boulton, Flushing Cisterns.

Dec. 7.—16,814, G. Parkinson, Syphon-flushing Tanks or Cisterns.—16,819, T. Pense, Curvilinear Door or Gate Hinge.—16,822, J. Smith and H. Geaves, Chimney Cows.—16,832, B. Turner, Hydraulic Lifts.—16,839, C. Dugate and E. Clark, Window, Door, and similar Arches, and Ornaments for Building Purposes.—16,843, J. Osgerby, Ventilator and Smoke Currier.—16,853, J. Smith, Ventilating Sowers, Drains, &c.

Dec. 8.—16,877, H. Maxim, Intermittent Water Discharge for Washing out Drains, Water-closets, &c.—16,916, G. Smith, Disinfecting Water-closets.—16,927, T. Ford, Hydraulic Lifts.—16,930, W. Thompson, Floors, Roofs, Ceilings, Partitions, &c.—16,931, J. Gowlard, Chimney-tops or Cows.

## PROVISIONAL SPECIFICATIONS ACCEPTED.

13,239, J. Smith, Connecting Pipes.—14,639, H. Alexander, Ventilator for Shafts, Pipes, Roofs, &c.—14,646, A. Crossley, Refractory Bricks, &c.—14,776, S. Timings and S. Hill, Spring Catches or Fasteners for Doors, Windows, &c.—15,173, J. Bean and W. Gaines, Closing Doors and Preventing the Slamming of same.—15,197, D. Alport, Lessening the Slamming of Doors, &c.—15,405, W. Yates, Ventilating Fans.—15,438, J. Boulter, Automatic Indicator for Water-closets, &c.—15,666, G. Layton, Manufacture of Cement.—16,092, J. Hewitt, Glaziers' Wheel Glass Cutters.—15,578, H. Willott, Window Sash Fasteners.—15,527, M. Eade and A. Buchanan, Iron and Steel Flooring for Bridges.—15,355 and 15,356, A. Patrick, Brickmaking Machinery.—15,467, G. Bulmer, Ventilating Rooms.—15,545, J. Lawrence, Bellows Regulators for Water-closets.—15,596, J. MacKnight, Artificial Pavement.—15,769, R. Bucknall, Folding Roof Trusses and Piers.—15,814, J. Carr, Paperhangers and Painters' Combined Paste and Size.—15,926, O. Bowen, Portland Cement.—15,931, J. Eardson, Double Flush Water-waste-preventing Valve.—16,119, G. Magalhães, Water-closets.—16,147, H. Munslow, Nails.

## COMPLETE SPECIFICATIONS ACCEPTED.

## Open to Opposition for Two Months.

14,142, H. Freese, Wood Pavements.—16,896, J. Fagan, Flushing Cisterns, and Ball-cocks for same.—156, F. Wade, Utilising Wood for Paving, &c.—2,590, E. Poole, Roofing Tiles.—2,657, R. Grocott, Fastening Knobs to Spindles.—14,663, P. Mouw, Guides for Band-saw Blades.—17,073, P. Justice, Imparting Humidity to the Air of, and Ventilating Buildings.—16,171, S. Hazeland, Wood-planing Machinery.—1,927, R. Scott, Decorating Detachable Wall and Ceiling Surfaces.—2,148, W. Bruce, Covering of Walls, &c.—3,889, F. Abbey, Construction of Main Drains, Conduits, or Sewer Pipes.—4,255, M. Syer, Syphon Water Waste Preventer.—4,544, J. Williams, Metallic Window Sashes and Frames.—8,786, J. Watson, Graining Wood.—8,914, J. Danly, Metallic Buildings.—15,146, G. Denys, Unfastening the Doors of Theatres, &c.—15,211, A. Boulton, Wire Lathing.

## RECENT SALES OF PROPERTY.

## ESTATE EXCHANGE REPORT.

## DECEMBER 5.

By VENTMOT, BULL, & COOPER.	
Hammersmith—19, The Broadway, freehold .....	£4,800
Kensington 28, 29, and 30, Never-square, 92 years, ground-rent 75s. ....	5,180
31, 32, and 33, Never-square, 82 years, ground-rent 76s. ....	4,715
West Kensington—2, Auriol-road, 82 years, ground-rent 18s. ....	905
4, 6, and 8, Auriol-road, 82 years, ground-rent 45s. ....	2,565
Chelsea—19, Cheyne-gardens, 76 years, ground-rent 11s. ....	1,010
Kilburn—145, High-street, 88 years, ground-rent 25s. ....	1,000
By MURKELL & SCORRELL.	
Kingsland—47, Ardleigh-road, 36 years, ground-rent 5s. ....	300
Islington—56, Prebend-street, 49 years, ground-rent 5l. 6s. ....	310
Holloway—An Improved ground-rent of 6l. term 74 years .....	91
By WEATHERALL & GIBBY.	
Somers Town—14, 16, 18, and 20, Gee-street, 32 years, ground-rent 44s. ....	890

## DECEMBER 6.

By W. W. JARVIS.	
Baywater—77, Linden-gardens, freehold .....	1,940
West Hampstead—6, Mill-lane, freehold .....	780
22 and 24, Ravenshaw-street, 97 years, ground-rent 11l. ....	370
By ARBIS, RUTHER, & WIGNERY.	
Horton—30 and 30a, Huntingdon-street, 72 years, ground-rent 8l. 6s. ....	700



By H. RICHARDS & Co. Southgate—14 to 20, 25 to 37, 45, 55 to 67 and 80, Traverse-road, 80 years, ground-rent 137l. 4s. ...	£630
By HOBSON, RICHARDS, & Co. Bethnal-green—Ground-rent of 16l. a year, rever- sion in 73 years ...	355
By A. ROBINSON Camberwell—55 and 61, Church-street, 80 years, ground-rent 55l. ...	1,085
By R. SMITH & Co. Huggin-lane, K.C.—3, Paul's-court, freshhold ...	1,000
By FRICKETT, VENABLE, & Co. Stratford—90, Windmill-lane, 52 years, ground- rent 2l. 10s. ...	190
Hampstead-lane—Stabling and outbuildings, 71 years, ground-rent 10l. ...	400
By C. C. & T. MOORE Row—147 and 149, Malmesbury-road, 59 years, ground-rent 7l. 4s. ...	885
Narrow-road—21, Church-place, 93 years, ground- rent 4l. ...	500
11, Welling-place, and premises in Kent's-place, 60 years, ground-rent 15l. ...	1,020
By GERRY & SON. Fleet-street—The Green Dragon public-house, free- hold area 1,800 ft. ...	17,750
By C. & H. WHITE. Rotherhithe—66 to 68, Adam-street, 50 years, ground-rent 32l. ...	855
By H. BEAUMONT. Kingsland—19, 21, and 23, Bentley-road, 30 years, ground-rent 10l. ...	255
Bethnal-green—66, Matilda-street, 19 years, ground- rent 2l. ...	90

## MEETINGS.

SATURDAY, DECEMBER 17.

Crystal Palace School of Engineering.—Award of Certi-  
ficates. 1 p.m.

MONDAY, DECEMBER 19.

Royal Institute of British Architects.—Papers on  
"The Recent Development of the City of Vienna," by  
Mr. Frederic R. Farrow (Holder of the Godwin Bursary),  
and Mr. Thomas Blashill. 8 p.m.

Society of Arts.—Mr. H. H. Statham on "The Ele-  
ments of Architectural Design." IV. 8 p.m.

Surveyors' Institution.—Adjourned discussion on  
"Alloiments." 8 p.m.

Inventors' Institute.—Various papers on "Inventions  
Suitable for the Household." 8 p.m.

TUESDAY, DECEMBER 20.

Institution of Civil Engineers.—(1) Further Discussion  
on Dr. Hopkinson's paper on "Electrical Tramways,"  
(2, time permitting) Paper by the late Hamilton  
Goodall, Assoc. M. Inst. C.E., on "The Use and Testing of  
Open-hearth Steel for Boiler-making." 8 p.m.

WEDNESDAY, DECEMBER 21.

Civil and Mechanical Engineers' Society.—Mr.  
A. T. Walmisley, M.I.C.E., on "The Roof of the National  
Agricultural Hall, Kensington." 7 p.m.

Royal Meteorological Society.—Four papers. 7 p.m.

Builders' Foremen and Clerks of Works' Institution.—  
Ordinary meeting. 8.30 p.m.

Liverpool Engineering Society.—Associated Soiree.

THURSDAY, DECEMBER 22.

Edinburgh Architectural Association.—Mr. P. Geddes on  
"Architecture and Decoration in their Social and  
Economic Aspects." 8 p.m.

## Miscellaneous.

**St. Pancras.**—The foundation-stone of the new church for the district of Holy Cross, St. Pancras, was laid on the 6th inst. by the Right Hon. G. J. Goschen, on the site in Cromer-street, Gray's Inn-road. The church, which will seat 500 persons, is built in memory of Commodore Goodenough, who was killed on the island of Santa Cruz, and will have a nave, aisles, and chancel, with two small transepts and morning chapel. It will be entered from the west by two porches leading into a narthex forming the baptistry, with four nave arches on each side on Pennant stone columns supporting a lofty clerestory. At the east end will be five lancet windows under deeply-moulded arches, and below, a reredos of alabaster. Under the church will be a large room for parochial purposes and a library. The cost of the building when complete will be 7,500l., but the church proper will be finished first, leaving the lower portions until funds can be obtained. The architect is Mr. Joseph Peacock, the builders being Messrs. Kilby & Gayford. It will be of brick, with Bath stone, and the roofs covered with tiles.

**Dobcross.**—The east window in Dobcross Church, near Oldham, is now filled with a painted window. The subjects represented are the Crucifixion and its antitype, "Moses and the Brazen Serpent"; with figures of St. Mary, B.V., and Our Lord as Prophet, Priest, and King, &c., in the side lights. The window is Classic in style, and the ornament has been kept in sympathy with the architecture of the church. The whole of the work was designed and executed in the studios of Messrs. Heaton, Butler, & Bayne, of London.

**Society of Engineers.**—The thirty-third annual general meeting of the Society of Engineers was held on the 12th of December, at the rooms of the Society, 9, Victoria-chambers, S.W. The chair was occupied by Professor Henry Robinson, President. The following gentlemen were duly elected, by ballot, as the Council and officers for the ensuing year, viz.:—As President, Mr. Arthur T. Walmisley; as Vice-presidents, Mr. Jonathan R. Baillie, Professor Henry Adams, and Mr. Robert Harris; as ordinary Members of Council, Messrs. R. W. P. Birch, W. N. Colam, W. Schönheyder, W. A. Valon, C. Anderson, J. H. Cunningham, J. W. Restler, and J. W. Wilson, jun., the four latter gentlemen being new Members of Council; as Honorary Secretary and Treasurer, Mr. Alfred Williams; and as Auditor, Mr. Alfred Lass. The proceedings were terminated by a general vote of thanks to the Council and officers for 1887, which was duly acknowledged by the Chairman.—The annual dinner of the Society took place on Wednesday evening at the Guildhall Tavern. Professor Henry Robinson, C.E., the retiring President, occupied the chair, and among those present were Mr. Aird, M.P., Mr. A. Manning, C.E., Mr. W. Airy, Mr. A. T. Walmisley, C.E., President-elect, Messrs. Phillips, Baillie, Birch, R. Harris, C. Horsley, Alfred Williams, hon. secretary and treasurer, and Mr. C. J. Light, secretary. The President, in proposing "Success to the Society of Engineers," said the Society never was in a more prosperous condition nor its work more appreciated than now. The published reports of their Transactions were sought for over the length and breadth of the world. Taking the whole of the year broadly, it showed a successful and altogether satisfactory state of affairs. Considering that it was part of their system to afford to the younger professional men opportunities for educating themselves and gaining experience, he was glad to be able to say that he believed the long period of depression, and probably of disappointment to them, was coming to an end. He believed that for all young engineers who properly qualified themselves and showed an aptness for their profession there was a good future open. Mr. Alfred Williams, "the father of the society," responded. Mr. Perry F. Nurgey proposed the next toast, that of the President, and the President, in the course of his reply, proposed "The President-elect," to which Mr. Walmisley replied.

**The Philharmonic Music Hall, Cardiff.** Last week the Philharmonic Music Hall, Cardiff was re-opened, after having undergone complete alteration and renovation. About seven weeks ago, the building was closed to the public, and the work which was then begun was kept going practically day and night until the opening. Every particle of the inside was swept away, and a new proscenium, boxes, balcony, and promenade erected. The building is now in the hands of a Company. The alterations were carried out by Mr. J. E. Jackson, builder, Cardiff, from plans and under the superintendence of Messrs. James & Morgan, architects, Cardiff. The decorations were executed by Messrs. Geo. Jackson & Sons; and the Linocrusta work by Messrs. Fredk. Walton & Co. Entire new scenery has been set by Mr. H. Churchward.

**South Weald, Brentwood.**—There has been erected here a monument of Sicilian marble, having a Latin cross, 6 ft. 6 in. long, resting horizontally on five octagonal moulded and diapered shafts, beneath which is a moulded slab richly carved with orchids, a favourite flower of the late Mr. O. E. Coope, M.P., to whose memory it has been erected, together with the elaborate alabaster reredos in St. Mary's, Whitechapel (noticed in a previous number of the *Builder*), from the designs of Mr. E. C. Lee, architect, and executed by Messrs. Earp, Son, & Hobbs, of London and Manchester.

**The Plumbers' Company.**—At the examination, held on Saturday, there were twenty-five plumbers from various districts of London, Hertford, Crewkerne, and Brighton. The practical branch of the examination included pipe-bending, joint-wiping, and roof work; and the theoretical branch, questions relating to the several subjects of plumbers' materials, house-fittings, and sanitation. The examiners were Mr. Hudson (assistant chairman of the Registration Committee), Mr. Webb, Mr. Lyne, Mr. Lobb, Mr. Taylor, and Mr. Millis. Eight plumbers passed.—*City Press.*

**Prizes for Art Workmanship.**—The judges appointed by the Council of the Society of Arts have awarded the following prizes for objects submitted in the Society's Art Workmanship Competition:—Class I.—Painted Glass.—Second prize (15l.) to William Glasby, John E. Penwarden, and A. Lawrenson, for a painted panel, "Music," from a design by Henry Holiday. Class II.—Glass Blowing in the Venetian Style.—First prize (10l.) to T. Smith (workman), W. France and W. Watkins (assistants); second prize (5l.) to J. Hughes (workman), A. Johnston and H. Hart (assistants). Class IV.—Inlays in Wood.—Third prize (10l.) to F. Spalding, for a fancy octagon table. Class V.—Lacquer.—First prize (25l.) to Thomas W. Hay, for a specimen of lacquer on wood. Class VI.—Decorative Painting on Wood or other Material.—First prize (25l.) to John Eyre, for painting on wood for piano front, subject, "Vocal and Instrumental Music." Class VII.—Hand-tooled Bookbinding.—First prize (25l.) to T. G. Cobden-Sanderson; second prize (15l.) to Fred. Maullen. Class VIII.—Repoussé and Chased Work in any Metal.—First prize (25l.) to R. Holloway, for capital of column in hammered gilding metal; First prize (25l.) to A. Hubert, for specimens in silver and other metals, of repoussé and cast chasing work; Second prize (15l.) to W. Bullas, for repoussé curtain in brass, for drawing-room stove. First, second, and third prizes were offered in each class, but were not in all cases awarded.

**The Home Iron Trade.**—The English iron market shows a distinct improvement, and the prices of all descriptions of iron and steel, almost without exception, are higher than they were a week ago. There is a steady demand for pig-iron, and large purchases of iron have been made for speculative purposes, as it is fully expected that another "boom" will soon set in, especially in view of the probable larger demand from America, should the reductions in the tariff charges foreshadowed in President Cleveland's message to Congress become a reality. The week has seen a general rise in ordinary pig-iron of from 3d. to 6d. per ton, and in hematites of 1s. 6d.; but in some of the Scotch brands the week's advance has been as much as from 1s. to 2s. per ton. The rise in Scotch pig-iron warrants is nearly 2s. on the week. The improvement in the shipbuilding trade has sent up quotations of finished iron to the extent of 1s. 3d. a ton, whilst steel has experienced an improvement of as much as 5s. per ton, and Scotch steel-makers, in view of their rise in hematites, decline to do business except at an advance of 10s. on the last price, which was 6l. 5s. per steel plates. Never before during the year has the outlook been so bright, and we can only express the hope that the better condition of the iron trade will prove of a permanent character.—*Iron.*

**The Guano Process for Precipitation.**—The Governors of Wellington College have renewed their agreement with the Native Guano Company for five years, on the basis of an increased subsidy for the use of the process. According to the report of the Bursar and medical officer of the College "the system works well and with great ease." Moreover, we learn that before renewing the contract a special committee of the governing body made full inquiry, personally inspecting the sanitary processes in operation at other public institutions. They reported that the method adopted at the college, under the advice of Mr. Baldwin Latham, was, "under the circumstances, the most advantageous that could be used," and this expression of official satisfaction is formally recited in the deed of agreement.

**The Mersey Railway Branch to Birkenhead Park.**—It is stated that Messrs. John Waddell & Sons, Edinburgh, have almost completed the contract for this railway. The branch connects the Mersey Railway with the Wirral Railway at West Park Station, in the vicinity of Birkenhead, and opens up the coast resorts of New Brighton, West Kirby, and the Dee side to Liverpool for the first time by direct through communication *via* the Mersey Tunnel. We understand that the contractors have accepted an estimate from Mr. T. W. Helliwell to do the whole of the glazing and zinc roofing required on Park Station. Mr. Helliwell, it may be mentioned, did the whole of the glazing on Green Lane Station, Borough Road Station, and Shore Road, where the railway was opened two years ago.



**The Art-Union of London.**—The Art-Union of London having attained its year of jubilee, the Council have issued an address drawing public attention to the results of its fifty years' work, and pointing out "the advantages which it affords to its members, in the hope of attracting new subscribers, and thereby increasing its means of public usefulness." The objects of the society, as stated in the Charter, are to promote the knowledge and love of the Fine Arts, and their general advancement in the British Empire, by a wide diffusion of the works of native artists; to elevate Art and to encourage its professors, by creating an increased demand for their works, and an improved taste on the part of the public. It is under the direction of a Council of the Members, whose services are honorary. In furtherance of these objects, the society has collected and disbursed no less than 594,000*l.*, to which considerable sums were added by prizeholders, in order to acquire works of higher value than the amounts of the prizes. The Art-Union claims to have been largely instrumental in creating the picture-buying public of the present day. "At its inauguration, in the year 1837, the number of purchasers of works exhibited in the public galleries was exceedingly limited, being confined to a small circle of wealthy amateurs. In one year alone, 1841, when the Art-Union subscriptions amounted to 5,300*l.*, and the first prize of the year was Mr. Maclellan's "Sleeping Beauty," price 500*l.* (which was afterwards sold for 1,000*l.*), the list of artists whose works were purchased by the Art-Union comprised Ward, O'Neill, Witherington, Woolmer, Copley-Fielding, Creswick, Clint, David Cox, Corbould, Duncan, Uwins, Gallow, Absolon, Frapp, Jutsum, Varley, Prout, Lee, De Wint, and others of lesser note, and there are very few of the Royal Academicians who have not received the support and patronage of the prizeholders of the Art-Union." The Art-Union also claims to have kept alive the art of line-engraving and that of medal die-engraving. On these and other grounds the Art-Union "still looks confidently for support to all lovers of art."

**The Empire Palace, Leicester-square.**—Messrs. Campbell, Smith, & Co. send us an account of the work they have carried out here. The scheme of decoration of the auditorium is somewhat Persian in character, the large oval ceiling being a kind of sumptuous Persian carpet. The sunlight will be a large flower in coloured glass, with the stamens and pistils of the flower electric lights. The general colouring is in turquoise and indigo blue, rose colour and crimson, with black and gold. The columns all round the theatre are white, with characteristic ornament in two blues and gold. This treatment is applied to the various box fronts, using in (as far as possible) the raised ornamentation already existing. The back and ceiling of the gallery circle is treated with ruby and gold leather paper. The three other circles which are Louis Seize in treatment, are severally rose and gold; blue, white, and gold; and white and gold, the latter with plush panels. The upper circle is lighted by eighteen lamps of Persian design, in coloured glass, with gold frames. The walls of the private boxes are all covered with a highly-enriched gold leather paper. The pit entrance is decorated with Egyptian ornament, leading down to a solid gold leather paper on the lower walls, and the white and gold treatment of the ground floor. The foyer (which is Renaissance in character) is entered by a grand staircase, Pompeian in treatment. The entrance-halls are Indian, and are coloured with black and gold, and a deep rich crimson. The work has been done under the superintendence of Messrs. Romaine-Walker and Tanner, architects.

**Obituary.**—The death is recorded, at Giesseu, of the architect Heinrich Ernst Schirmer, who was for thirty-five years in the service of the Norwegian Government, and during that time erected a number of public buildings in Norway. His principal work was the rebuilding of Thronbjørn Cathedral, carried out between 1869 and 1871. The Norwegian Storting twice refused Schirmer a pension for his long services, and it was in consequence of this refusal that he returned to Germany. The deceased was born at Leipzig, and had attained his seventy-third year.

**The Priory Church at Brecon** has received an addition to its stained glass of a window from the studio of Mr. Taylor, of Berners-street, the gift of Mr. Anselm George, in memory of his wife and daughter.

**Marble Replaced by Tin.**—The *New York Times* says that the Board of City Trusts, Philadelphia, on the 15th of November "signed a contract by which the famous marble roof of Girard College will be replaced by an unsightly structure of tin. The cost of the work will be \$9,000. That of replacing the marble would be \$20,000. The defect in the roof was discovered about six weeks ago, when water was found leaking into the building. An examination of the marble revealed the fact that the surface was rapidly turning into lime. The Board of City Trusts met, and upon discussion of the matter made up their mind that the practical decomposition of the roof was due to the action upon it of an atmosphere impregnated with anthracite coal smoke. The roof had stood 41 years, and they concluded that \$20,000 would be too much to invest in another structure of the same prospective life." The same paper says that Thomas M. Walter, the architect of the building, died at an advanced age a few weeks ago. "The College was the pride of his life, although he had designed the extension of the National Capitol and many other famous buildings. He was therefore kept in ignorance of the mishap, which was partly due to the use of the roof, against his wishes, as an observatory for visitors."

**Edinburgh Police Courts.**—The Edinburgh Plans and Works Committee have recommended that provision be made for the better class of witnesses in the police court, and that double windows be placed in the courtroom. It was moved that in view of the report of her Majesty's Inspector of Constabulary as to the whole accommodation in the police chambers the matter should be delayed. The Lord Provost thought that this showed the importance of having new Municipal Buildings, as, in a short time it would be found that in rejecting the Bill they would have to go to far greater expense than otherwise would have been the case. The recommendation was, however, adopted.

**Wesley Chapel, New Swindon.**—The Wesley Chapel, New Swindon, has, during the past month, been closed for extensive alterations. A hot-water heating-apparatus has been put in by Mr. James Gray, of Danvers-street, Chelsea. The building portion of the work was carried out by Mr. J. Webb, of Swindon, who is also laying down wood-block flooring. Three cathedral-glass windows have been executed by Messrs. J. Hall & Sons, of Bristol. The building is a large one, seating nearly 1,000 persons on the ground-floor. The total cost of the works now carried out is 220*l.* The work has been carried out under the supervision of Mr. A. G. White, of New-road, New Swindon.

**Residential Flats in Westminster.**—A large block of residential flats is being erected by Messrs. J. W. Hobbs & Co., Limited, of Queen's-buildings, Southwark Bridge-road, S.E., in Carlisle-place, Victoria-street, Westminster. The building is six stories in height, and has a frontage of 227 ft., with an elevation Classical in style, consisting of a central block and two end wings, flanked by composite pilasters, and faced with malm and stone dressings. A large block, consisting of about fifty flats, erected by the same firm, on the opposite side of Carlisle-place, is now approaching completion, about thirty flats being occupied. The architect for both blocks is Mr. George Baines.

## PRICES CURRENT OF MATERIALS.

TIMBER.			
	£.	s.	d.
Greenheart, B.G. ....	ton	6 10	0 7 15
Teak, E.I. ....	lead	8 0	0 15 10
Sequoia, U.S. ....	foot cube	0 2	0 3 0
Ash, Canada ....	load	3 00	0 41 0
Birch " ....	2 00	0 31 0	
Elm " ....	3 10	0 41 0	
Fir, Dantsic, &c. ....	1 10	0 4 0	
Oak " ....	2 10	0 41 0	
Canada " ....	3 00	0 6 0	
Pine, Canada red " ....	3 00	0 31 0	
" yellow " ....	2 00	0 40 0	
Lath, Dantsic " ....	fathom	3 00	0 5 0
St. Petersburg " ....	4 00	0 51 0	
Wainscot, Riga " ....	log	0 00	0 00
" Odessa, crown " ....	2 10	0 3 0	
Deals, Finland, 2nd and 1st. ....	std. 100	7 10	0 0 0
" 4th and 3rd " ....	6 00	0 5 0	
Riga " ....	6 10	0 7 10	
St. Petersburg, 1st yellow " ....	8 10	0 14 0	
" 2nd " ....	7 00	0 8 0	
" white " ....	6 10	0 8 0	
Swedish " ....	6 15	0 15 0	
White Sea " ....	7 00	0 15 10	
Canada, Pine, 1st " ....	16 00	0 21 0	
" 2nd " ....	10 00	0 15 10	
" 3rd, &c. ....	7 00	0 10 0	
" Spruce, 1st " ....	8 00	0 10 0	
" 3rd and 2nd " ....	5 00	0 7 0	
New Brunswick, &c. ....	5 00	0 7 0	
Batons, all kinds " ....	4 00	0 10 10	
Flooring Boards, sq. ft. in, prepared, First " ....	0 8 0	0 11 8	
Second " ....	0 8 0	0 7 8	
Other qualities " ....	0 4 0	0 6 0	
Cedar, Cuba " ....	0 0 32	0 0 32	
Honduras, &c. ....	0 0 3	0 0 32	
Australian " ....	0 0 3	0 0 32	
Mahogany, Cuba " ....	0 0 42	0 0 7	
St. Domingo, cargo average " ....	0 0 42	0 0 8	
Mexican " ....	0 0 32	0 0 32	
Tobacco " ....	0 0 3	0 0 6	
Honduras " ....	0 0 4	0 0 5	
Maple, Bird's-eye " ....	0 0 5	0 0 7	
Rose, Rio " ....	8 00	0 11 0	
Balsa " ....	7 00	0 9 0	
Box, Turkey " ....	5 00	0 12 0	
Satin, St. Domingo " ....	0 0 5	0 0 8	
Porto Rico " ....	0 0 5	0 10 0	
Walnut, Italian " ....	0 0 4	0 0 6 1/2	

METALS.			
IRON—Bar, Welsh, in London, ton	4 15	0	5 00
" " in Wales " "	4 10	0	4 10
" Staffordshire, London " "	5 10	0	8 00
COPPER—			
British, cake and ingot, ton	0 00	0	0 00
Best selected " "	0 00	0	0 00
Sheets, strong, " "	0 00	0	0 00
Chili, bars " "	75	0	00
YELLOW METAL, lb. " "	0 08	0	00
LEAD—			
Pig, Spanish, ton	14	5	00
English, common brands, ton	14	15	00
Sheet, English " "	15	10	00
SPELT—			
Silesian, special, ton	19	5	00
Ordinary brands, ton	18	15	00
TIN—			
Straits, ton	198	0	00
Australian " "	198	0	00
English ingots " "	0 00	0	00

OILS.			
Lined " ....	ton	19	5 00
Cocunut, Ceylon " "	30	0 0	81 00
Ceylon " "	23	15	0 00
Palm, Lagos " "	22	0 0	0 00
Rapeseed, English pale " "	26	10	27 00
" brown " "	25	0 0	0 00
Cottonseed, refined " "	20	10	0 00
Tallow and Oleine " "	25	0 0	46 00
Lubricating, U.S. " "	5	0 0	8 00
" refined " "	5	0 0	12 00
TURPENTINE—			
American, in casks, cwt.	1	4	0 00
Tar—			
Stockholm " barrel	0 15	0	0 00
Archangel " "	0 10	0	0 00

## CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

## CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Keel and Channeling Works .....	East Barnet Valley L. B.	Official .....	Dec. 19th	ii.
Cast-iron Parapet, Tower Bridge .....	Bridge House Estates Committee .....	T. Wolfe Barry .....	do.	ii.
Street Improvements .....	Edmonton Local Board .....	Official .....	Dec. 27th	ii.
Gasholder Tank, &c. ....	Gas Light and Coke Co. ....	Urban A. Smith .....	Dec. 29th	ii.
Lock-up, Watford .....	County of Hertford .....	do. ....	Jan. 3rd	x.
Making-up Road .....	S. Bernsey Local Board .....	E. Fry .....	Jan. 14th	ii.
Retiring-Rooms, Finsbury Park .....	Met. Board of Works .....	Official .....	Jan. 10th	ii.
Various Works .....	School Bld. for London .....	do. ....	Not stated	x.
New Schools .....	Ramsey School Board .....	H. Boshell .....	do.	ii.

## PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Foreman of Roads .....	Chelsea Vestry .....	100 <i>l.</i> , &c. ....	Dec. 28th	xiv.



## TENDERS.

[Communications for insertion under this heading must reach us not later than 12 Noon on Thursday.]

**BETHNAL-GREEN.**—For stabling, &c., for Mr. James Cox, mineral water manufacturer. Mr. R. A. Wooster Rees, architect, 14, Devonshire-square, Bishopsgate. Quantities by the architect:—

Garratt & Son, Loughborough	£2,700 0 0
W. Beale, Cambridge-road	1,905 0 0
F. & P. J. Wood, Mile-end	1,877 0 0
Thomson & Son, Hackney-road	1,845 0 0
J. Hughes, Old Ford	1,825 0 0
W. Shum, Lower Clapton	1,692 0 0
Horlock, Manor Park	1,670 0 0
Taylor & Co., Cambridge-road	1,640 0 0
G. Lusk, Mile-end	1,633 0 0
A. Day, Colchester (accepted)	1,590 0 0

**BEXHILL-ON-SEA.**—For erecting Jubilee reading-room. Mr. Richard A. Bill, architect:—

S. Ockenden	£541 0 0
C. Rery	0 89 0
W. G. Newman	72 10 0
J. Cole	691 15 0
J. King (accepted)	641 0 0
T. S. Todd	627 0 0

[All of Bexhill.]

**CAMBERWELL.**—For paving with Limmer Asphalt Marmora-road, for the Vestry of St. Giles, Camberwell:—

Val de Travers Asphalt Company	£269 17 0
French Asphalt Company	495 6 0
Limmer Asphalt Company	474 19 0
Brunswick Road Asphalt Company	368 1 4
Bradshaw & Co., 55, Queen Victoria street, London (accepted)	413 0 0

**CATERHAM.**—For the erection of a house on the Streeter Estate, Caterham. Mr. Henry Ling, architect, Northumberland-chambers, Charing-cross, W.C.:—

T. Churchill, Godstone	£795 0 0
J. & J. Ward, Warringham	715 0 0
Hunter & Bryant, Kenley (accepted)	689 0 0

**CATERHAM.**—For alterations and additions to house required for new Post-office premises, Caterham. Mr. Henry Ling, architect, Northumberland-chambers, Charing-cross, W.C.:—

Hunter & Bryant (accepted)	£255 0 0
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[No competition.]

**ENFIELD.**—For the supply and laying 12,000 ft. of straight kerb, for the Enfield Local Board of Health. Mr. Wm. Kitteringham, surveyor:—

	per foot.	per foot.
s. d.	s. d.	s. d.
Griffiths, London	—	2 9
Williamson, Tottenham	—	2 5
Moslem & Sons, Westminster	2 2	2 5
Marshall, Brighton and Stratford	2 1	2 3
Novell & Robson, Kensington	2 0	2 2
Bloomfield, Tottenham	1 11	—
Batty, Bromley-by-Bow	1 11	2 1
Wheeler, London	1 9	—
John Jackson, Enfield	1 9	2 2
Palmer, Birmingham	1 8	—

\* Accepted for Cornish.

**LONDON.**—For the erection of a new Welsh chapel, Falmouth-road, New Kent-road. Mr. William C. Evans, architect, 34, Porters'-corner, S.W. Messrs. Young & Brown, surveyors, 5, Henrietta-street, Covent-garden:—

J. & W. Faulkner	£8,585 0 0
Gregory & Co.	8,157 0 0
Greenwood	6,117 0 0
Grover & Son	6,065 0 0
Howe & Williams	5,354 0 0
Peto Bros.	6,026 0 0
Downes	5,853 0 0
H. L. Holloway	5,847 0 0
H. & R. Evans	5,968 0 0

**LONDON.**—For rebuilding No. 46, Great Titchfield-street, W., for Mr. Edwin Parr. Messrs. Wyllson & Long, architects, 21, King William-street, W.C. Quantities supplied by Mr. Arthur W. Saville, 99, Strand, W.C.:—

Simpson & Son	£1,567 0 0
W. Boden	1,637 0 0
W. Pearce	1,602 0 0
Hall, Beddall, & Co.	1,434 0 0
G. H. & A. Eywaters	1,423 0 0
J. T. Chappell	1,407 0 0
W. Rhodes	1,390 0 0
W. Oldrey & Co.	1,370 0 0
Fatman & Fotheringham (accepted)	1,337 0 0

**LONDON.**—For repairs at Nos. 66 and 66A, Berwick-street, W., for Mr. W. Eckstein. Mr. Arthur W. Saville, architect, 99, Strand, W.C.:—

T. W. Morris (accepted)	£260 0 0
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**LONDON.**—For the finishing of carcasses, situate 41 and 43, Walburgh-street, St. George-in-the-East, and building additions at the rear. Mr. William Livermore, architect:—

A. Nicholls, Leytonstone (accepted)	£357 10 0
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**NEWMARKET.**—For residence for Mr. W. B. Sheppard. Messrs. Holland & Son, architects:—

Samuel Chapman, Norwich	£1,795 0 0
Cowell & Son, Soham	1,679 0 0
Simpson & Son, Newmarket	1,659 0 0
Saint & Son, St. Ives	1,638 0 0
Plummer, Rattlesden	1,628 0 0
Hook & Tobitt, Soham	1,625 0 0
Kerridge & Shaw, Cambridge	1,461 0 0
Mason & Son, Haverhill	1,430 0 0
Blyth & Hunt, Newmarket	1,413 0 0

**SOUTHEND.**—For building three houses on Royal-terrace, for Mr. J. Brown. Mr. G. Sherrin, architect:—

J. Chapman, Hackney (accepted)	£3,688 0 0
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**SURBITON.**—For building house at Ditton-hill, for Mr. B. Everest. Mr. Geo. Sherrin, architect:—

J. Chapman, Hackney	£900 0 0
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[No competition.]

**WEST HAM.**—For repairs to pumping engines, for the Corporation of West Ham. Mr. Lewis Angell, Borough Engineer:—

Hunter & English, Bow	£332 0 0
Chapman	315 0 0
Chapman	435 0 0
Stewart & Co., Blackwall	475 0 0
William Harris, Stratford	454 0 0
Robinson & Co., Victoria Dock	425 0 0

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## TO CORRESPONDENTS.

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M. T. H. N. M. H. McC. G. B. (see paragraph in Builder for January 17, 1880, page 80)—R. T. (too small).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline pointing out books and giving addresses.

**NOTES.**—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors. We cannot undertake to return rejected communications. Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED. All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

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**DOUGLAS POTTER, Publisher.**  
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**SPECIAL.**—ALTERATIONS IN STANDING ADVERTISEMENTS. IF BY ORDER TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that the latter (IF ONLY) should be sent.

**PERSONS Advertising in "The Builder,"** may have Replies addressed to the Office, 46, Catherine-street, Covent-garden, W.C. free of charge. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage.

AN EDITION Printed on THIN PAPER, for FOREIGN CIRCULATION, is issued every week.

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**BOX GROUND.** | **COMBE DOWN.**  
**WESTWOOD GROUND.** | **STOKE GROUND.**  
**RANDELL, SAUNDERS, & CO., LD.,**  
CORSHAM, WILTS.

## Bath Stone.

**Pictor's Monks' Park.** | **Combe Down.**  
**Corsham Down.** | **Stoke Ground.**  
**Box Ground.** | **Winsley Ground.**  
**Farleigh Down.** | **West Wood.**  
**PICTOR & SONS, Box, Wilts. [ADVT.]**

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The stone from these quarries is known as the "Weather Bed," and is of a very crystalline nature, and undoubtedly one of the most durable stones in England.  
**THE CHELYNCH STONE.**  
Is of the same crystalline nature as the Chelynch Stone, but finer in texture, and more suitable for fine moulded work.  
**THE BRAMBLEDITCH STONE.**

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# The Builder.

Vol. LIII. No. 2942.

SATURDAY, DECEMBER 24, 1887.

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### Ancient Sepulchral Monuments.



HE very fine illustrative volume published by Mr. Brindley and Mr. Weatherley under the above title\* is, as we are told in the brief preface, "the outcome of a comparatively small collection of drawings of ancient sepulchral monuments made at different times, to aid those who, rebelling at the ordinary modern monument, desired a worthier and more satisfactory memorial." It has been expanded into what is intended as a text-book of monuments of this kind, from the earliest to the latest times, the drawings being for the most part to a uniform scale of one inch to the foot, with in many cases sections and details one-fourth the real size. The book, as may be seen at a glance, must have been the work of years. The drawings have mostly been carefully made, and are very well reproduced, and comprise an immense number of examples which are not only very fine in themselves and historically interesting, but which are also very suggestive as starting-points from which to work out new ideas in monumental designs of this kind.

The subject is so large that it may be fairly said that no single volume could well be a text-book of it, if we are to understand by that a book of reference which will contain examples of every type of monument which has been erected by mankind to commemorate the departed; and it would hardly be possible for any one, except with an almost unlimited command of time and funds, to produce a really complete *corpus* of examples of this class of architectural designs. The subject is endless, in fact, and it is no slight credit to the authors that they have illustrated it so largely as they have in one folio volume; but it cannot be regarded as giving a complete illustration of the subject. Among the well-known types of monument, we hardly find the Greek tombstone with bas-relief subjects illustrated so well as it deserves to be; the drawings given of these show very well the various beautiful types of foliated ornament which form the finish to the apex of many of these works, and which constitute a kind of comparative study of the Greek anthemion ornament used

in this portion in so many various forms and with so many curious and significant differences of detail; but of the bas-relief sculpture subjects the best that are available have hardly been selected, and those which are given are on too small a scale for full justice to be done to them; they are the smallest in scale of all the drawings in which figures are introduced, and they certainly deserved a large scale and careful illustration more than any of the Renaissance monuments to which fuller justice has been done. Nor do we find any example of the very best type of English Renaissance monuments, such as we see exemplified in the Clopton monument at Long Melford, and the Paston monument at North Walsham. We may also question whether all the monuments figured here are really such as would present themselves as models to those who desire "a worthier and more satisfactory memorial" than the modern monument. This remark is, in fact, a little out of date now, for there have been some very fine monuments executed of late years here and there, some of them worthy to take rank with the very best in this book (e.g., Mr. Gilbert's Fawcett monument in Westminster Abbey), and on the other hand some of those that are given are, though historically valuable, not such as we should be prepared to hold up as by any means models for imitation. We should imagine, for instance, that the monument on plate 161, with its coarse Classic details and broken pediments, or 164, with an urn in relief on a pyramidal slab, or Nos. 205 and 206, or No. 208, a pyramid with spheres at the base standing on a surbase with a heraldic sculptured panel, would be the kind of thing which would suggest in the mind of most persons a desire for a "worthier" monument, something with more refinement of detail and more seriousness of aim and feeling about it. These examples were, however, necessary in a historical point of view; we only demur at being asked to admire them or to consider them as examples of what a monument ought to be; the expression in the preface rather leads to the conclusion that the authors regard all these as good examples; and here we must differ.

That is, however, all the criticism we have to make on the book, which is a very fine and a very useful one. Some of the plates which now appear in it have been previously published in our pages, one a fortnight ago, the marble tablet from Siena (*Builder*, December 10, p. 819), and one or two more a good while previously, one of these being one of the finest and most characteristic in the book, the highly-enriched cross standing in relief against a wall in the cloister of San Juan de los Reyes, at Toledo. The classes of monuments are arranged in groups, and in each

group as far as possible chronologically. We commence with Egyptian obelisks, of which five are given, including two drawings of that monument of remarkable vicissitudes which is dated in the corner of the plate "Heliopolis, B.C. 1500; Alexandria, B.C. 23; London, A.D. 1878" and who knows where next? For it may outlast several more empires, for anything we know. Then follow some of the Assyrian obelisks now in the British Museum, with their tops worked in steps or stages, two of them in sloping lines, like an imitation on a small scale of the type of tower with inclined plane stages round it, which has sometimes been made to do duty for the mythical Tower of Babel. An important distinction between these and the Egyptian type is that, whereas in the latter the ornaments and sculptures and hieroglyphics are worked in intaglio out of the main surface of the granite, in the Assyrian examples the sculpture subjects are enclosed in panels formed by sinking the ground, and leaving the figures in relief on it, their upper surfaces being on the same plane with the main surface; in other words, in the Egyptian examples, it is the design that is incised; in the Assyrian examples, the spaces round the figures are incised, and the figures left in relief.

The obelisk is one well-marked and distinct type of monument. If we were to endeavour to classify the forms of monument that have been used we might, perhaps, divide them into the obelisk form, the cross (which may be called the Christian parallel to the obelisk); the sarcophagus, with or without a figure on it; the upright sculptured slab, including the Greek stela; the horizontal sculptured slab; similar forms of slab with only inscriptions and no carving except a little bit of decorative heading or border; and the arched recess, Gothic or Classic, with a figure included within it. The sarcophagus is one of the most long-lived and most constantly-recurring forms; there is something in its heavy solid form and horizontal lines which suggests, more perhaps than any other of the accepted monumental forms, the idea of imperishable endurance; and accordingly we have it used almost *ad nauseum* in modern burial-grounds, as a mere exterior form from which all use and all its original meaning as the receptacle for the body has departed; and in many examples, such as the tomb from St. Cecilia in Trastevere at Rome (given in plate 174), the figure, which originally should have been enclosed in the sarcophagus, is sculptured as reclining on the top of it. The sarcophagus seems to have been the originating form of the late English table-like monument. The two forms are shown together, whether intentionally or not, in the two late English tombs given on plate 203,

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\* Ancient Sepulchral Monuments: containing Illustrations of over Six Hundred Examples from various Countries and from the Earliest Periods down to the kind of the Eighteenth Century; with descriptive and general Index. By William Brindley and W. Samuel Weatherley, F.R.I.B.A. London: Printed for the authors by Vincent Brooks, Day, & Son. 1887.



both of which are nearly alike in the design of the side, but in one the top is made in pediment section, in the other it is flat. Among the examples given are the two from St. Apollinare in Classe at Ravenna, which are called sarcophagi, but which have lost the old Roman form, and become more like cabinets, with a semicircular top, and in one case an arcade in relief at the side, in the other case a frieze with vine scrolls and figures of peacocks. These are very interesting, and the first-named one is a good bit of miniature architectural design, but they have lost the characteristic massiveness and imperishable appearance of the Roman sarcophagus. Some of the examples given in this book are of interest not only as varieties of sarcophagus form, but as constituting examples of different phases and styles of ornamental treatment: there is the characteristic Etruscan one in the British Museum, with its reminiscence of a temple roof with roll tiles and antefixæ, and the band of foliage carved out of the surface of the stone, dividing the height in half; there is the Roman example found in London in 1853 (plate 21) and now in the British Museum, the sides decorated with a large spiral ornament in flutes, which is interrupted in the middle of its length by a medallion with a head in alto-relief within it, and the one (B.C. 298) in the Vatican Museum (plate 20), a solid-looking piece of work showing, however, the want of fancy and imagination of the Romans, the whole thing being a Roman Doric architrave and entablature with a boldly-moulded base added at the foot of the "entablature." It is noticeable that in this portion of a Doric order, from which the column is omitted, the triglyph is placed at the angle, as in Greek work, apparently showing that the Romans, when there were no columns to trouble them, preferred that treatment to the one they adopted over the column order, of thrusting the triglyph away from the corner. There is an Egyptian sarcophagus given on plate 5, with a pedimented head and hanging wreaths, executed in a manner suggestive of the granite material in which we presume it was worked, with wreaths of the severest outline with no surface carving or indications of leafage on them; but is this one (at Mehllet el Kebry) in the true sense Egyptian? The authors do not suggest a date. It looks to us more like a Roman idea executed by Egyptian hands.

The treatment of the cross in monumental work is a curious study of variety in the way of regarding and treating the same object, when we see, as here, a number of examples from different countries and periods together. One of the most curious and interesting is one on the first page in which crosses appear (plate 30), a slab built, we are told, into a ruined church in Athens, and showing a cross with two cross arms (like a double transept) one above the other, formed by an interlacing ornament, and with a base looking like an outlined section of steps. In two circles under the main arms of the cross are figures of birds, over them two paterae. The whole thing is so curious in its mingled suggestions and reminiscences, half Classic, half Byzantine, that it is to be regretted the authors did not give some further information as to its position and probable origin. There is, however, practically no letter-press to the book, and no information about the examples, except that dates, or approximate dates, are given or suggested to many of them in the index. The Byzantine tablets from Rome and Torcello on plate 32, in which the design consists of a decorative arch, with a cross under it, are, like the Athenian example just referred to, very interesting from the architectural point of view. They are so much alike in design that they must have originally belonged to the same locality or have been even worked by the same hands. They form a curious link between Classic and Mediæval art. The surfaces of the crosses on them are decorated with the old Roman ornament of two strap forms interlaced so as to make a series of intercepted circles, but at the ends and junctions of the cross arms the two bands or straps are intertwined in a manner quite at variance with Classic

feeling. On either side of the cross is a leaf which seems a last reminiscence of the Classic acanthus, a kind of mummy of it, with all the life and flow gone out of it, and on the extrados of the arch is a series of small scrolls springing out of the extrados moulding in a manner curiously resembling the Gothic gable crocket of later days. The various examples of crosses worked on the faces of upright stones, especially the Celtic ones in Scotland, the Isle of Man, and elsewhere, are full of suggestions in decorative design which might be worked out afresh with new detail. A great many examples are given of the form of equal-armed cross worked upon or into a circle, which is so effective in a decorative and symbolical sense, and has been treated with such variety of method and detail. Among other forms of cross delineated here we may notice the type of flat slabs cut out into crosses, of which the richly-decorated example at Kilklispeen, in Ireland, is one of the most remarkable; by the way, no indication or information is given as to whether this cross is or is not monolithic, but we presume it is; and another which is variously illustrated is the type showing a small cross on the top of a very long and thin stem. This is shown in several varieties; a Celtic one from Tuam; several from Gosforth, Cumberland; a country cross from Jouarre, in France, a very curious example, labelled early fourteenth century, and consisting of a thin round pole with a little quasi-Romanesque capital on the top (which, by the way, looks much earlier than fourteenth-century), and the cross on that. Is this a wooden or a stone cross? The texture of the drawing does not give any indication, and there is no note of this, so we presume it is stone, but it is a remarkably thin and long affair to execute in stone. A later one at Auvergne, but of the same general type, follows, and one from a church in Lincolnshire, with a crucifix and a curious little kind of section of a roof over it; and one from Tarragona, with a shrine and little figures on the top of the shaft, the cross and crucifix above. All these, differing in detail and coming from different parts of the world, show, nevertheless, the prevalence throughout Christian countries at one time for this peculiar form of monumental cross, of which, probably, many examples have disappeared, their slender proportions being such as to render them peculiarly liable to injury.

Of horizontal slabs, a number of most interesting and varied examples are included, some of them of great beauty of design; we may draw attention especially in this respect to the Early English examples shown on plate 110, and one of those from Wales (No. 2, plate 113). A considerable number of the Renaissance examples of monuments are given, though not the best available, with the exception of the tomb of Filippo Decio, of which there is a reproduction in the Florentine Court of the South Kensington Museum, and of which admirable drawings, by Mr. Oakeshott, were given in the *Builder* for June 21 and 28, 1884. The delicacy of the detail is hardly done justice to in the manner of illustration adopted here.

A good many of the late Renaissance tombstones, with their pretty and naïve little ornaments of vases in relief and cherubs' heads are given, interspersed with simple tombstones without any carving, but merely decorated by ornamental enrichments and by the manner of shaping the head. As this or something analogous is the only form of monument that the majority of persons can afford, a selection of examples and hints is of practical value; otherwise we should have said that the space given to them was somewhat disproportionate. The appearance of the urn in bas-relief on some of these reminds us that the urn form of monument does not appear in the book otherwise than as a sculptured adjunct in this way. The adoption of it gave rise to a fearful number of commonplaces; some of them, however, were as good as some of the other commonplaces of seventeenth and eighteenth century work given in the book; and the urn form has a certain claim to be recognised. It stands

on just the same footing as the sarcophagus; it is the retention, as a monumental feature, of a form which was at first used for the practical purpose of holding the ashes of the dead; and if (as we have little doubt) cremation becomes the mode of burial of the future, the urn form of monument is likely to have a practical meaning again, and the consideration of its effective treatment, both in a symbolical and in a decorative sense, will become one of the frequent tasks of the designer of modern sepulchral monuments.

#### A SANITARY HITCH.

**T**HE account given in our last number of the expenditure of nearly half a million of money in outfall works, for one side of the Thames alone, coupled with the evident uncertainty of purpose betrayed by the effort to keep secret a scientific report as to what these works are expected to effect (an effort which has been so far successful, though we perceive that Mr. Rider Cook intends to raise the question again), is a matter of very serious consideration for the ratepayers and residents of London. The outstanding loans of the various metropolitan authorities, at the end of the financial year 1884-5, amounted to 35,856,494l. Of this sum, which does not include the capitals of the gas and water companies of the district, 18,434,101l. is owed by the Metropolitan Board of Works, and 5,582,031l. by the School Board. The former, spending 920,000l., draws from the rates 760,000l., the latter 887,000l. per annum. The Metropolitan Board of Works have spent 6,346,892l. on main drainage and main sewers, a sum which it is now proposed to increase by probably another million. Their expenditure in 1885 on the maintenance of the sewerage and pumping was 75,886l.; to which 107,063l. was added for "sewerage experiments and deodorising," making a total of 182,950l. At the same time the Thames, according not to vague rumour but to the definite statement of naval officers stationed on the river, was worse last summer below London than it ever was before. It was as bad at Greenwich as it had previously been at Woolwich. Not only so, but a new feature declared itself in the river. Persons wrote to the daily newspapers with Thames water, which was at all events inky enough to allow of the letters being read and printed. Ink is probably the right word; for it has been pointed out, ever since the details of the present mode of treatment were made known, that a combination of iron and lime always blackened sewage effluent at some distance from the outfall, even when it appeared bright and clear in the first instance. This result of the 107,000l. spent in experiments is not encouraging. Nor does it by any means form a good argument for the patient waiting of the ratepayers while the Board consider a report that they will not allow to see the daylight.

At the same time, the Urban Sanitary Authorities have incurred an outstanding debt of 81,500,000l.; the Rural Sanitary Authorities owe 1,485,000l. The expenditure of the former in the year 1884-85 was 14,232,565l., not defrayed out of loans, and 4,150,000l. out of loans. The expenditure of the Rural Sanitary Authorities, from both sources, was 497,000l. Nor are these Authorities less in the air as to any efficient sanitary measures than the Metropolitan Board of Works. To the present hour, when the Local Government Board exerts a pressure on the authorities of some dangerously unsanitary place, what is the first step taken in consequence? A deputation is appointed, consisting, for the most part, of wholly inexperienced persons, to go round the country and see what other people are doing. Time, no doubt, in one sense of the word, is thus gained; in another sense it is lost, and money too. In one instance, mentioned in our columns in the present year, the results of such expeditions and of the subsequent deliberations on them has been the expenditure of 90,000l. on outfall works for 11,000 persons, with the effect of producing an intolerable nuisance, freely commented on in the press and in Parliament. Such is the



present outcome of an expenditure of ninety millions sterling, together with an annual outlay of fifteen millions a year, an expenditure blindly, steadily, and rapidly increasing.

It is not the magnitude of the thing that alarms us; it is the inadequacy of the results obtained. Nor is it so much the actual inadequacy of these results in itself, as the want of any definite, systematic, business-like attempt to grapple with the subject by bringing into a focus all that is actually known. The concealed reports and the picnic visits are consistent parts of the same want of system. However anxious a sanitary authority may be to know which plan would be likely to suit them best, they are provided with no information on the subject. The Local Government Board will offer no opinion, and institute no inquiry, except for the purpose of sanctioning or otherwise an application for loan. The entire disconnection of all sanitary authorities throughout the country is such as to confine the knowledge which may anywhere be obtained from experience to the smallest number of people, and to prevent it, as far as possible, from becoming public property.

We are not aware of the manner in which this general and contented ignorance is fostered by that remarkable feature of our day, the advertisement system. No ill to which flesh is liable is without a cheap, ready, and certain cure, as per advertisement. If anything were needed to make confusion doubly confounded it would be this chorus of interested advice. We are not about to suggest any method of getting out of the difficulty. Not that we regard it as insuperable. If sanitary matters were taken up by the country with a patient resolve to get at the truth, and to fix and publish, step by step, the progress that is made, the matter would, we believe, be easy of attainment. But we do think it the duty of the press to call attention to the enormous and increasing expenditure; to the fact that expenditure is increased, perhaps more often than not, in the teeth of the definite knowledge of competent experts; and to the fact that one great and ever-increasing incense-cloud of dangerous and disgusting vapour is steadily ascending, most perceptibly as the temperature rises, from so great a portion of the island.

#### NOTES.



R. JACKSON paid far too great a compliment to the agitation of a small clique of persons for the registration of architects, in making it the subject of a paper before the Architectural Association, who, as one of the members observed, would have been only too glad to hear him on some more interesting subject. With his general views we are in concurrence, though we think he underestimates the possible importance in the future of the examination for entrance to membership of the Institute of Architects, and the meritorious efforts which the Institute has recently made to render membership of its body in future something like a pledge of professional proficiency in that department of professional knowledge which can be tested by examination. However, Mr. Jackson upheld the artistic standard in architecture, and for that, at least, we thank him. His paper afforded an opportunity for the promoters of the "Bill" to advertise themselves afresh, and to receive some compliments on their "honest intentions," concerning which we will only say that people are to be judged in such respects by their actions rather than by their professions; that those who believe in the disinterested aims of persons who commenced operations by sending round among the profession a printed statement that they represented the Institute and other societies which had categorically refused to have anything to do with them, must be very simple-minded and charitable people indeed; and that the idea of the social status of the profession being raised in this kind of manner is too grotesque for comment. We observe that the promoters of this Bill have been asking, through our advertisement columns, for subscriptions

in aid of their project. With their business relations with the publishing department of this journal we do not interfere, but we hope no one will be foolish enough to throw away any money in response to their appeal. As one example of the degree to which registration may be expected to raise the standard of architecture, we may mention that we were offered the other day an illustration of a new building by an architect whose name has figured among the promoters of this proposed Bill (not one of the signatories to the advertisement), which, though it was in other respects our interest to publish it as an illustration of a building likely from circumstances to be talked about, was such a wretched design that we felt we could not discredit our pages with it, and preferred to decline it. The argument is hardly any better in regard to mere constructional matters. The worst constructional disaster of this age,—the worst, perhaps, of which we have any record in English history,—was the fall of the Tay Bridge. This was unquestionably in great part the fault of the engineer, who practically confessed as much in the most pathetic manner, by dying of a broken heart; for that, we believe, was about the truth. But what possible Registration Act could or ought to have kept Sir Thomas Bouch out of the engineering profession? He could have passed any examination; he did a great deal of good work; but he for once unhappily took his responsibilities too easily, and he and others paid a fearful price for it. The remedy for such disasters is in a higher and stricter sense of responsibility among engineers and architects, and you cannot secure that by Act of Parliament.

CONSIDERABLE alarm, we are told, has been excited in the North of England by visits that have been recently paid by members of English ship-building firms to Spain, and by the opening of negotiations for the purchase, on the banks of the Bilbao river, of sites for the establishment of ship-building and marine engine works. Assuming the truth of these accounts, as at least showing that there is something in the wind, the gravity of the indications they offer can hardly be exaggerated. In the movements that have already taken place, transferring the centres of production from inland towns to seaboard or river-served towns, the great difference between the cost of land and water carriage has been put forward as a satisfactory reason for the change, great as has been the sacrifice of capital involved. We have ventured to ask whether, if these great industries once took wing, it was so certain that it would be on our own seaboard that they would always alight. In the case of two very important businesses the sea, it appears, is about to be crossed. The addition of a ship-building movement to that already noted as to the cotton industry and the manufacture of artillery is an unwelcome feature in the case. It is all very well to lay the blame on the trades unions; indeed, there can, in our view, be no question that the measures adopted by many of these bodies with a view of keeping up the rate of wages have had a directly opposite result. But the real source of difficulty and of danger lies lower. Trade-union restrictions are rather symptoms than original causes of the difficulty. The true origin of the trouble is the fact that as the productions of a country where the rate of living is, from climatic causes, necessarily high, meet with unchecked competition from the productions of those countries where it is low, the first may be gradually elbowed from the market; and the true point for the investigation of impartial and clear-minded statesmen is, whether in the measures that have been taken of late years for reducing the price of certain elements of the cost of living we have not been actually placing our own producers more and more at the mercy of their foreign competitors.

WE have not space for more than a line or two of reference to the temperate, clear, and judicious paper, by Sir Juland Danvers, on the "Defects of English Railway Statistics,"

read before the Royal Statistical Society on Tuesday evening last. It is seventeen years since Sir J. Danvers turned his attention to the working out of the average receipts and expenses per passenger and per ton of goods per mile. He is now able to state that on the East Indian lines last year each passenger was conveyed at the cost of about 0.82 pie, or, at the present rate of exchange, of 1s. 6d. per rupee, a little more than three-tenths of a farthing per mile, at a profit of about seven-tenths of a farthing; and each ton of goods was conveyed at the cost of 2.15 pies, or about eight-tenths of a farthing, at a profit of one and four-tenths of a farthing. The Statistical Society can render no better service to the country than by exerting its influence in pressing on the Government that powers should be given to call upon railway companies of the country to keep and to publish such accounts as have been long and vainly demanded by the professional authorities cited by Sir Juland Danvers.

WE are glad to learn from the last issue of the *Classical Review* (i. 10) that there is every hope that something like systematic excavations under English auspices will be undertaken in Cyprus. Archaeological, like other duties, begin at home, and it is better that we should gather in the harvest of our own island, where we have not to cope with the difficulties of Turkish firmans and political jealousies, than expend our efforts further a field. Not long ago we called attention to the remarkable results of a tentative exploration of the site of ancient Marion (Poli-tis Chrysokhou), the two unique vases,—the *Edipous lekythos* and the *Pasiades alabastos*. These have happily now, as we learn from the same journal,—an invaluable medium for archaeological news,—passed into the keeping of the British Museum. It is the success of this excavation that has "at last goaded the British public into action." At the last meeting of the Hellenic Society it was decided to appeal to the public for subscriptions. The Oxford and Cambridge travelling studentships are to be turned to account in connexion with the work. The sanguine *Review* hopes that the Government will make a special grant.

THE *Berliner Philologische Wochenschrift* (Dec. 10) reports the accidental discovery, in the island of Cos, of some sculptured remains, which point plainly to the site of the once famous temple of *Æsculapius*. An altar has been found, and a marble snake, the sacred attribute of the medicine god. It will be remembered that Strabo (book xiv., c. ii., *et seq.*) gives an account of this temple well calculated to excite archaeological curiosity. It was, indeed, as we know from many sources, only third in importance to those of Epidaurus and Athens. Strabo says:—"In the suburb [of Cos] is the celebrated *Asclepion* full of votive offerings, among which is the painting of Antigonos, by Apelles. It used also to contain the 'Aphrodite rising from the Sea' (*Anadyomene*), but that is now removed to Rome." He goes on to say that Hippocrates learned much of his medical lore by studying the inscriptions engraved in the temple recording cures wrought there. It is true the two chief works of art mentioned by Strabo are pictures which must in any case long ago have perished; but then, who knows how many of the "votive offerings" and the medical inscriptions are yet below ground. The excavation of the *Asclepion* at Athens recently yielded a rich harvest, but there is much as to the details of the cult and ritual of *Æsculapius* still to learn. It is not reported yet whether the site is to be systematically excavated.

COARSE-GRAIN pit sand is well known to be more suitable material for making concrete than river sand, and owing to difficulty in obtaining the former a French concrete-maker has devised a machine for separating sand from ordinary earth by washing. The apparatus consists of a copper cylinder 3 ft. 3 in. in diameter. It is pierced with holes of varying size, the smallest being at the top and the largest, about 2½ in. in diameter, at the bottom.



The shaft on which the cylinder revolves is hollow, and through it water circulates under pressure, escaping into the cylinder through holes provided for the purpose. Hydraulic power is used for turning the cylinder at the speed of one revolution per minute. The earth is introduced at the top of the cylinder, where the smallest holes are situated, and there is an internal screw which causes it to travel through. In this way the materials of varying coarseness are separated, falling into suitable receptacles below, and are set apart for their respective uses, the coarsest being used for road-mending or concrete-making. The water escaping carries off fine sand and vegetable earth, and is run into one of two troughs in which it is kept stirred by revolving blades. The fine sand is gradually deposited, and the water, holding vegetable matter in suspension, passes to a series of basins in which the earth is deposited, and finally flows away to the river. The fine sand is used for the cement-mortar, and the *humus* is in demand for agricultural purposes. A plentiful supply of water is necessary for the successful working of the system, but in the case under notice its use has led to a considerable reduction in the price of cement pipes, together with a better quality. An account of the working of this machine may be found in the "Mémoires de la Société des Ingénieurs Civils" and in the "Proceedings of the Institution of Civil Engineers" for the present year.

DR. FRANK, of Charlottenburg, has recently given some interesting facts relative to the use of magnesia salts in place of plaster of Paris. Large quantities of potash are manufactured at Stassfurt, and magnesia salts are produced as a by-product. The possibility of finding some useful field for this has for some time occupied the attention of those interested in the industry. It was known that a mixture of chloride of magnesium and magnesia would produce a cement, but it was not found a practical success owing to the tendency to swell and blow, common to calcareous cements. Dr. Grundmann, of Herschberg, has, however, recently introduced a process which promises to relieve the overburdened potash manufacturers of some of the troublesome by-product. The magnesia is calcined and carefully slaked, and the casting made from it is afterwards exposed to the action of carbonic acid gas. The result is much the same as when a coke fire is made up in a room recently plastered in order to harden the material, as the coke fire also creates carbonic acid gas. There is a natural carbonate of magnesia, known as magnesite, which is of great hardness and density, taking a good polish. The material produced by Dr. Grundmann's process resembles magnesite in these respects. The magnesia can also be used for cementing, and in this way an artificial dolomite is made when combined with marble, or it can be used by builders as a stucco. Further particulars may be found in Glaser's "Annalen für Gewerbe und Bauwesen."

THE results of some German experiments, made by Herr J. Bauschinger, to give information on the elasticity and strength of the wood of larch, pine, fir, and deal, have recently been published. The tests were made on pieces taken from stems 13 ft. 1½ in. long, cut off 1 metre from the ground. A large number of experiments were made, the following being some of the chief conclusions arrived at. Crushing strength and density vary with the degree of moisture; bending and crushing strength form the best basis for estimating the quality of the timber; the bending strength is greatly influenced by the nearness of branches to the critical section; the modulus of elasticity and the bending and crushing strength are connected by some law, which can probably be represented by a simple linear equation; where the rings of growth have the same breadth in various samples, those with the greater proportion of summer growth are the stronger. The connexion between the crushing strength and density may be approximately represented by the formula,  $B = 1,000 \delta - 100$ , where B is the

crushing stress in kilogrammes per square centimetre, and  $\delta$  the density. These tests are quoted in the "Proceedings of the Institution of Civil Engineers," vol. lxxxix., p. 5.

"LA NATURE" gives some particulars communicated by Mr. H. Bonzami of an apparatus for testing the setting of lime and cement. It consists of a tube having, at its lower end, a flange which rests on the piece tested. On one side of the tube is a set screw, and inside it there is a rod, attached to the lower end of which is the needle by which the test is made. This needle is 1.180 in. long, and has a cross sectional area of 0.0015 square inch, or one square millimetre. On the upper end of the rod is a table upon which zinc discs, each weighing 1.76 oz., are placed to the required number. The rod weighs also 1.76 oz. On the side of the rod opposite the set screw there is a notch, the upper surface of which forms an inclined plane. Against the latter the end of the screw presses, and it will be obvious that the rod may be raised or lowered in the tube by turning the set screw either one way or the other. The setting of the cement is shown by the weight required to cause the needle to penetrate a certain depth, the latter being registered by a scale on the upper part of the rod. The instrument is described in the "Transactions of the Institution of Civil Engineers," and in the original communication in *La Nature* tables were given showing the difference in the progress of the setting of various products.

THE measured drawings and studies submitted for Col. Edis's prize for "the best series of measured drawings and sketches of any buildings in Great Britain and Ireland, of any style of architecture current between 1600 and 1800," has only been responded to by three competitors, whose merits, however, seem on the whole pretty evenly balanced, though we do not question the decision arrived at in favour of Mr. Greenslade's set. We understood from the terms in which Col. Edis announced, at a meeting one evening, his intention of offering the prize, that his idea was to make a practical protest in favour of measured drawings as against picturesque sketching, and therefore we were surprised to find perspective sketches included; but these appear to be secondary to the measured drawings, which in all the three sets seem to have been carefully done, and are, moreover, very neatly and effectively drawn without losing practical clearness. The author of the premiated set has taken the old Exeter Guildhall as his principal subject. The sketches by the late Mr. Devey, which have been hung at the Institute, are beautiful examples of picturesque sketching, getting a great deal of effect by a few broad washes of colour here and there on a toned paper. In the Arbitration Room have been hung the drawings submitted for the special Travelling Studentship in connexion with the Archaeological School at Athens. This, as elsewhere mentioned, has been awarded to Mr. R. Elsey Smith, whose drawings seem to show a fitness of things in the selection, as he alone exhibits drawings of Greek detail sketched on the spot, and also shows by one or two drawings from casts of figures and busts that he is equal to making a satisfactory drawing of a bit of antique sculpture, which may be of practical advantage, or even necessity, in work in connexion with the School at Athens.

THE best portion of the Exhibition of the Society of British Artists, in Suffolk-street, is in the first two small rooms, among the water-colours, where there are a good many very nice things, mostly small and slight, but interesting and original; among the larger and more finished works is a fine and solid, though rather loaded, drawing by Mr. Bernard Evans, of "Bolton Abbey from the Moors" (28). There are two noteworthy drawings by Mr. Fraser, "Barling Gap, Sussex" (173), and "Brighton Trawlers" (93); in the latter the craft are plunging through and throwing up the water with great vigour, but the artist has not got the surface and transparency of water,

only its movement. As to the large room, it contains a few good things amid a number of works either hopelessly mediocre or ostentatiously eccentric. The "Birth of Venus," by "Mr. William - Stott of Oldham," as he chooses to be called, is a mere monstrosity; and we cannot but wonder that Mr. Arthur Hill, who can paint the figure well, as shown in his "Young Slave" (240), should be content to exhibit in a gallery where such a production as this "Birth of Venus" is given a central and prominent place. Most of the things which are out of the run of commonplace are absurd eccentricities,—clever sometimes, but not worth going to an exhibition to look at, certainly not Mr. Whistler's scratches (we cannot call them drawings) which are hung on the stairs. The staircase and entrance have been treated as a "symphony in white," and look very well, but that only makes the greater part of the interior contents of the rooms the more disappointing.

WE frequently hear that very queer appointments are made to Surveyorships of Local Boards and Sanitary Authorities, and a query we have received this week seems to indicate that this idea is founded on fact. A correspondent writes to us on the headed paper of a certain provincial Highway and Sanitary Authority, under the signature of "Nemo," but with his name on the corner of the paper and "C. E." after it, to ask us to "give him the formula" for calculating the cubic contents of an apartment, which is a simple parallelogram with a semi-octagon bay at one end of it and a semi-circular bay at the other: heights figured. This problem seems to be too much for the "C. E.!" People who are so ignorant of their profession have no right to trouble a journal with "problems" which they ought to have been familiar with in their pupillage; and if "Nemo" asks us any more questions of the kind we will give him an answer, but we will give it with his name and address. In the present case we merely tell him that he will find the "formula" for the area of a circle in any primer of geometry, and he had better get one and improve his education; the rest of the matter, of course, does not even require a "formula." The question is, how did this gentleman come to be in a position to have his limited knowledge put to such exacting tests?

#### ROYAL INSTITUTE OF BRITISH ARCHITECTS.

The fourth ordinary meeting of the present session of this Institute was held on Monday evening last, Mr. Edward P. Anson, F.G.S. (President), in the chair.

The Edis Prize, Drawings by the late Mr. George Devey, J.C.

Mr. J. Macvicar Anderson (Hon. Sec.), announced the winner of the Edis Prize to be Sidney K. Greenslade, of 42, Ockenden-road, Islington. He further intimated that the Studentship of 50l. instituted by the Committee of the British School at Athens, with a similar sum added by Mr. P. Anson, had been awarded to Mr. Ravenscroft Elsey Smith, son of Professor T. Roger Smith.

Mr. Macvicar Anderson also pointed out that on the screens were to be seen two different sets of drawings of great interest and excellence. One set had been executed in the South of France by Mr. Needham Wilson, Soane Medallist in 1886, and to whom the Council had awarded the money premium connected with the medallion. The other set consisted of sketches by the late Mr. Devey, lent by his executors for exhibition. These were of great interest not only from the fact that Mr. Devey was no longer with them, but also from their intrinsic beauty and artistic excellence.

#### Proposed Art Exhibition at Munich.

Mr. Macvicar Anderson then read the following letter, addressed to the Secretary of the Institute:—

"Foreign Office, Dec. 15, 1887.  
SIR,—I am directed by the Marquis of Salisbury to state to you, for the information of the Royal Institute of British Architects, that his Lordship has been informed by the German Ambassador at this Court that, with the support of the Bavarian Government, the third International Art Exhibition will be opened at Munich from



the 1st of June next until the 3rd of October, and is intended to celebrate the hundredth anniversary of the first Art Exhibition held in that capital. His Lordship is informed that this Exhibition is under the patronage of H.R.H. the Prince Regent of Bavaria, and it is specially desired to obtain the co-operation of foreign artists, with the view of enhancing its interest; he has been requested to make it known to British artists.

Accordingly enclose you copies of the programme and regulations of the Exhibition, in order that publicity may be given to its objects, and am to request you to inform me what prospect there is of British artists taking part therein.—I am, Sir, your most obedient humble servant,  
(Signed) JAMES FERGUSON.

Mr. Anderson added that an answer would be sent to the effect that the Council would have great pleasure in giving publicity to the communication, with a view to British architects taking part in the Exhibition.

#### The Recent Development of the City of Vienna.

Mr. Frederic R. Farrow (holder of the Godwin Bursary) then read a paper on "The Recent Development of the City of Vienna," of which the following is an abstract:—

The author commenced by describing the separation between the City of Vienna and its surrounding town by a system of fortifications existing previous to 1857, and the proposals made to remove the separation, leading to the decree of the Emperor, issued Christmas, 1857.

**Decree of the Emperor.**—This decree provided for the removal of the fortifications, the appropriation of the area partly for open spaces, partly for sites of public buildings, for the formation of a boulevard round the city and a quay next the Danube Canal, for the sale of surplus land to form a fund from which were to be erected numerous public buildings, and for the promotion of a competition for designs of the proposed scheme.

**Carrying-out of the Decree.**—The competition was held, an official plan subsequently prepared in the Office of Works of the Ministry of the Interior, and the work commenced. The Stadt Park, the Palace Court, People's Garden, Rathaus Garden, and the Place in front of the Votive Church laid out as open spaces. The building fund was established by the sale of surplus land at prices ranging from 150,000. to 300,000. sterling per acre, from which was defrayed the cost of erecting public buildings on the Ring.

**Museum of Applied Art.**—Erected for the purposes of a Museum and Technical Art School during the years 1868-71 from the designs of the late Freiherr von Ferstel, Royal Gold Medalist, at a cost of 65,000.

**Cur Salon in the Stadt Park.**—A building used as concert-room and café, designed by J. Garben in florid Italian Renaissance.

**Opera House.**—Was the first public building erected on the Ring, having been built during 1861-1868 from the designs of Vander Nüll and Von Siccardsburg, at a cost of 500,000, for the accommodation of an audience of 3,000 persons.

**Academy of Fine Arts.**—Facing the Schiller Platz, designed by Baron von Hansen, and erected in 1874-76. Contained galleries for casts and pictures, library and reading-room, and accommodation for students of architecture, sculpture, painting, and etching.

**Museums of Art and Natural History.**—These twin museums, intended to form, with the Imperial Palace now in course of erection, one grand conception, from the designs of Semper and Hasenauer were commenced in 1872 and completed in 1884.

**Houses of Parliament.**—In Classical Greek style, designed by Baron von Hansen, consisted in the main of a one-story building on a basement, and provided for a House of Peers and a House of Representatives, with the necessary offices, &c.

**Rath-haus.**—Designed by Freiherr Friedrich von Schmidt, Royal Gold Medalist, whose plans were selected in open competition. Erected in 1872-1884, in Modern German Gothic style, with an admixture of Renaissance features. Included a grand ball-room, 12,000 ft. superficial area and 45 ft. high, with its attendant supper-rooms, salons, &c., a council chamber and municipal offices.

**University.** The buildings contained forty-six lecture-rooms for 6,000 students in the faculties of arts, laws, medicine, and theology; three large halls for festive occasions; examination-rooms, and a fine library, on the model of the Ste. Geneviève at Paris, for 32,000 volumes and 520 readers. The buildings were designed by Baron von Ferstel, commenced in 1874, and completed in 1885.

**Court Theatre.**—Designed by Semper and

Hasenauer in florid Renaissance, thus contrasting with the other buildings in the same group,—the Houses of Parliament in Greek, the Rath-haus in German Gothic, and the University in severe Italian Renaissance.

**Ring Theatre and its Commemorative Building.**—On the site of the Ring Theatre, destroyed by fire, 8th December, 1881, *Das Kaiserliche Stiftnngs-haus* had been erected, from the designs of Baron von Schmidt. This building contained a commemorative chapel and suites of residences in "flats." These latter were especially noteworthy, as showing the latest phase of feeling in Vienna in respect to such dwellings, the rooms being for the most part entered directly from a vestibule or corridor, a distinct departure from earlier types of plan, in which the only means of access to many of the apartments was by transit of other rooms.

**The Bourse.**—Designed by Baron von Hansen, and erected in 1870-1875 at a cost of about 350,000. The great hall, of basilican form, 195 ft. by 130 ft. in extreme dimensions; offices for bankers and stockbrokers, a corn exchange, &c.

**Hotels on the Ring.**—The Grand Hotel, on the Kärntner-ring, with 300 visitors' rooms; the Hotel Imperial, also on the Kärntner-ring, formerly the Palace of the Duke of Württemberg, and the Hotel Austria, on the Schotten-ring, each with 150 rooms, and the Hotel Métropole, on the Franz Josef's Quay, with 400 visitors' rooms.

**Palace of the Grand Duke William.**—On the Park Ring, overlooking the Stadt Park, designed by Baron von Hansen.

**Houses in "Flats."**—The "Heinrichshof," one of the largest in Vienna, situated on the Ring, and built from the designs of Baron von Hansen. The house "Zur Kugel," or Globe House, erected in the Hof, in the Baroque style prevalent in old Vienna, from the designs of Ludwig Tischler, combining café and restaurant with dwellings on the upper floors, planned on the most modern system, with the rooms entered from vestibules or corridors. House of Herr Neumann, in the Rudolfs-platz, with stone façade, an exception to the stucco generally used in Vienna. The "Arkaden-Häuser," near the Rath-haus, luxuriously fitted blocks of residences, with cafés and restaurants on the ground floor. A group in the Stadiongasse, also near the Rath-haus, planned on the older system of residences in "flats." The Schwarzenberg group, containing 100 dwellings in three blocks, also planned on the older system. The private house of the brothers Böhm, in the Maria Lifer-strasse, with the ground floor arranged for shops and small residences for letting, and the third floor also arranged for letting. The Commercial Bank, a combination of business premises and residences on the upper floors.

**Other Developments of Viennese Architecturally.**—The author briefly noted some of the churches of Friedrich Schmidt, the Brigittenan, the Weissgärber, the Lazaristen, and the octagonal planned and domed Gothic church in Fünfhäus.

Mr. Thomas Blashill, Superintending Architect to the Metropolitan Board of Works, next read a short paper on the subject of "Architectural Design in Viennese Buildings." He commenced by referring to the drawings and photographs he had obtained during a recent visit to Vienna, which illustrated most of the important new buildings. A plan, prepared in the office of the architect to the municipality, showed the situation and surroundings of the city, which, as regarded latitude and altitude, only slightly differed from London. The climate, however, differed materially, and the general brilliant sunshine makes Vienna, to English eyes, first of all, bright. It could not be called a manufacturing or commercial city, but more the residence of the Emperor and wealthy classes. In some of the suburbs were important villas, but the middle classes lived mostly in flats, in which accommodation was far more expensive than a house and garden in London. The working population occupied houses of some architectural pretensions, with rather high rooms, in which, however, they were closely packed. From an elevated point, near the beautiful "Volks-garten," the chief of the new buildings could be seen: the Hof, or Court, theatre, now being completed by Baron von Hasenauer, sumptuous in design and decoration and open on every side; Ferstel's University, and his Votive Church; the Palace of Justice; the Town Hall, by Baron von Schmidt; and the Houses of Parliament, by

Baron von Hansen. These names would be familiar to the Institute as those of past or present Honorary Corresponding Members. Following along the wide Ringstrasse were the two Imperial museums, and opposite to them the new Palace of the Emperor was slowly rising. Blocks of private houses filled up intervals and formed backgrounds to the view. The new Opera-house, rather beyond the view, was a fine Renaissance building, possessing an auditorium very successful in respect to sight and sound. The grand church of St. Stephen was a rare ancient example of the Gothic style, but the Votive Church and the Town-hall were almost the only modern instances of Gothic in that area, the group of spires in the latter forming a picturesque feature above the horizontal lines of the general mass of buildings. The sober character of the great mass of Italian designs was striking. Doorways, windows, &c., seemed old friends of thirty years' standing, and, though specimens of good Renaissance were not wanting, there was little or nothing of the very "free Classic" which, in the interval, had flourished in London. The Houses of Parliament was the only instance known to Mr. Blashill of the successful use of the Greek style in a large and complicated design. In this work it was developed into life and beauty. The building was of greyish-white marble, and the interior richly designed in coloured marbles, adorned with figure sculpture and harmonious decorations. Figure sculpture was a striking feature of the new architecture of Vienna. It was very cheaply executed, and was employed in every situation in which the human figure could be placed in the exterior of a building, and also much used in interiors. The back elevation of the University building furnished a good example of external *scagliola* work. In Vienna, it seemed probable that it would long retain its freshness. Terra cotta was used in enriched friezes and figure sculpture. Although much used, brick was seldom seen in the elevations of important buildings, much of the architecture being executed in cement upon a structure of brick. Stone was not the local building material, but good grey marble, reddish-white marble, and light grey limestones were obtained for important buildings, besides the richly-coloured marbles lavishly used inside the Houses of Parliament. Portland cement had been much used, but old work executed in a local plaster were well, and this plaster was still used. The new improvements were the results of a grand combination of tact, talent, and business capacity, and were worthy of study. Having referred to the employment of women as bricklayers' and masons' labourers, Mr. Blashill concluded by expressing his thanks to Baron von Hansen, Baron von Hasenauer, and Baron von Schmidt, who had received him cordially, and rendered him much assistance.

Mr. William Woodward, in opening the discussion, said he had listened to Mr. Jackson's remarks before the Architectural Association the other evening to the effect that the history of architecture was mere antiquarianism, and that building operations were confined to the builder. He had also heard Prof. Kerr, in an eloquent and commendatory peroration, endorse to some extent the views laid down by Mr. Jackson.

Prof. Kerr protested that Mr. Woodward was not correctly stating what took place.

Mr. Woodward continued that he was, therefore, not surprised at the absence of the representatives of high art, and of artistic architecture, on the occasion of the reading of papers on the laying out of streets (a voice: "Query")? Mr. Woodward then went on to criticise the way in which the Metropolitan Board of Works laid out new streets in London.

Mr. Henry Dawson proposed a vote of thanks to both the readers of the papers. They were very much indebted to Mr. Farrow for the painstaking manner in which he had brought the different features of Viennese architecture before them. It would take too long to enter into a discussion of the details contained in the papers, but he believed they formed, taken together, one of the most useful contributions of the kind the Institute had had for some time past.

Mr. Arthur Cates in seconding the vote of thanks, said he considered the members were very much indebted to Mr. Farrow and Mr. Blashill. Mr. Farrow had had the advantage of visiting Vienna as Godwin Bursar, and it was to their respected friend, Mr. George



Godwin, that they owed a great deal of what Mr. Farrow had given them (applause). The result of Mr. Farrow's labours showed how great an advantage was to be derived by a young man from obtaining the Bursary so liberally and generously founded by Mr. Godwin. He was sorry, therefore, that on the last occasion on which the Bursary was offered there was no competitor for it. Whether that arose from the profound ignorance of modern languages which characterised the generality of the young men of the day, or from indifference to foreign ideas, he could not say, but the fact that there was not a single competitor for the Godwin Bursary was not creditable to the Institute or to the profession at large. They were especially obliged to Mr. Blashill, considering the high position he occupied, in devoting so much attention to what was being done in Vienna (applause). Thus that evening they were favoured on the one hand with the views of the student, and on the other hand with those of the mature official, highly placed. He believed, indeed, that London, which had suffered so much in years past from great neglect, would derive much advantage from the studies Mr. Blashill had so well made and put before them that evening. There was a curious parallelism between what had been done in London and what had been done in Vienna. About the year 1856 a great project was set on foot in London for what was called the Public Offices, and a very beautiful plan by a Belgian architect, he believed, was presented for reconstructing the district between Whitehall and Westminster Bridge. The result could be seen in the Foreign and Home Offices, and in the shattered scheme for the Admiralty and War Offices, which had been withdrawn in order that the old and somewhat wretched buildings of the Admiralty should be extended with buildings of a similar kind, while part of the site acquired for the Public Offices was to be sold as a commercial speculation to meet the cost. When they considered the expenditure on those Viennese buildings, they ought, as a nation, to be ashamed of themselves. The contrast between what could be seen in Vienna, Prague, Munich, Dresden, Berlin, and other Continental cities in the way of a wise expenditure for the improvement of these cities, and for the people's pleasure, and what was done in this country was very great indeed. He could not say that the Continental architecture was in all degrees perfect, but it did show much consideration for general harmony of composition, for outlay, and for liberality of conception. He knew of nothing finer than the great staircase of the University of Vienna, or the large hall of the Reichsrath, and the same principles governed the whole of the designs. The key to that was doubtless the fact that the architects were subjected to academic training, which might produce some hardening of the eye and hand, but which, at the same time, gave that idea of harmony and power of general disposition which was so important, but which unhappily so many English architects neglected. He did not know that our public bodies were so much to be blamed. The architects themselves had not the courage to lay down their plans with due regard to liberality of disposition, but were always overcome with the idea of economy, encouraging their employers to cover every inch of the ground, and especially so in London. As Mr. Farrow had shown, ground in Vienna was at least as costly as in London, and while house-rent was more than double, yet they were ready to make open spaces for the beautification of the city, and the benefit of the public at large. In London, and in England generally, in place of that wise and generous expenditure, every scheme was spoilt and blasted by what could only be termed a profligate parsimony and a wasteful economy. There was a curious parallelism also between Vienna, Paris, and London. The Ring Strasse of Vienna was constructed upon the site of the old fortifications. In Paris, again, the magnificent boulevards occupied a similar place. In London there were no boulevards, but about the year 1750 a scheme was set on foot for forming a new road from Islington to the City. In 1757 an Act was passed authorising the formation of the "New Road," which was now known as Marylebone-road, Euston-road, and the City-road, with an express provision that the road should be of a certain width, and that no buildings should be constructed within 50 ft. of the line. Any one

who walked along the New-road of to-day would say that it was one of the most miserable examples to be seen in any great metropolis (applause). If its wretched shops could be cleared away, and the road restored to its original state it would be evident that a magnificent opportunity had been lost for placing public buildings along the line, and making a fine Ring Strasse. The opportunity had gone, and he only referred to it as a warning, so that in future care should be taken that no more of such buildings were erected on the western part of the thoroughfare, which had been saved by the fortunate intervention of the freeholder. London, at one time, had magnificent streets and open places, but in too many instances the buildings had been brought up to the edge of the road. He had been much struck, in successive visits to Vienna, with the development which had taken place there. Mr. Blashill had shown that the stucco used externally was not of an offensive character. Mr. Blashill had spoken well and truly of the respect in which the Baron von Hansen was held by his pupils. Some three or four years ago, when the Baron entered on his 70th year, it was the subject of general congratulation, and the period was marked by great festivities. The Academy at Athens, to which reference had been made, was a building of exceedingly pure Greek work, and its design and execution were of the highest character, while the marble masonry was, in accuracy and fineness almost equal to the best masonry in the Parthenon. Mr. Cates bore willing testimony to the extreme kindness and courtesy with which the Viennese architects received their brother professionals from England. Of all kind friends he had met there, the kindest was Baron von Hansen, who, old as he was, still devoted himself to the completion of the decoration of the Reichsrath.

Professor Kerr thought the discussion had gone into a very proper channel. They were indebted to Mr. Woodward for bringing it into that channel, and to Mr. Cates for the remarks he had made, but what they must bear in mind was this, that the authorities in this country could not exercise full powers over the architectural decorations of the metropolis. They, as architects, might fret under such a state of things, but when they considered that the Metropolitan Board of Works was under the control of the ratepayers, and Parliament the same, it was obviously impossible to achieve such works as were accomplished by Imperial Governments on the Continent. Public architecture did not flourish under a Government like ours, and he was afraid it never would except in this way. If they went through the City of London they would see many buildings which, with all their faults, constituted a series of works which were considered by foreigners to be exceedingly creditable to English taste and English enterprise. And it must be borne in mind that our system of architecture was different from any Continental system, relying, as it did, on individuality of design and effort. Whatever was done in this country was accomplished by the hive of bees working each one by itself. What was accomplished on the Continent was done by centralised power. This ought to be borne in mind, and they should take to themselves the credit of at least doing their own work in their own way, and in such a manner as to be considered honourable by those who were strangers. At the same time, it was well that the Institute should never cease to deplore the fact of the public authorities not being alive to the great principle that the decoration of a town "pays" (applause). What would France be without the liberal expenditure upon art which characterised her Budget every year? England had no Art Budget, and they, as architects, could not too often impress upon the public and the Government the great economical maxim that the expenditure of public money upon art was a beneficial expenditure for the nation at large, and a most profitable investment. (Applause).

The President said it was now fifty years since he saw Vienna, and six years since the first steps were taken to embellish and improve that ancient city. What had fifty years of comparative peace after twenty or thirty years of desolating war not done? It had not only affected Vienna, Paris, Brussels, and Berlin, but London also, and in spite of the shortcomings of our administrators and the little interest that was admittedly felt by this nation in art, he would ask what had not been accom-

plished in London? London was a fine city among the fine cities they had been talking about, and in spite of what had been said regarding the much-abused Metropolitan Board of Works, what finer work had been accomplished amongst the cities of Europe than the Thames Embankment, which had been carried out by that much-maligned Board? (applause). Some reference had been made to the satisfactory use of plaster on the new buildings at Vienna, and he might add that in some of the noblest works plaster had been very satisfactorily used. The Farnese Palace at Rome was plastered externally, the dressings being of stone. Many of the finest palaces at Genoa were plastered, and if it were applied as plaster, and did not pretend to be stonework, it might be satisfactorily applied even in the grandest buildings. The resolution was then put, and carried by acclamation.

Mr. Farrow, in returning thanks, added that as an illustration of the enormous rentals paid in Vienna for a suite of rooms on a flat, one gentleman he knew, with a salary of 3000. a year, was paying 100l. for his rooms on the third floor of one of these buildings. The *agraffe*, which was used somewhat largely in Vienna, was to a greater extent used in Buda-Pesth. Besides the numerous Bohemians who came to work in Vienna, large numbers of Italians also came, the latter being employed in masonry work.

Mr. Blashill also returned thanks, and bore testimony to the excellent practical information which Mr. Farrow had given them that evening.

The President announced that the next meeting, which would be a special general one, would be held on the 16th proximo, for the award of prizes and studentships, the work for which was to be submitted before the 2nd of January.

Mr. W. H. White (Secretary) announced that the Exhibition of Candidates' Drawings for Studentships, Prizes, &c., which would open on Friday, the 13th of January, at noon, would close on Saturday, the 21st of January, at four p.m.

The proceedings then terminated.

#### THE CONSTANTINOPLE MUSEUM.

SIR,—My report to the Chairman of the Palestine Exploration Fund (printed in your paper of the 10th inst.) respecting the Sidon sarcophagi has, I find, attracted much attention.

These monuments will be housed in the Museum at Constantinople when the additions to it are completed; and as I find that its existence even is very little known I think that a short description of its present position and that of the School of Art which is connected with it may not be uninteresting to your readers.

The Museum is located in the gardens of the Semağlio, and may be approached either by the tramway leading to St. Sophia or by water, the visitor landing at the quay under the old walls, which are there well seen.

A good opportunity is also thus afforded of seeing the well-known inscription upon them, the greater part of it being very well preserved.

The Museum building was formerly the *Tehinili-Kiosk*; in itself an object of interest as it is said to have been built A.H. 870 (A.D. 1466), and to have been the first monument erected by the Turks after their conquest of Constantinople.

It was repaired and embellished A.D. 1590, and is in a beautiful position, is very picturesque both externally and internally, and is very fairly lighted.

The collection is at present small, but comprises several objects of great interest. Amongst them may be noticed a marble sarcophagus splendidly sculptured with mythical scenes (*Ariadne*, &c.), and supposed to be of the time of the Antonines, a large collection of gold and other objects found by Dr. Schliemann at Hissarlik, and three terra-cotta sarcophagi found at Clazomenae, which are considered by the Director to be Assyrian. To me they appear to be more nearly allied to Greek art. These sarcophagi have no covers, but there is a fourth sarcophagus, not yet exhibited, which has a circular-headed cover.

The Museum possesses, also, one of the serpent heads of the famous bronze tripod in the Hippodrome and two bronze figures of



extreme beauty, though somewhat injured, and assigned by various authorities to the age of Polyosetes and Praxiteles,—certainly before Lysippos. They are said to have been found at Tarsus. Of these and the other interesting contents of the Museum there is, unfortunately, no catalogue.

When I visited the Museum some few years since there was a very good one, drawn up in French by M. S. Reinach, from whose description much of the above is given. But this is now out of print, and no other has been issued, the Director waiting, as he told me, until the new objects from Sidon, &c., can be properly housed and classified. The absence of a catalogue and of any descriptive notices on the objects, together with the difficulties which are placed in the way by the attendants of making even rough sketches, seriously interfere with the utility of this otherwise very interesting collection.

In the same garden, equally well-placed with the Museum, is a school of art, to which his Excellency Hamdi Bey pays great attention, he being, I am told, encouraged in this work by the direct approval of the Sultan himself.

I went all over this school at the invitation of Hamdi Bey, who is anxious to make his work widely known, and to have the co-operation in it of European societies and lovers of art generally, by furnishing him with casts, copies of Transactions, &c.

There were at the time of my visit, I was told, 130 students of various nationalities,—no test of any kind being required. They were being instructed in separate classrooms in perspective, drawing from casts and from life, colouring, the elements of architectural design, and, generally, in all the work of an art school. The only objection as to the architectural work which I had to offer was that the teaching was altogether French as regarded the style of design, although the school had the beautiful forms and details of Byzantium at its very doors.

But this matter may be (and I trust will be) remedied, and the school then be of much benefit to native art. It certainly appears to have a very successful beginning.

T. HAYTER LEWIS.

Athenæum Club.

#### THE PROPOSAL TO MAKE ARCHITECTURE A CLOSE PROFESSION BY IMPOSING THE TEST OF EXAMINATION AND REGISTRATION.\*

THE subject on which I propose to address you to-night is not one in which I have myself taken any pleasure, nor does it fall within the usual scope of those which are discussed by your Society, which has for its object the improvement of its associated members in that noble art to which we have devoted our lives. The proper subject for our habitual thoughts is not architects, but architecture; not ourselves, but our art; and I would much rather have talked to you about brick and stone, timber and marble, than about Acts of Parliament, registers, and examinations. But however much we may grudge the time which it is necessary to bestow on questions of professional practice, it is obvious we cannot afford to neglect such questions entirely, especially when they affect not only the personal well-being of architects themselves, which is or should be a very secondary consideration, but the actual well-being and progress of architecture.

Such a question is the one which I have chosen to speak of to-night. It is obvious that so sweeping a revolution as that by which what is now a free and liberal art, to the pleasures and honours of which all may aspire who can obtain employment, would be converted into a close profession like law, physic, and divinity, to which admission could only be obtained by apprenticeship, payment of fees, examination, and diploma, could not be effected without influencing for good or for evil the progress of architecture in the kingdom. It is, therefore, a matter which ought to be thoroughly considered in all its bearings, and from all points of view, both by those who follow architecture as a profession and by all others outside our ranks who value the progress of art among us. Nothing could be more

disastrous than that such a radical measure should be hurried through Parliament and become law without any real certainty that it is desired by the public, or even by the whole body of architects; without any clear prospect that it would help to improve the architecture of the day, or even that it would not, on the contrary, fatally injure it; without due consideration for the case of those on whom the new restrictions would press with undeserved hardship; and, above all, without proper intelligence of the undoubted blessings of liberty from State or bureaucratic control which we should sacrifice. This thorough and impartial consideration the proposition has never yet received. The advocates of the measure have had their say, and have probably said all that is to be said on their side of the question. Those who object to it have been generally silent; the success of the scheme seemed to them unlikely, and the attempt to carry it out not dangerous; and they have consequently turned away with a feeling of security from the discussion of a question which, while it remained a mere question, was uninteresting to them. The time has, however, arrived when their views ought to be known, and the arguments against the proposed change ought to be listened to with equal attention to that which those of their opponents have received. It is for this reason, therefore, that I have chosen as my subject to-night "The Proposal to make Architecture a Close Profession by imposing the Test of Examination and Registration." It seemed to me also that the discussion which I wish to provoke would, with special propriety be begun by one, like myself, who is not a member of the Institute or any other architectural society, and who may therefore be regarded as in a special way able to look at the matter impartially.

The history of the scheme and its growth from a mere speculative idea into the concrete form of a Bill, which it was sought to bring into Parliament last session, is given briefly in the *Journal of Proceedings of the Royal Institute of British Architects* for November last. From that account it appears that the Council of that Society for 1859-60 reported that "the establishment of a system of compulsory examination, extended to all architects, whether members or not of this Institute, was considered desirable." The first step taken towards this end was the establishment of voluntary examinations of candidates for admission to the Institute, which, after some twenty years, became compulsory. The further extension of this examination is now seriously contemplated, and Mr. Connon, the author of a paper in the *Journal* I have just cited, says that "should compulsory registration become an accomplished fact, the registering and examining authority should alike be vested in the Institute." Meanwhile, however, in the absence of any sort of coercion, it would appear from the same account that these examinations have not been attended by a great measure of success. From 1861-81, while the examinations were voluntary, the average number of candidates who passed annually was less than three; while, since 1882, when the examination for admission to the Society became compulsory, the number has risen only to twenty or thirty, although, according to one statement, no less than 400 students, on an average, enter the profession yearly. It is clear, therefore, that we are very far from the state of things contemplated by Mr. Connon under which the Institute would hold the keys of admission to the profession.

As a step towards the attainment of that object, it is now proposed that all the local architectural societies in the kingdom should accept the Institute as a common head, to which they should be affiliated, so that the parent society should stand to architects in the same relation as the Incorporated Law Society to solicitors and attorneys. But in spite of the analogy, this dignified position will not, it seems, be willingly accorded to the Institute by all those who promote compulsory registration, and it is from the dissentients that the first tangible scheme for closing the architectural profession has seen the light in the form of a Parliamentary Bill. Whether if registration were carried the Institute would have the management of it or not it is unnecessary to discuss here. I should myself agree with Mr. Connon that it would be the natural and most convenient plan; but this is only a matter of detail, and I wish to-night to confine myself to

principles. Setting aside this point, the Bill, of which I dare say most of those in the room have seen an abstract, may be taken to give correctly in the main the nature and scope of the restrictions which it is desired to place on the pursuit of our craft. I propose to examine them in detail.

The Bill calls itself "The Architects and Engineers Act," but it includes surveyors also within its jurisdiction, and its object is to combine architects, civil engineers, and surveyors,—surely a strangely heterogeneous assembly,—into a close profession of which the members are to be registered after a qualifying examination, and of course payment of certain fees. After a certain date it is proposed that any unregistered person calling himself an architect shall be fined 20*l.* for the first and 50*l.* for each subsequent offence; that no public body shall give him any appointment; that his certificate shall have no legal value; and that he is to have no *locus standi* in a court of law for recovery of his professional charges. The only way to registration is to be in the first place by apprenticeship to a registered architect for a term in general of five years, and afterwards by examination. The term of apprenticeship is reduced to two years in the case of assistants of five years' standing and students who have passed the examination of the Institute or others like it; while assistants of eight years' standing are excused the examination, though one reads with surprise that even they are expected to serve an apprenticeship of two years beyond that time. Such is the outline of the Bill, which may be summed up in three words: registration, to which the avenue is by apprenticeship and examination.

Looking more closely at the details of the Bill one cannot but be struck by the unequal measure meted out to apprentices and assistants. The article pupil may present himself for examination after five years' pupillage, but the salaried assistant after serving five years must undergo two more as a pupil before he can do so. Now it is likely that before he became an assistant he had been some years learning his business in an inferior capacity, so that probably he would have undergone a probation of nine or ten years before, in the opinion of the framers of the Bill, he was qualified to offer himself for examination. But during these five years the assistant is at least as likely as not to have made better use of his time than the pupil, and it is simply unjust that the man who can afford to pay a premium should be floated into the profession at the end of the time, while, from want of a golden key, his poorer companion has to go to school again for two years more. This is a hard case enough, but what must we say to that of the assistant who is to be subjected to two years' apprenticeship after eight years of service as a draughtsman, which probably implies twelve years or more of training for a profession to which the man with a premium in his hand may obtain admission after five years or less. If the final qualification is to be by examination, what need is there for the further qualification of apprenticeship? If an assistant or any one else can pass the examination, that ought to be enough. But this evidently is not the intention of the Bill, which proposes to adopt the restrictions of the old trade guilds and modern trade unions. Like them, it makes apprenticeship the only door of entrance, and as no architect in his senses would take pupils without a premium, their services being of little or no use even at the end of their term, the result would be that there would be fewer architects to share the same amount of work, and that poor men, however well qualified, would be left on the outside of the door, while a golden shower of premiums would fall on those who are on the right side of it. As the same fortunate persons are to have the sole right to hold public appointments, it is easy to see who would be the gainers and who the losers by the new state of things. Although the Bill professes to be drawn in the public interest, it is not our fault if it awakens that incurable suspicion with which we regard those who propose that certain privileges and advantages should be conferred on them because it will be for the public good that they should enjoy them.

The preamble of the Bill, however, boldly takes its stand on the ground of public interest. It runs thus:—"Whereas it is expedient that persons requiring professional aid in architecture, civil engineering, or surveying, should

\* A paper by Mr. T. G. Jackson, M.A., F.S.A., read at the Architectural Association meeting, at 9, Conduit-street, on Friday, December 16, 1887, as elsewhere mentioned.



be enabled to distinguish qualified from unqualified practitioners, be it therefore enacted," &c.

This beginning would naturally lead one to suppose that the Bill emanated from the public, anxious to protect itself from incompetent practitioners. Nothing, however, can be farther from the fact. The scheme for closing the profession, and this Bill, which is the first outcome of it, are the offspring of architects; they come from within the profession itself and not from without, and this alone is enough to justify the outside public in regarding it with suspicion. The general body of mankind is, in fact, wholly in the dark about us; they neither know nor care whether we are organised into a close profession or not. I have even heard it said that nineteen men out of twenty, in a mixed company, if questioned on the subject, would be obliged to confess that they had never even heard of the Institute, a statement so nearly, if I may say so, bordering on profanity, that I should hesitate to repeat it had I not heard it from the lips of a member of the Council of that respected body. Nothing can be more complete than the indifference of the outside world to these plans for revolutionising our condition, except its ignorance of them.

There has not been the least sign that any one outside our own ranks is otherwise than satisfied with things as they are, unless it be Lord Grimthorpe, who wrote to the *Times* approving the idea of examination, but saying at the same time, that there was nobody among us fit to be examiner. To his support, such as it is, the promoters of the Bill are, so far as I am concerned, heartily welcome; but with this solitary exception, I know of no instance in which the public have given any sign that they require the kind of protection the Bill offers them; nor do I believe that if they had it they would attach the least importance to it. Had it been otherwise, surely the tentative and imperfect tests of qualification, which have been afforded by the examinations of the Institute would have attracted some attention. But who can recall an instance in which membership or non-membership of that or any other architectural society told to an architect's advantage or disadvantage? What employer ever troubled himself to inquire how many and what capital letters the architect whom he thought of employing could write after his name? On the contrary, it is notorious that an architect may reach the highest grade among his brethren, and, in the estimation of the outside world, without being a member of any architectural society, in proof of which we need look no further than the list of architectural members of the Royal Academy. Obviously, the public are wise enough to trust rather to their own eyes than to those of other people; they are content to judge architects as they do painters and sculptors by their works, and they find in them a better guarantee for good workmanship than would be afforded by any diploma or registered certificate of competency.

As to the protection against bad work which it is pretended the Bill would give, the public have already taken the matter into their own hands without any aid from us, by erecting an elaborate machinery of local boards, sanitary authorities, and district surveyors. If this machinery is properly worked, unwholesome and unsanitary building ought to be impossible, and if bad work does manage to pass through such a sieve it would probably pass through any other that could be devised. If the surveyor does his business it is impossible for drains and soil pipes to convey sewer gas into houses, or for the construction, so far as the plans go, to be insecure, and any subsequent failure must be the result of bad workmanship or wilful negligence on the part of the architect or builder in carrying out the work. Against negligence, of course, no diploma is any protection. Whatever certificates of competency an architect may have it will not be enough that he should know how things ought to be done; the public will not rest satisfied with that, but will insist on seeing that he does it. No one can seriously believe that they will dismiss their local surveyors and shut up their Building Acts and By-laws as unnecessary when the world is supplied with a duly certified and registered body of architects. The regenerate architect, if ever he comes into being, will have to pass local boards and their surveyors just as we unregenerate have to do, and he will be very sanguine if he supposes his diploma will be of any assistance to him or will be

regarded by the outside world as affording any security which would enable them to dispense with that of the Local Government Act. So far as public security goes, the proposed measure would add nothing to it; the present machinery is sufficient if properly administered, and if necessary its efficiency can be increased and its powers enlarged. Society may safely be left to take care of itself in this respect, and it is certainly no business of ours to undertake to defend it against ourselves.

In support of the scheme for closing our profession a great point is made of the analogy of other professions which are already closed. In the paper by Mr. Connon, to which I have already referred, we read,—"The demand is no new thing. It has already been granted by the State to the clergy of the Established Church, to military and naval officers, to members of the Civil Service, to physicians, surgeons, and apothecaries, to solicitors and barristers, to chemists and druggists, to dentists and veterinary surgeons, to metropolitan surveyors, to colliery managers, to certified teachers, to ships' captains and mates, and to steamship engineers." But the analogy sought to be drawn between these professions and our own craft is fallacious. Many of them have inherited their privileges and monopolies either from trade guilds and mysteries of the Middle Ages or from ecclesiastical usurpation, and cannot be said ever to have received them directly from the State. Others, again, like doctors and chemists, have to deal with matters of instant life and death, and it is clear that we have a right to feel sure that the man who serves us knows the difference between Epsom salts and oxalic acid. With a still larger number of cases, such as those of officers in the army and navy or of the Civil Service, District Surveyors, and certificated teachers, we have absolutely no analogy at all, for all these persons are public servants paid by the State, and the public which pays has, therefore, a right to be assured that they are worth their wages before it engages them. In our case there is nothing parallel to this, for the State certainly does not engage to find a practice for those of us who preve, by examination, that we are competent to undertake it. Neither is our case analogous to that of the Church. The established clergy enjoy emoluments and immunities at the public expense, and some of their acts have a certain legal value. It is evidently only in virtue of these endowments and official duties that they are under State control, for in the case of other denominations which enjoy no such privileges there is no State control whatever, and any one who pleases is at liberty to undertake the office of minister without incurring any pains and penalties. So also in the case of certificated teachers, the Government interferes only where there is a question of receiving a grant of public money. Schools that receive no Government aid may employ uncertificated teachers if they please. The analogy attempted to be drawn between these cases and our own is entirely fallacious, but even if there were anything in it it would not be worth much as an argument unless we are prepared to invite the State to play a paternal part and close every profession that is now open for fear an innocent public should be imposed upon by incompetent professional men.

But it is time to point out that the Bill offers no sort of protection against the worst kind of building that goes on in our midst. It only aims at preventing people who do not know how to build calling themselves architects, a matter which need not trouble us very much, and it leaves the "jerry-builder" unharmed so long as he does not offend our respectability by ranking himself as one of us. There are, of course, bad architects in the world, but there are few of them who do not know how to build houses that will stand, and be wholesome to live in. It is not, so far as I have observed, in their buildings that the evils occur which are generally complained of. I remember a case where, after a family had lived a few days in a new house, all the drains were mysteriously choked up, and where, on examination, it was found that the leaden soil-pipe was carried into the ground and the end turned up and closed without any pipe drain from it at all; but this house was one of a dozen or so built by a speculative builder without an architect. I remember another case in the present year where a house fell down, which proved to have been designed, not by an architect, but by a plumber. And let it be observed that with

cases like these no Registration Bill would interfere. Let the builder call himself a builder, and the plumber a plumber, and they would incur no penalty. If they avoided the sounding title of architect they might go on designing and building these filthy and insecure habitations as long as the District Surveyor let them. To make the Registration Bill efficacious it would be necessary to insist on the employment of a registered architect on every building that is put up. This would be protection indeed with a vengeance, but though it is difficult to regard it seriously, I observe in the same journal to which I have more than once alluded that one gentleman actually suggests that local authorities should be required to condemn plans prepared by any other than a properly-qualified architect.

Here at last we seem to have the *reductio ad absurdum* of the whole scheme. It begins by shutting the door against all but those who can afford to pay the premium of apprenticeship, and having thus limited the number of architects to a fortunate few it proceeds to sweep into their net all the building operations of the kingdom. Surely the wildest imagination can go no further, and may well rest satisfied with the glorious prospect of such a good time to come.

Before leaving this branch of the subject it is necessary to notice one strange argument, I must, I fear, call it a selfish argument, in favour of making architecture a close profession. It is supposed that in some mysterious way the social status, as it is called, of the profession would be thereby raised,—an idea which embodies a sort of complaint that architects are not thought of as highly as they deserve.

Now, even if it were true, I must object that this is an unworthy argument, which we ought to be the last persons to employ. But I believe the complaint to be wholly unfounded; there seldom was a time when the calling of an architect stood higher in public estimation, certainly there never was a time when so many young men of higher culture and superior position flocked into it. Among people of educated taste it seems to me that architects and their works receive quite as much attention and commendation as they deserve; and I am far more afraid that our profession will become fashionable than that it will be despised. But however this may be, it is certain that it will gain no additional respectability from the Registration Bill, nor will those who now think themselves too low on the social ladder find themselves raised by a single step if that Bill becomes law.

Setting aside, however, this Parliament-made gentility, which may be left to dazzle those who fancy it, and the more solid advantages of loaves and fishes, which the Bill is to confer on the new profession,—setting aside, in fact, architects themselves altogether,—let us turn to the far more important question of what the revolution will do for architecture.

The object which its promoters have in view is thus stated by Dr. Connon. He says, "That the largest proportion of the profession are as well educated and as highly trained as they would be under an Act of Registration is probably true. What is sought is the exclusion of those who sink far below the standard which should be the lowest level of fitness." It is intended, therefore, that the unworthy should be shut out by the test of examination; but nothing is said of the exclusion of those who, for want of means, are unable to undergo the compulsory apprenticeship which the Bill requires, whether they are able to pass the test of examination or not.

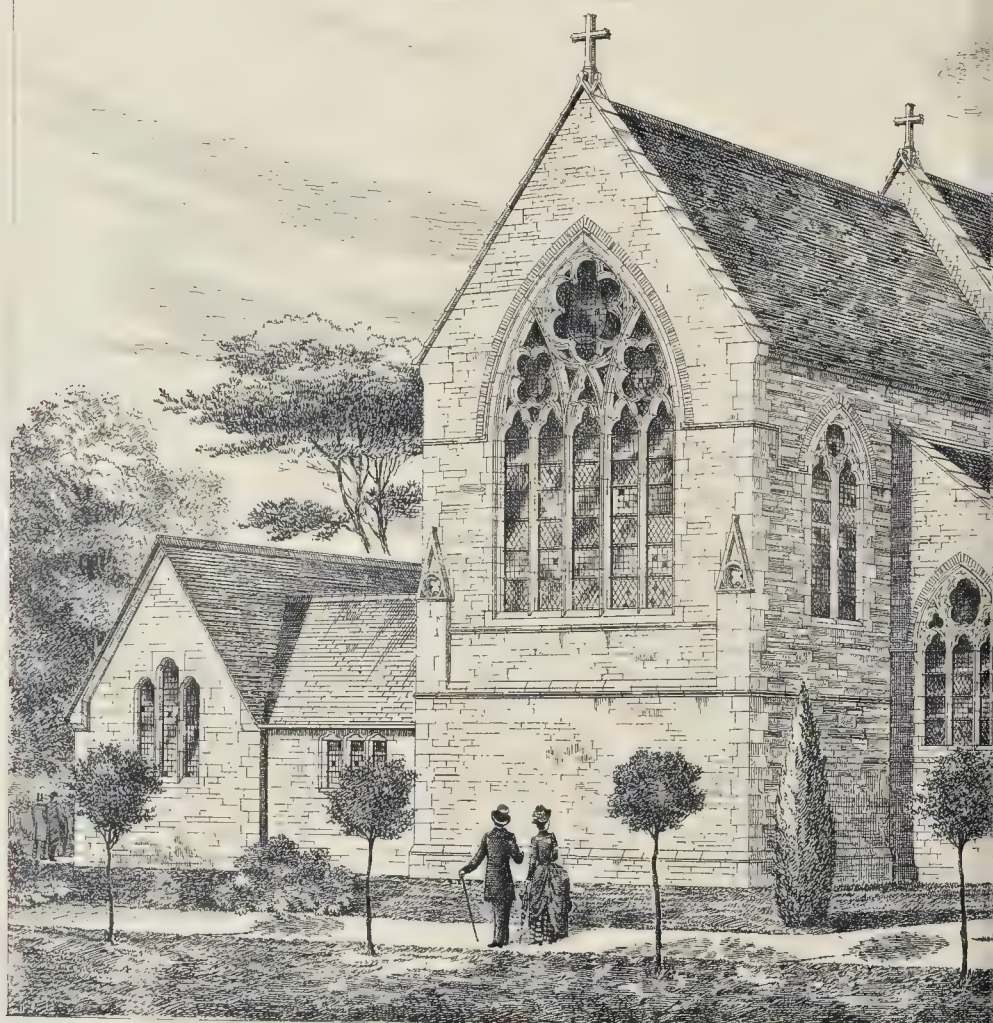
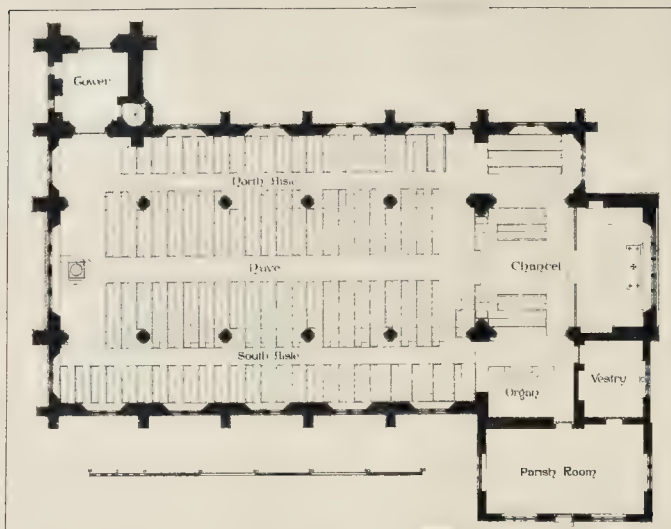
This condition would have the effect of narrowing the field to those who can afford to pay for entering it, and there would certainly be no gain to architecture in this. Every one must know of cases of men who have risen from assistants into architects and done excellent work, though they have never gone through a regular pupillage, and who would have been lost to the profession had the proposed Bill been in force.

But we are told, further, "that the profession of architecture would benefit greatly by the universal education of its followers which would follow from legal registration." And this brings me to what is, perhaps, the most misleading of fallacies, and one which seems to underlie all that has been written and said on the side of registration, namely, the confusion of examination with education.

Now, there are several ways of employing

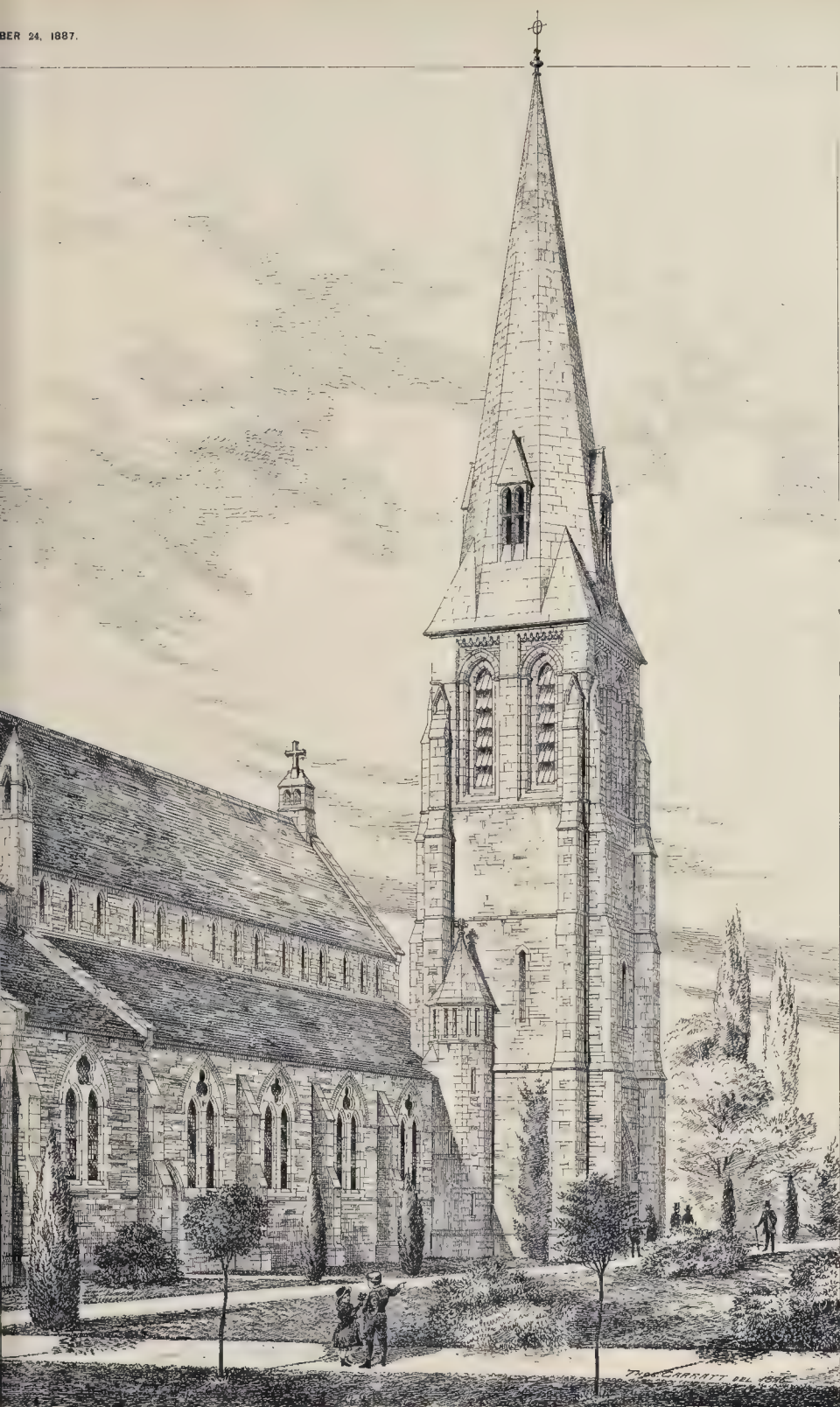






ST. ANDREW'S PARISH CHURCH, LONGTON, L.





PHOTOGRAPH BY STRAUSS & CO. 22 MARTIN LANE LONDON, E.C.





examination. Students may be examined by their teachers with a view of seeing whether they have properly understood what they have been told, and of correcting any misapprehensions they may have fallen into. That kind of examination is itself a means of education, and is both useful and necessary to the student, who might otherwise be a long while in discovering his mistakes. It is obvious, however, that the examination for admission to a profession is not of this kind. There is another kind of examination like that at our old Universities, which are both teaching and examining bodies, where the teachers are also the examiners, and do in a manner review in the University schools the result of the University curriculum. This kind of examination is less educational than the other, and many University teachers of the present day advocate the abolition of University examinations as the best thing that could happen for University education. Clearly, however, the examinations at Oxford and Cambridge have little in common with that we are considering. The third type of examination is that for admission to the public services by examiners who have had nothing to do with the education of the candidates, but simply admit or reject them according to their success in answering a certain number of questions. This kind of examination has been adopted in dealing with public appointments, less for the sake of guaranteeing the efficiency of the public servants than for satisfying the people that Government patronage is fairly and impartially distributed. Such examinations are perhaps necessary, but, if so, they are necessary evils; it is obvious they are of no educational value to the student like the first kind, nor do they enable him to gauge his own knowledge like the second kind; they do not follow at the end of a long course of study directed by the same body which conducts the examination, and which therefore knows how to bring out and sift the knowledge of the candidates; they must therefore be general and superficial, taxing the memory rather than the intellect, and they often degenerate into something like a game of skill between the examiner and his victim, in which luck and accident play not the least part.

It is to this last class of examinations that ours would inevitably belong, and I can conceive nothing more likely to divert the studies of architectural students into unprofitable channels, or to put before them a wrong object for their efforts. To work with the object of passing a board of examiners is a very different thing from working to acquire knowledge. The object is not education, but a diploma; and the man will read, not to clear up his own ignorance and fill up the gaps in his knowledge, but to prepare himself with such scraps of information as may come in usefully and help him to fill up his examination paper. Oram, with all its hateful parody of real teaching, would become the order of the day. We should have superficial text-books by the dozen to save the student the trouble of thinking and searching for himself, and to give him just that kind of smattering which would pass muster with the examiners, without planting in his mind any germ that might afterwards grow up into accurate and scientific knowledge. Independence of thought and freedom of research are impossible under such a system, and without these nothing original can ever be produced. The question with the student would be, not "what do I most want to know?" but "what will pay best in the examination?" That this is the result of the system of examination for the public service is too notorious to be questioned; cramming has become a lucrative profession, and has created a special literature of its own, which all sound scholars would wish to put on the fire back. It is only too certain that the same effect would attend the establishment of a qualifying examination for our own calling; it is the merest fallacy to suppose that it would be an educational measure, and its actual result would be that real architectural education, so far from being promoted, would be positively obstructed.

But a greater difficulty than ever presents itself when we come to the subjects which intending architects are to take up. A formidable list is given in a collection of papers on education read at the Conference of Architects last summer, for a copy of which I am indebted, I believe, to Mr. Cates. It ranges from mathematics in its highest branches to the history of architecture in all ages and

countries, freehand, linear, and perspective drawing, experimental mechanics, heat, optics, acoustics, electricity, with laboratory practice in all; then follow chemistry, also with laboratory practice; and languages, either French or German, or both. All this we are told is comprised in the first year's course of an architect's training in America, and we can only wonder at the astounding powers of digestion which an American architect enjoys if he can get any nourishment out of such a surfeit of good things.

But the most surprising thing, after all, is that in all this magnificent programme for an architect's studies, architecture itself is forgotten. The student may bring up for examination a pitiful smattering of the great sciences I have enumerated, which is all he can hope to acquire in so short a time, and which he will do well to forget as soon as he can for fear it should lead him into danger, and he may show that he knows something of the various styles of architecture of other ages and of all countries, which is, after all, a matter rather of antiquarianism than of art. He can also be examined in the elements of construction; he can be asked how he would lay his drains, how he would warm and ventilate his rooms, how he would roof over an irregular space, how he would construct a vault or a spire or a dome, or any other part of a building. But all this is not architecture; this is but the builder's art. Architecture begins after all that; it assumes that the building is well planned and constructed, *tout cela va sans dire*,—and then it steps in and makes it artistic and beautiful. But this is an intangible operation that cannot be brought to the test of examination; as well might you try to examine painters or sculptors in their arts, and if there is no actual standard by which to try them, neither is there any by which you could try an architectural design or pronounce its author qualified or unqualified to practise. You can examine a candidate in building construction, and if he shows ignorance you can, without fear of contradiction, pronounce him unfit to be an architect on that score; but what examiner would dare to pluck a candidate on the ground that his design was artistically bad? One may easily imagine the outcry that would be made, the prejudices that would be offended, and the battle the examiner would have to fight with men of rival schools. He would be told at once that he had exceeded his powers, and had no right to prevent a man from earning his bread in the profession because his work did not happen to suit an examiner's taste. And the objection would be a very fair one, for architecture can no more be brought to the bar and tried by a fixed code than the other arts, and no board of examiners would ever dare to attempt it.

This being so, it follows that any man who passed in building-construction and knew how to lay his drains, would, under the proposed scheme of registration, be ushered into the world as an architect; and not only so, but he would receive, as it were, the Government stamp or hall-mark to certify to the world that he was, in every sense of the word, a genuine architect, although he might be more incapable than his own office-boy of producing an architectural design that was decently tolerable to an artist's eye. If this is what is meant by raising the status of the profession, we may, in all conscience, pray heartily to be left where we are.

It is, no doubt, the impossibility of applying the test of examination to the artistic side of our work that has driven the advocates of higher examination for architects to attach an exaggerated importance to the scientific side. After reading the astounding list of sciences that we are invited to learn, one is reminded, with Mr. Aitchison, of the knight in "Wonderland," who was equipped with a mousetrap lest he should sleep at a place overrun with mice, and a beehive lest he should meet a swarm of bees in his travels. We architects have no occasion to enter the laboratory of the chemist or the physicist; the little knowledge we might pick up there would be worse than useless, and in any real difficulty we should be forced, after all, to rely on the advice of the chemist or physicist himself. We need know no more about optics than the simple laws of perspective. In questions of heat and electricity we must be guided by the advice of specialists, and it is enough for us to know to whom to go, and such general facts about those matters as lie within the reach of every layman. Of

mathematics a very little indeed will be found practically sufficient, and I fail to see in what an architect would be the better for knowing much of botany or even geology. In all these things we must, like other people, be content to accept the result of other men's studies and to believe those who have made these sciences their life's work. Life is not long enough for all this. No architect ever did or ever will make himself master of such a mass of scientific matter, and if we merely dabble in it we shall only be wasting our time, or, at the best, acquiring that little knowledge which is proverbially dangerous.

The main point which I want to make clear to-night is that the examination test to which it is proposed architects should be submitted cannot be applied to the artistic, but only to the constructional qualifications of the candidates; that is to say, not all to their skill in architecture, but only to their knowledge of building.

Consequently, as it admits men to our profession on mechanical grounds alone, it lowers architecture to the level of a mechanical art, and the change, if it ever came to pass, could not fail to be detrimental to the pursuit of architecture as a fine art. It would open still wider the breach which unfortunately divides it from the sister arts of painting and sculpture, and in so doing would condemn it to a lifeless monotony and hopeless unprogressiveness. It is, believe me, in the extending of an architect's skill into the decorative arts, in the closer union of himself with other artists, in the cultivation of the power to ornament his own handiwork, and so of introducing consistency and harmony into what otherwise is a mere jangle of jarring notes struck by unsympathetic hands, that the hope of architecture among us lies. The true brethren of the architect are the painter and the sculptor, not the surveyor and the engineer, and these are no true friends of our art who would try to persuade us otherwise.

Let it not, however, be supposed that I undervalue any plan for protecting the public against bad building. Against bad architecture nothing can protect them except their own good taste, but against bad building it is possible to erect safeguards. This, however, I repeat, has already been done by a legal machinery independent of us, which renders any safeguard of our own devising superfluous. If it be thought that the present system of supervision by local boards is inefficient, that is a matter for the public to see to; it may easily be made more stringent, and its area of jurisdiction may be widened so as to cover the country as well as the towns. So far from wishing to supersede the present system, I would see it improved; in particular I should like to see the office of local surveyor in small country towns undertaken by persons of higher qualifications, and in London and the larger towns I would have the number of District Surveyors increased till they were able to exercise such supervision over buildings in progress that bad construction could not escape detection.

Let it not be supposed either that I undervalue the importance of improvement in architectural education; only let it not consist in superficial dabbings in a host of scientific subjects, none of which we shall have time to master, and about which in the end we must take the opinion of experts, but in such matters as really belong to our craft; not in chemical analysis of our building stones, but in practical masonry; not in botanical classification of our timber, but in actual carpentry and joinery; not in the theories of optical science, but in the study of light and shade and perspective effects. A month spent on a building in progress under the eye of a friendly clerk of works will be of more use to a student than a year spent in the laboratory of the chemist or the experimental philosopher. It is a piece of training that I always recommend to my own pupils after they have seen something of office work, and I am sure there are few better.

Lastly, let me not be supposed to undervalue the constructional part of an architect's work because I say that this part is not architecture, but building. Architecture follows building, and therefore building must precede architecture and is included within it. There can be no good architecture without good building, and I firmly believe that no man ever has been or ever will be a good architect without being first a good builder. The great masters of old are at least as remarkable for



skilful construction as for beautiful design; and it will be admitted that the same is true of the most eminent architects of our own day who have certainly shown themselves as attentive to strength and convenience as to purely artistic quality in their work. Sir Charles Barry, Mr. Street, and M. Viollet-le-Duc certainly cannot be accused of want of constructive knowledge; no engineer could have more skilfully saved the great central towers of St. Alban's and St. David's from ruin and set them on new and substantial legs again than Sir Gilbert Scott; and I wonder how many of those who boast of their practical knowledge in comparison with those whom they call the "artist architects" would venture to give a lesson in building construction to Mr. Pearson, Mr. Butterfield, Mr. Waterhouse, Mr. Norman Shaw, or Mr. Bodley. There is no more fatal error than to suppose that the two sides of our profession are antagonistic, and nothing can be more injurious to architectural study than to consider the one and ignore the other, as any scheme of examination that can be devised is bound to do.

Before we set to work on any revolutionary plans and upset our present constitution let us consider how architecture in England compares with that of other countries where it enjoys State protection and control, and where something like State education is provided for its students. I quote from a paper read at the late Conference by Mr. Phéas Spiers, whose knowledge of the training of architects both in England and France entitles him to speak with authority. He says,—"There is no national school of architecture here; there is no traditional teaching of 200 years as in France; so far as architectural design is concerned I am inclined to think this is a positive advantage, and that in consequence English architecture is at present in a much more healthy state than that either of France or Germany. In ecclesiastical architecture it has always been so, and of late the progress made in domestic and town architecture has been such as to outstrip entirely our foreign contemporaries."

One may without vanity accept this picture as a true one. Travel where one may on the Continent one cannot but be struck by a certain tameness and hardness, and a cast-iron monotony that characterises even the best work one sees. Perhaps our worst English work is worse than anything we see abroad, but our best is incomparably better; it bears signs of life and progress and of wholesome originality that are wanting elsewhere; and foreign architects themselves now look on English architecture and architects with a respect unknown before.

The cause of this may be found in our freedom from the shackles of State control on the one hand, and the enervating influence of State protection on the other.

Liberty and free trade are necessary to the growth of art, and any measure for controlling or regulating the pursuit of architecture stifles that element which belongs to art and brings into prominence that which is purely mechanical.

In Italy and Austria the architect is a man who has failed to qualify himself as an engineer. It is the engineer who restores ancient buildings and builds new ones, while the architect figures as little better than a clerk of works.

Can anything more expressively illustrate the tendency of legislative interference to eliminate that element which constitutes the difference between a mechanical and a fine art? Such would be inevitably our fate if architecture were made a close profession. Hitherto we have been free; in our freedom lies our hope of the future; our true wisdom lies in guarding it jealously against State interference and bureaucratic control. If engineers and surveyors choose to put the chain round their necks it is no affair of ours; but let us, at all events, beware how we sacrifice that proud independence under which we have won for our country a foremost place in the ranks of art with the promise of still greater achievement in the future.

A report of the discussion which followed will be found on pp. 894-7.

**Social.**—The "Mutual Cycling Club," formed by the office staff of Messrs. Colls & Sons, gave a smoking concert at the Surrey Masonic Hall on the 14th inst., presided over by Mr. W. A. Colls. Among those present were representatives of several leading firms. A long and varied programme was given.

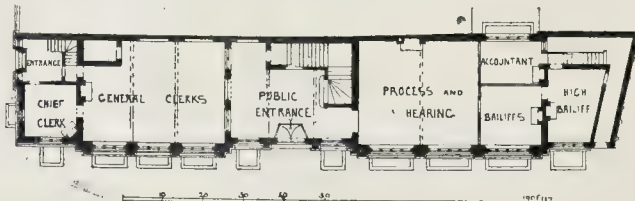


### Illustrations.

#### NEW CITY OF LONDON COURT, GUILDHALL.

THE New Court Building occupies the sites of the Old Court, the Land Tax Offices, and the "Tap" of the Guildhall Tavern; it will ultimately, on the expiration of a short lease, be extended over the site of No. 84, Basinghall-street, and the design has been made with the view of covering the entire area.

On the ground-floor will be offices for clerks and bailiffs, on the upper floor the judge's court, 45 by 26, and the registrar's court, 36 by 26, each with a private room attached and approached by a separate stair and



City of London Court.—Plan of Ground-floor.

entrance. The general entrance will be in the centre of the facade from Guildhall Buildings, and will open into a hall and staircase giving access to the offices on the ground-floor and to the courts above. In the basement will be lavatories and stores for books, papers, &c.

The style is late Gothic, harmonising with the Library and the new Council Chamber. The external moulded work will be in Portland stone, with grey Penryn granite plinths, the walling of Kentish rag; internally, the hall and staircase will be of Bath stone, the open roof of oak; the courts will have wainscot panelled ceilings.

The plan has been designed with the view of obtaining ample space and plenty of light, with good ventilation. The warming will be effected by means of hot-water coils and pipes, as well as open fireplaces.

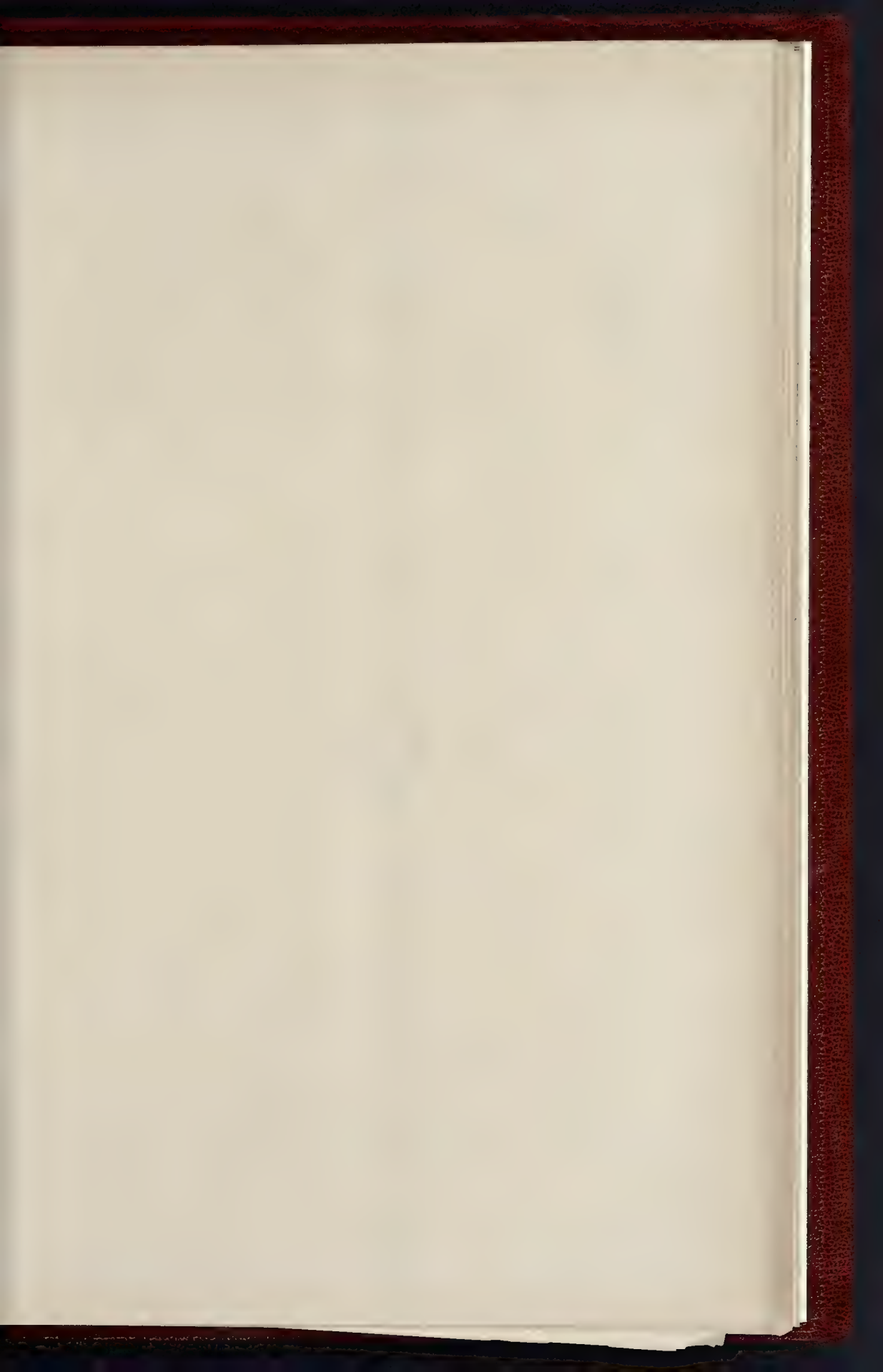
The amount of the contract is 13,637l. (estimate, 14,500l.); the architect is Mr. Andrew Murray, A.R.I.B.A.; the builder being Mr. James Morter, of Stratford.

#### STALLS, WESTMINSTER ABBEY.

We give a sheet of measured drawings and details of one compartment of the stalls in Henry VII's Chapel in Westminster Abbey, made some time since by Mr. G. G. Woodward. From the data given in Scott's "Gleanings from Westminster Abbey" it would appear that the work was probably executed somewhere between 1512 and 1516. Some further information as to the work will be found in Mr. Woodward's notes on the face of the drawing.

#### ST. ANDREW'S CHURCH, LONGTON, LANCASHIRE.

This church is being built alongside and to take the place of the old parish church built in 1770,—a square structure without any points of interest,—which will be pulled down when the new building is completed. The new church, which is approaching completion, is being built of brick faced externally with Yorkshire parpoint stone, with red Runcorn stone dressings externally and internally, the wall spaces between the stone internally being





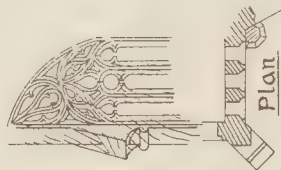
# WESTMINSTER · ABBEY · HENRY · VII's · CHAPEL ·

SHEET N<sup>o</sup> 1

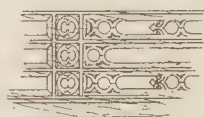
## STALLS · OF · THE · KNIGHTS · OF · THE · BATH ·



With the exception of a few, these ornaments have been removed



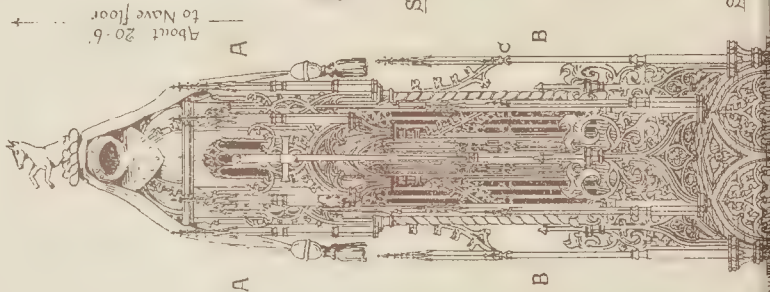
Plan



Detail of Tracery



Sketch



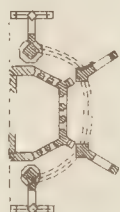
A

B



Sketch at C

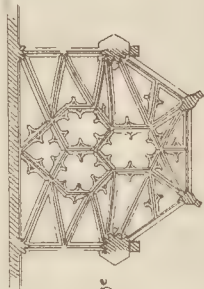
↑ About 20-6 to nave floor



Approximate Plan at A-A



Approximate Plan at B-B



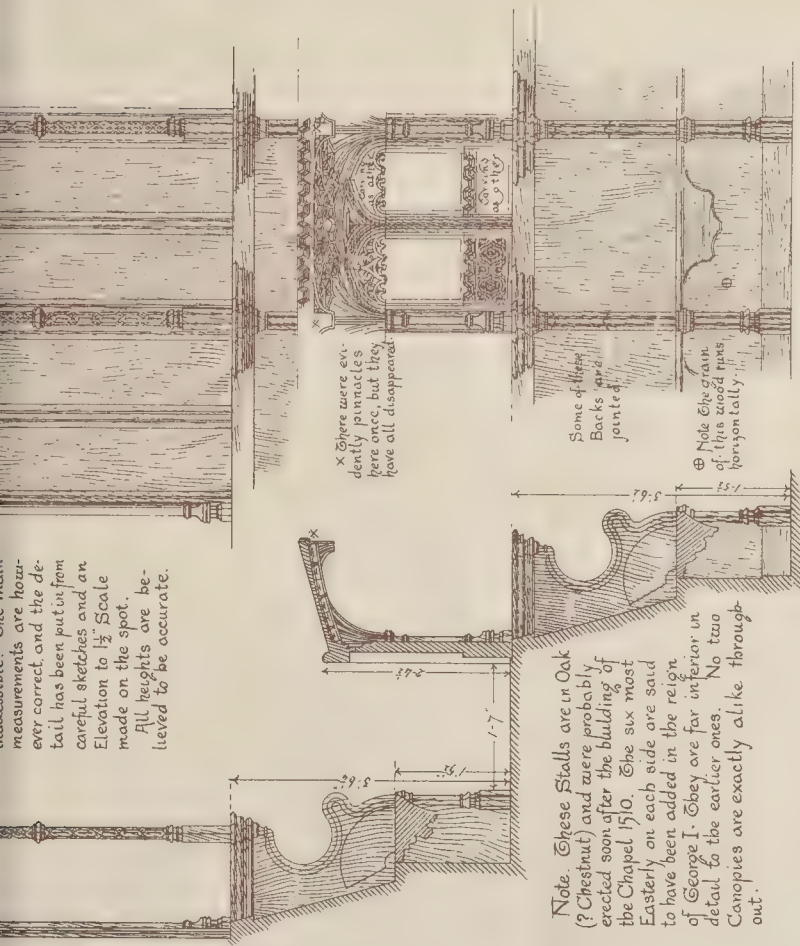
Crocket

Moulding to One Arch 1/2 Full Size



Sketch 1/2 Elevation of Side

measurements are however correct, and the detail has been put in from careful sketches and an Elevation to 1/2 Scale made on the spot. All heights are believed to be accurate.



Note. These Stalls are in Oak (? Chestnut) and were probably erected soon after the building of the Chapel 1510. The six most Easterly on each side are said to have been added in the reign of George I. They are far inferior in detail to the earlier ones. No two Canopies are exactly alike throughout.

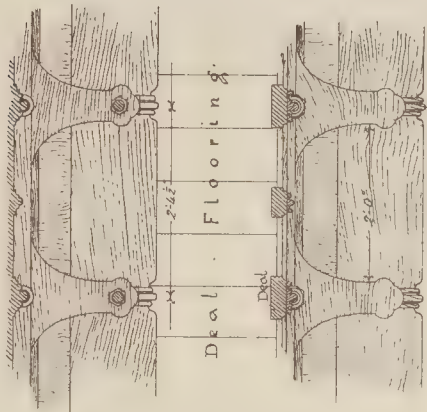
## SECTION

## FRONT ELEVATION

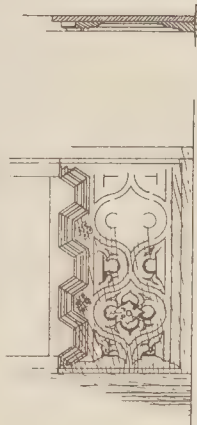
Scale for General Drawing: Details 1/2 Full Size.



## Plan of Canopies looking up



## Plan looking down

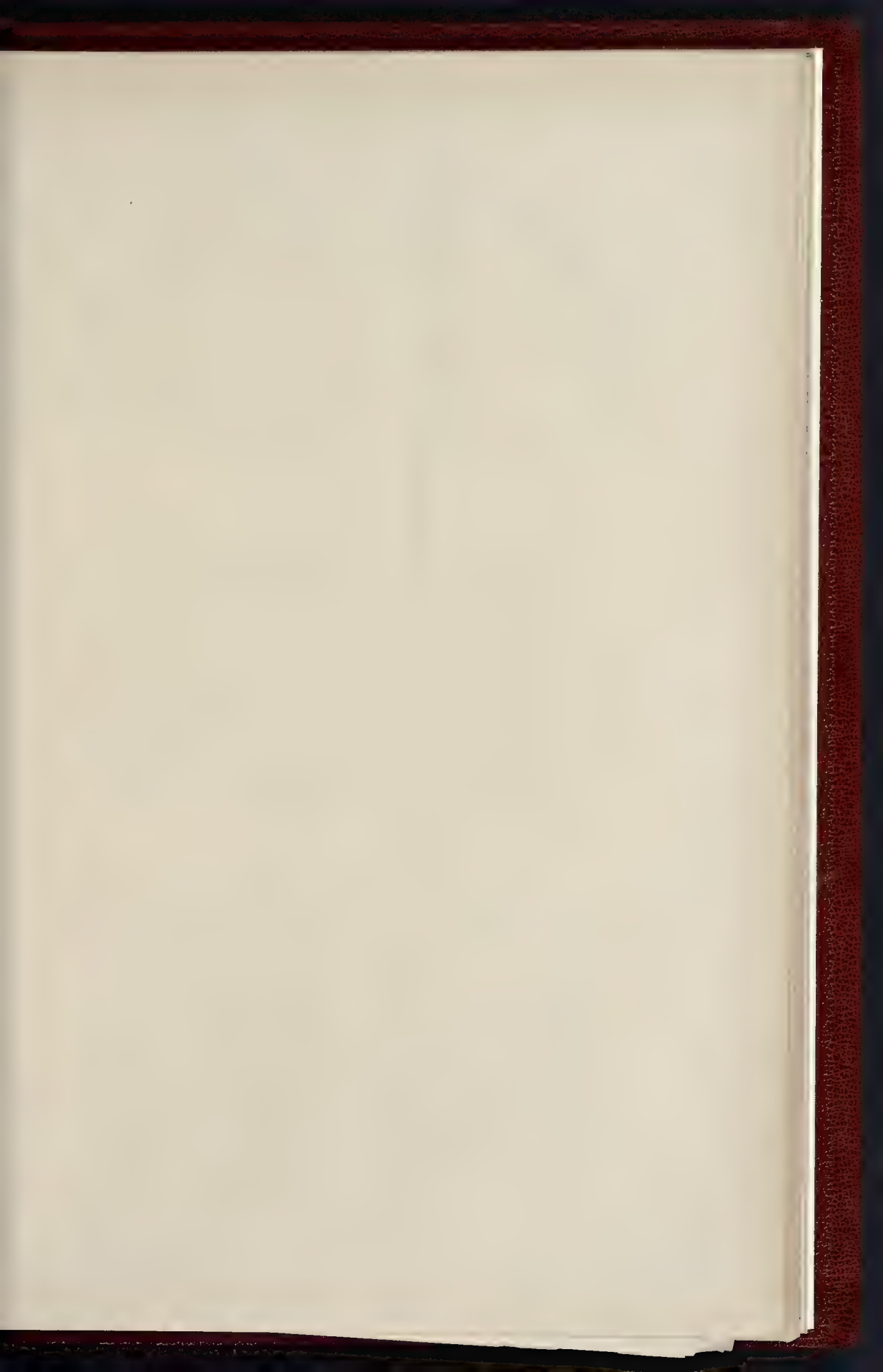


## Detail of Foot-board Section

George I. Canopy in the Chapel  
Mens 1882-83  
Delt. April 1883.











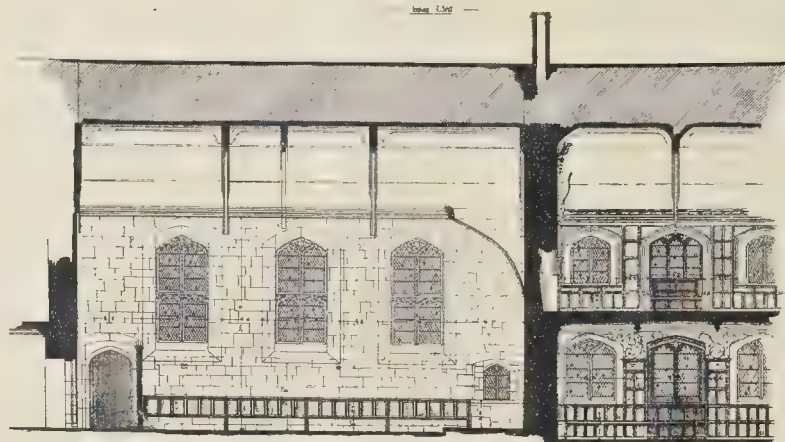
— Section on Line A-A —

Looking towards East



— Section on Line B-B —

Looking West



— Section on Line C-C —

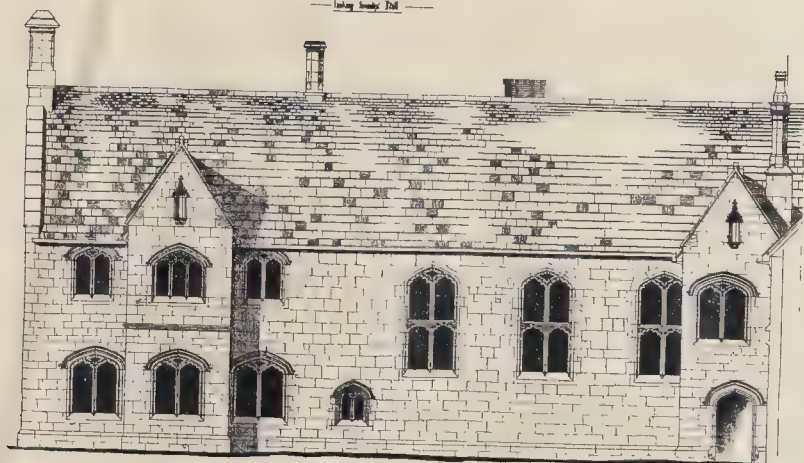
Looking East



— Section on Line A-A —  
Looking South



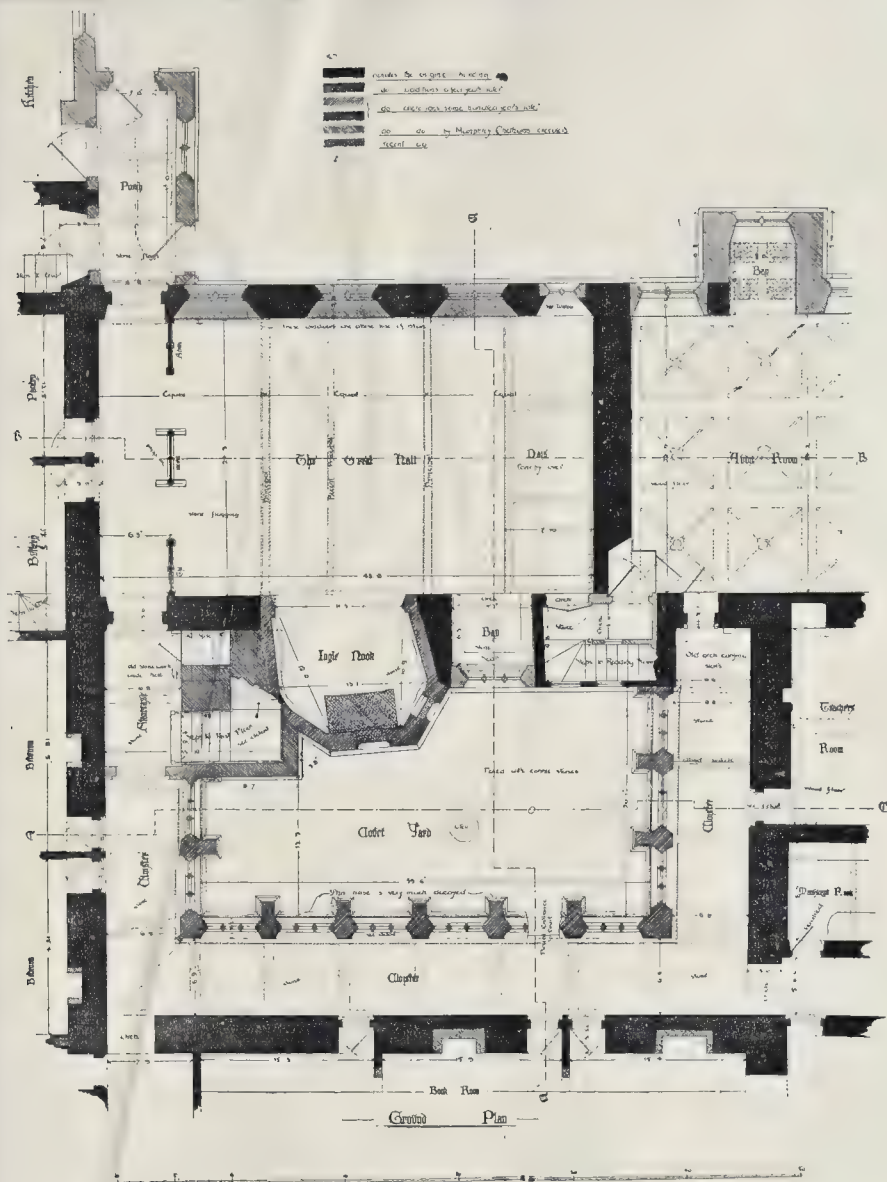
— Section on Line B-B —  
Looking South East



— Elevation to Great Quad. —







Chetham Hospital, Manchester.—Plan.

astered. The chief features inside are the entry arcade and chancel arch with handsome clustered columns. The roofs are of pitch pine, the boarded ceilings, and covered with Westmoreland slates. The seats and fittings will so be of pitch pine. Mr. Fecitt, of Blackburn, the builder. The contract, exclusive of the tower and parish room, is 4,231*l*. Messrs. E. K. & J. P. Cutts are the architects.

CHETHAM HOSPITAL, MANCHESTER.

PEOPLE who visit Manchester nowadays find very few objects of ancient architectural interest, the tide of modern improvement having swept away nearly every vestige of them; and, even to the majority of the inhabitants of this busy city, the fine old College now called the Manchester Hospital is practically unknown. This relic of old Manchester stands on a

naturally defensive site, formed by the junction of the rivers Irk and Irwell, and on a small plateau some 40 ft. above the water-level. The Hospital stands on the site of a series of ancient buildings, and is supposed to have originally been occupied by a Saxon stronghold and afterwards by the Baron's Hall of the ancient Norman line of the Gresleys and De la Warres, who were lords of the manor. Thomas de la Warre, the last Rector of Manchester, had succeeded to the manorial rights in the year 1398, and in 1425 he almost entirely rebuilt the old Baron's Hall as a College for the use of a warden, eight fellows, four clerks, and six choristers, who officiated in the neighbouring Collegiate Church till the College was dissolved in 1547.

In 1481 James Stanley, a son of the first Lord Stanley, became warden, and that was

the first connexion of the Derby family with the College. In 1547 the College was dissolved and became the property of the Earls of Derby, till the confiscation of their estates under the Commonwealth.

The Civil Wars left the College in an almost ruinous state, and it was then Humphrey Chetham began the negotiations which ended after the Restoration in the fees acquiring the buildings, and, under the proviso of Humphrey Chetham's benevolent will, forming it into what was then termed a hospital where a certain number of poor boys selected from several neighbouring parishes were fed, clothed, and educated till of sufficient age to be apprenticed to some useful trade, and as such, with the addition of a most valuable collection of ancient books, well known as the Chetham 'Library, it continues to this day.



The hospital consists of an extensive range of buildings, but as the plates show only the parts adjoining the great hall it will be scarcely necessary to refer to them in detail, though a few remarks concerning more particularly the illustrations may be found interesting.

It is most difficult to ascertain with any degree of certainty the different dates of erection, as the buildings have been so altered and extended as to defy any discovery with regard to the periods when they were built. The cloisters do not seem to form an integral part of the first building, and alterations have obliterated any means of ascertaining their date, though it is assumed that the old entrance to the courtyard was done away with when the large staircase was erected. Mr. Henry Taylor thinks that the ingle nook, bay, and small staircase were added some fifty to a hundred years after De la Warre's death, and the large staircase when Humphrey Chetham's feoffees altered the College, and he thinks further that the roof of the Great Hall is the old one of the Baron's Hall re-used, which is probable. It will be noticed that the ingle nook is ingeniously twisted, evidently to make room for the then existing door to the courtyard, and has been taken advantage of in erecting the staircase. The curious old screen, the "dole window" at the high table end, and the ancient canopy are of much interest. A cleverly-planned little room exists over the bay, and quadrifol openings are out giving a view of the hall.

The usual buteries open off the Great Hall, and at the back exists the ancient smaller hall, now the feoffees' room, elaborately panelled and decorated, and together with the present reading-room containing some valuable ancient furniture.

Altogether, this building forms an interesting and absorbing study, and as one of the few remaining objects of archaeological interest in Manchester deserves special attention. Mention should be made of the fact that the famous Doctor Dee inhabited the College when it was partly ruinous, and tradition still points out the scenes of his weird incantations, and many are the legends existing describing the fearful deeds there enacted. While he resided in the College it was shunned as an "uncanny" place.

I gladly acknowledge my indebtedness to Mr. Henry Taylor and to his valuable book on "The Old Halls of Lancashire and Cheshire" for many facts stated above, and to the Governor of the Hospital for his kindness in giving me all facilities for measuring.

J. N. W.

#### THE ENGINEERING AND APPLIED SCIENCE DEPARTMENT OF KING'S COLLEGE, LONDON.

We have received the following communication from King's College as to the above:—

"This Department is now entering upon the fiftieth year of its existence; a life short enough, it is true, when compared with those of some of our ancient foundations, whose chief object was to furnish a so-called liberal education, but comparatively old amid the numerous Technical Colleges which have sprung up of recent years to meet a want which King's College was one of the first to recognise and to satisfy.

In 1838, the technical 'Department of Engineering and Applied Science' became a distinct branch of King's College. From the first the Council have sought, in arranging a curriculum, to combine a thorough knowledge of the theoretical portions of the subjects taught with a practical acquaintance with the methods by which the theories are applied in the various experiences of engineers, whether civil or mechanical, electrical or hydraulic, military or sanitary, metallurgical or chemical. The lectures, themselves illustrated largely by diagrams, models, or experiments, have always been supplemented as far as possible by individual instruction and frequent practice in the laboratory, workshop, or drawing-office, as well as on the field; or by visits to manufactories.

The subjects recommended for study are Mathematics, Mechanics and Physics, Chemistry and Metallurgy, Mineralogy and Geology, Photography, Drawing, and Workshop practice, with Surveying and Civil Engineering, Manufacturing Art and Mechanical Engineering, and Building Construction and Architecture. An intelligent student may thus fit himself for any professional position by a sound knowledge covering

a wide range of subjects. Or he may specialise in any branch of Engineering, or of 'pure science,' in which he may develop an interest.

The tendency of modern education on these subjects being increasingly practical, it may be of interest to sketch the manner in which this class of teaching is carried out at King's College.

The period of time proposed for the course of studies is three years; and during the whole of that time the student is expected to attend the drawing classes, where he receives personal instruction in the different branches of Geometrical Engineering, Mechanical, and Architectural drawing.

Workshop practice is progressive, and also extends over the entire three years of study. By making for himself various articles or models of wood, the student first learns the use of the lathe and the tools of the carpenter's, turner's, joiner's, and patternmaker's shops. Passing thence into the foundry he receives instruction in moulding and casting in iron or brass; in the fitting shop he acquires the use of metal-working tools; in the smithy he gains experience at the forge; and after some practice in metal turning, and with the machine tools in the shop, he is taught the art of working in sheet metals. Finally, under adequate supervision, he is encouraged to design and construct suitable machines or models. The workshop is placed in the charge of an experienced mechanical engineer, with trained assistants in each branch of the work. All the lathes, drilling, planing, slotting, and other heavy machinery are driven by steam power, but the lathes are convertible, so that they may also be worked with the treadle.

The Chemical Laboratories are two in number; in the Junior Laboratory the second year's students, having already in their first year attended a course of lectures on Experimental and Applied Chemistry, are trained in the use of the blowpipe and in conducting such analyses as may be ordinarily required in the practice of their profession. In the Senior Laboratory those students who wish to make a special study of Chemistry may undergo a complete course of instruction in analytical or research work; and for the encouragement of such original research a Scholarship has been founded in memory of Professor Daniell, the first holder of the Chair of Chemistry.

The Metallurgical Laboratory, together with the lectures on Metallurgy, are attended in the third year of the course; and in this year, or in his fourth if he should elect to prolong his studies, a student may gain the Siemens Gold Medal and prize, founded by the late Sir William Siemens, 'with the object of stimulating the students of King's College, London, to a higher standard of proficiency in Metallurgical Science.' This department is one of the most recent additions to the College, and is fully equipped with assay, muffle, and large brass-melting (crucible) furnaces, lathe, and testing machinery; it is intended for instruction in assaying and mineral analysis, in the treatment of ores and metallurgical products, and in the practical examination of the properties of the metals and their alloys.

The Physical Laboratory, in which Sir Charles Wheatstone conducted his historical experiments with the electric telegraph, and to which he bequeathed a large collection of apparatus, is also attended during the Course. Here the student gains experience in the use of the apparatus, in the methods of physical measurement, and in the investigation of physical and mechanical laws. An installation of dynamo-electric machinery, with the necessary instruments and apparatus for measuring and dealing with large currents, has lately been added in order to meet the increasing demand for a thorough practical knowledge of electrical science and methods.

The Photographic Laboratory is used during the last year of study. It has recently been much enlarged by the addition of a new glass-house and developing room, and now affords facilities for practice with the older wet-plates, and in the manufacture and use of the more modern dry-plates; for portraiture, copying or enlarging in the glass-houses; for architectural studies in and around the College; and for landscape work after College hours.

There is also a single-level Testing machine of the Kirkaldy type, presented by the Clothworkers' Company, and placed under the joint control of the Professors of Mechanical Engineering and Metallurgy. It is capable of

tensile, transverse, torsion, or compression tests up to a strain of 50,000 lb., and is used to demonstrate the mechanical tests usually applied to materials, and the resistance of bodies to rupture by different strains.

Museums containing large collections of physical apparatus, chemical specimens, minerals, rocks, and the like, are available for the assistance of students to a right understanding and appreciation of the lectures.

In the Mathematical Course, the students of each year are arranged in classes according to their knowledge and capabilities, and thus receive personal assistance suited to their calibre.

In addition to these classes already described, many of the Lecturers, whose subjects do not permit of laboratory demonstration, give facilities to their pupils for acquiring an insight into practical work outside the College. Thus, the Professor of Civil Engineering supplements his lectures by a course of instruction in surveying in the field, so that the students may become proficient in the use of the instruments employed for this purpose, and the method of arranging and calculating the measurements obtained. The Professor of Mechanical Engineering is accustomed to take his classes to factories and workshops in the neighbourhood of London, where they may study the application of the principles and devices they have learned in the lecture-room; and thus, under the guidance of the Professor, they obtain a valuable working knowledge of machine construction and management. In the Geology course, also, opportunities have from time to time been afforded of accompanying one of the Professors on field expeditions.

Thus it will be seen that the student, fresh, it may be, from the school-room, is first thoroughly grounded in the theoretical portion of a subject by means of lectures, and is then encouraged to confirm, enlarge, and apply his knowledge by means of experimental work performed by his own hands. Such is the scheme recommended for students in general; but, in addition to the matriculated students who are attending the whole or a greater part of the Course, there are many 'occasional' students, who, requiring a special knowledge of one or more subjects, devote their whole time to these in the Laboratory or the Class-room for periods varying from a month to three or even four years, according to the circumstances and requirements of the student."

#### THE ARCHITECTURAL ASSOCIATION.

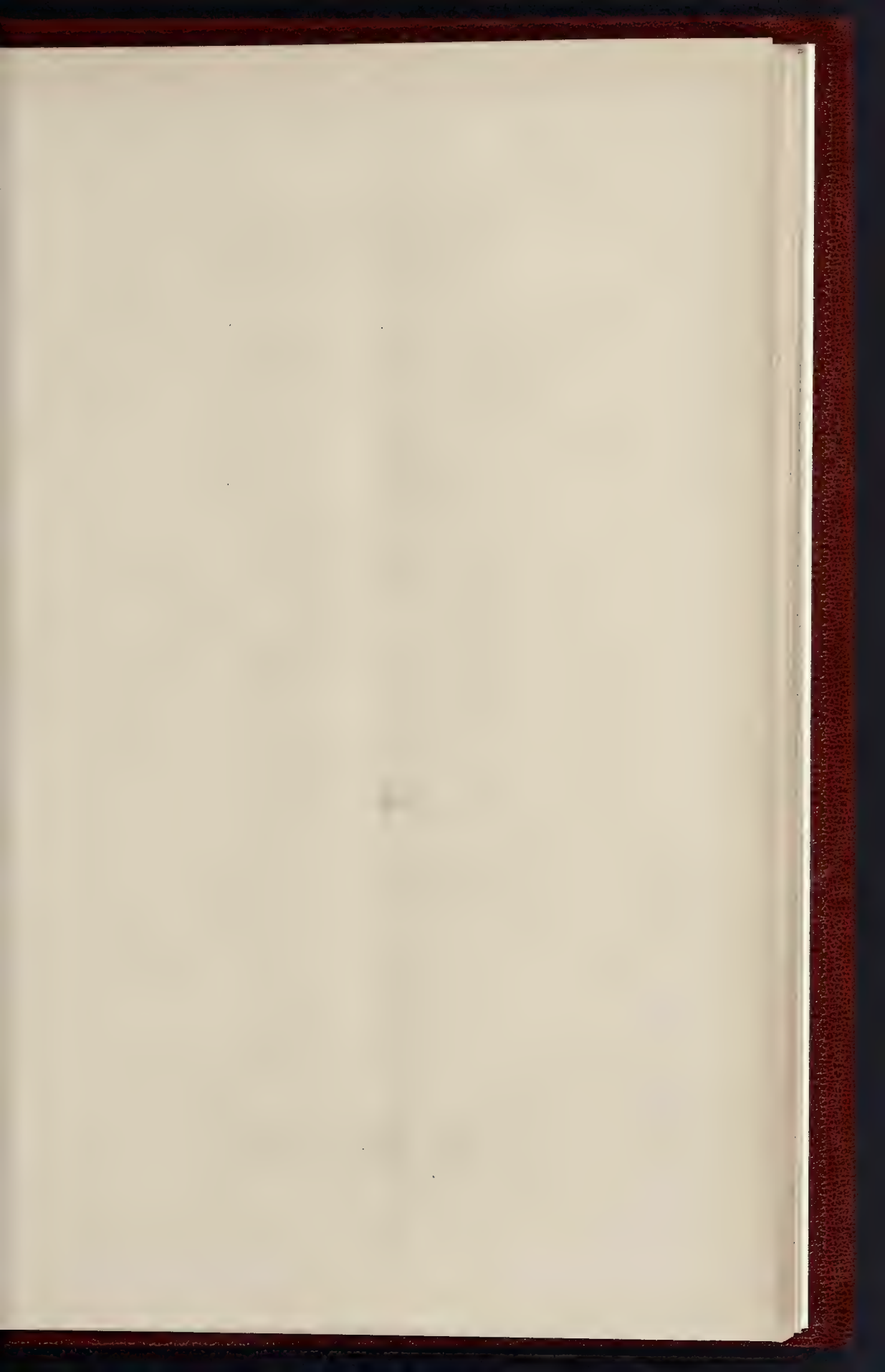
The fifth meeting of this Association for the present session was held on the 16th inst. in the meeting-room of the Royal Institute of British Architects, Mr. John Slater, B.A. (President) in the chair.

The following new members were elected, viz.:—Messrs. H. H. Dunn, G. P. D. Saul, S. A. Stanger, J. G. Henderson, D. F. Pitt, P. R. Smith, P. Hayton, Jun., J. H. Seakins, A. F. Faulkner, E. A. Massey, F. C. Eden, F. Bouch, H. W. Bannan, E. Osborn, H. J. Hicks, E. L. Lutyens, G. P. Wagstaff, and W. E. L. Wears.

The Chairman said that at the last ordinary meeting he announced that a requisition had been sent in by several of the members asking that a special business meeting should be convened to consider the construction of one of the rules. A sub-committee of the general committee had been sitting to consider the question of the affiliation of provincial societies, and had presented a report which, if carried, would involve the alteration of several rules. It, therefore, seemed needless to have two special business meetings following each other, and, as Mr. Somers Clarke, who had promised to read a paper on the 20th January next, would then be abroad it had been decided to hold the special business meeting on that date. At the next ordinary meeting, on the 6th proximo, he would be able to announce the proposed alterations in the rules relating to affiliated societies, to be discussed at the same time.

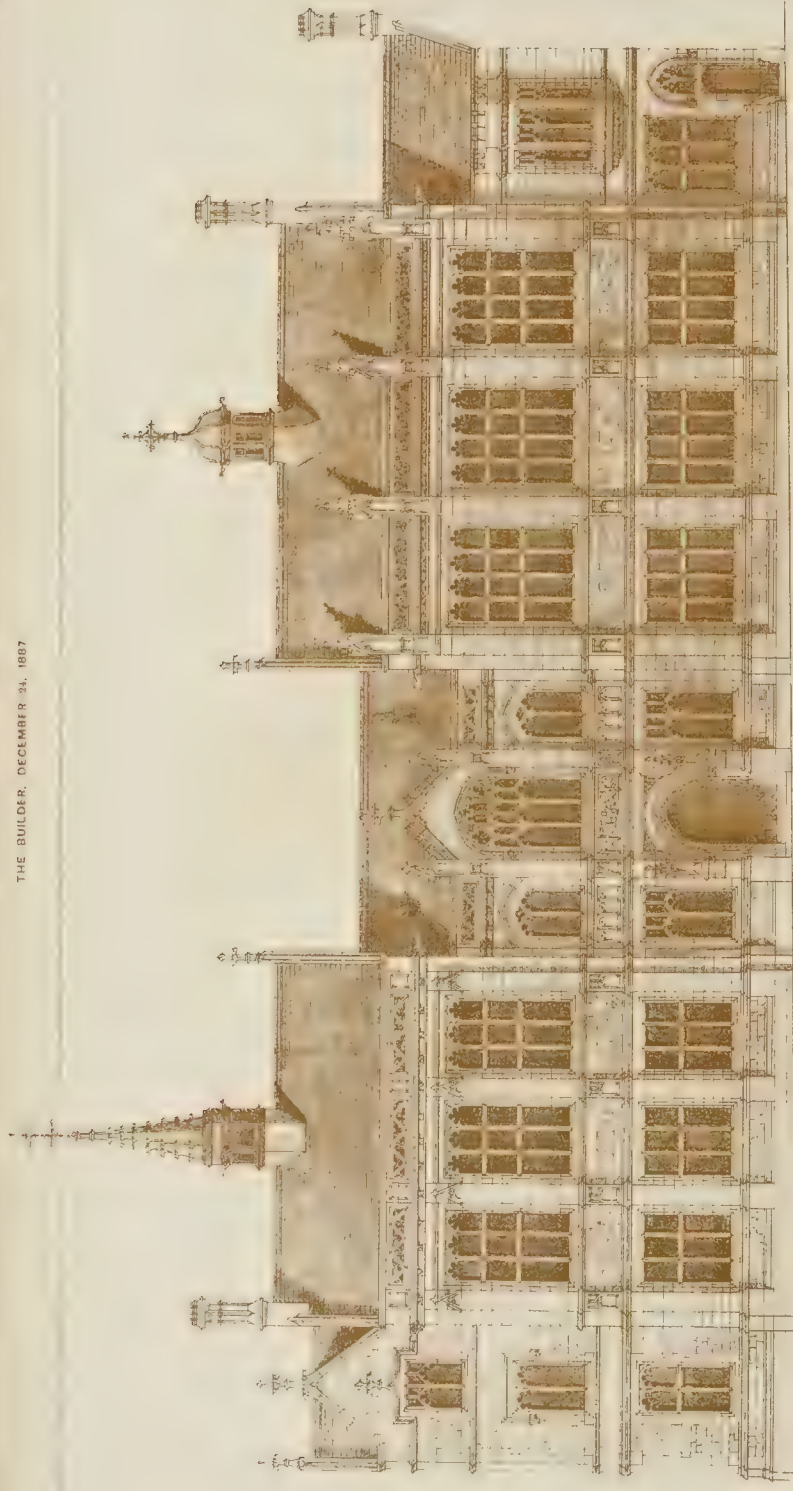
Mr. T. G. Jackson, M.A., then read a paper entitled "The Proposal to make Architecture a Close Profession by imposing the Test of Examination and Registration," which we print *in extenso* on other of our pages.

The discussion was opened by Mr. G. A. T. Middleton, who, as a member of the committee which had drafted the Registration Bill, thanked Mr. Jackson for his criticisms, as it was only by honest criticism that the Bill



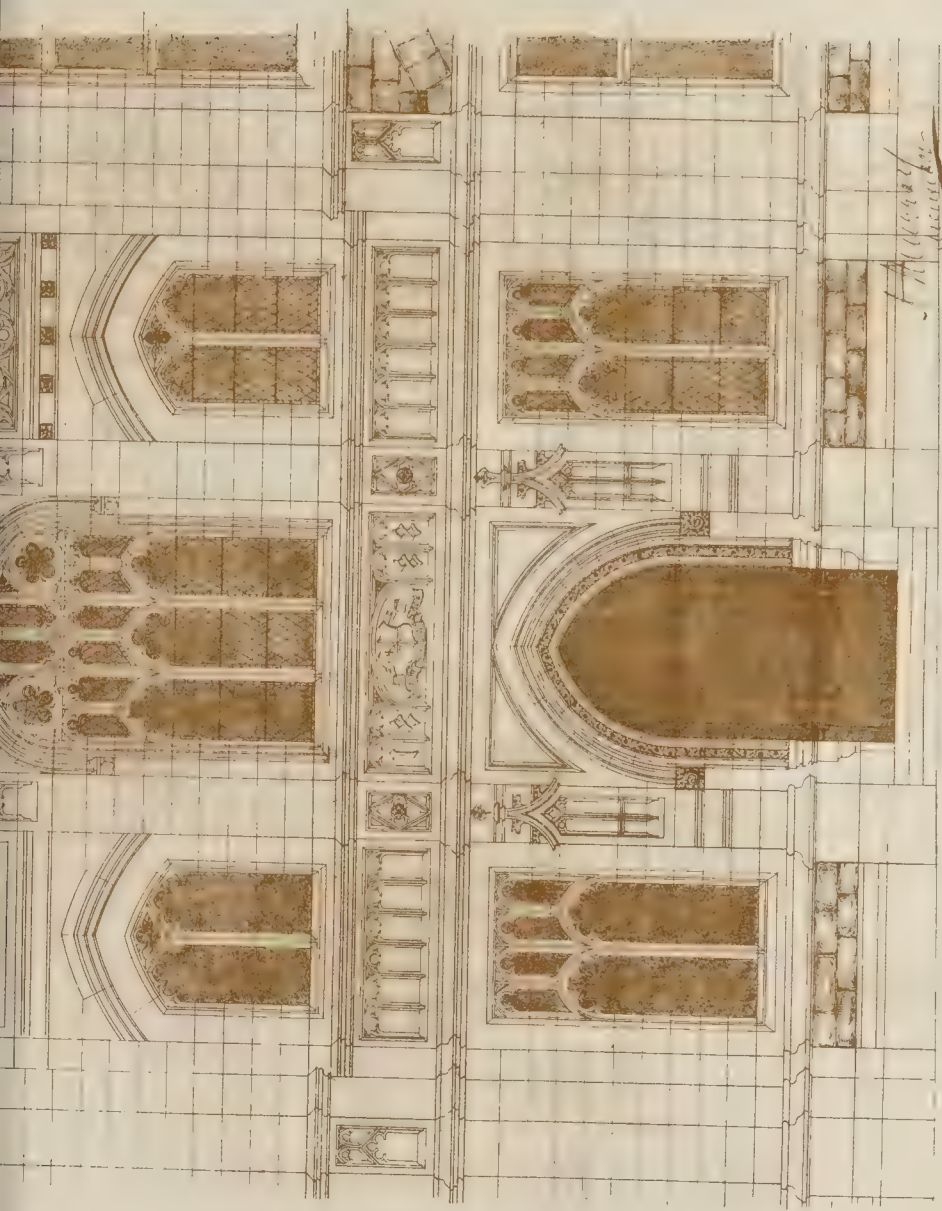


THE BUILDER, DECEMBER 31, 1887



—ALEXANDER & CO. CIVIL ENGINEERS—





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CITY OF LONDON COURT: GENERAL AND DETAIL ELEVATIONS.—MR. A. MURRAY, A.R.B.A., ARCHITECT





could be so altered as to make it thoroughly acceptable. Mr. Jackson seemed to think that the machinery at present existing was sufficient for the protection of the public, but that was not the case. Under the action of the Bill it would be found that all the registered architects, engineers, and surveyors would be competent men, which could not be said of all the members of those professions at the present time. It was proposed to include engineers and surveyors under the Bill, but their examinations would be distinct, and, in fact, the Bill would provide for three professions. The examinations to be fought shy of were such as those for the Civil Service, where the competitors had to work for a post, and to cram themselves with merely superficial knowledge. A real examination, like that of the Institute, did not require that kind of cramming, and those who studied to pass it were much improved by the preparation.

Mr. Bernard Dicksee drew attention to the fact that the proposed Bill would interfere with men at present in the profession, but who did not come under the qualifications mentioned in the Bill (applause). Were such men to be turned out of the profession, because the Bill would make it a *sine qua non* that every architect must be articulated, unless he had been in practice prior to 1882?

Mr. William Woodward said he presumed that the object of the promoters of the Bill was first to inquire whether the public would be better protected if such a Bill were passed. They had thought, and with some reason, that much of the discredit into which architects had recently fallen had been from a defective architectural knowledge. Many had asked whether such a Bill would convince the public that registered architects were better able to carry out works, or whether membership of the Institute was not synonymous with its recommendations. He therefore thought the discussion should turn more in the direction as to whether membership of the Institute, with its compulsory examination, would not carry more weight than registration would, if the Bill should be passed. It would have been better if an architect less distinguished than Mr. Jackson had taken up the question, as he, in consequence of his assured position, could look somewhat lightly on the endeavour of the rising generation to satisfy the public of their ability to carry out the works which might be entrusted to them.

Mr. H. R. Gough said he had come that evening expecting to hear some crushing arguments used against the Bill, but he was extremely glad to find that the arguments used had been so weak. (Cries of "Oh, oh," and laughter.) One thing that had perhaps attracted more attention than any other was the inclusion of the engineers and surveyors. But, he would ask, who was the engineer of fifty years ago? Was he not the architect? It was simply because architects had become such specialists that some of them could afford to despise construction. It would be almost impossible in a Bill of the kind to leave out the engineers; for many of them were now practising as architects, and *vice versa*. An architect ought, to a great extent, to have the knowledge of the engineer, the same knowledge being required to put a bridge across a river as to put a girder across a big building. Many who wished to look upon architecture as an art pure and simple said that a man's qualifications could not be tested by examination; but was any one bold enough to say that the medical profession might tear up its Acts of Parliament, and the public be as well or better off? It was the quacks who called themselves architects that they desired to get rid of. Mr. Jackson had said that the Bill had been promoted by a body who would not look on the Institute as a great central body. That was not the case, because the promoters of the Bill had carefully made the Institute, so far as architects were concerned, the central body. He could not see why surveyors should not be included, as they were undoubtedly as much a branch of the profession as the engineers.

Professor Kerr.—I venture to think the time has come when the meeting ought to be called upon not to misinterpret Mr. Jackson's views (cheers). There are some to whom his phraseology may be obscure (laughter), but there are others who remember in very old times when the phraseology was in every one's mouth in this room, and was used so good purpose by many distinguished men now dead, but who, I hope, have left some behind who can speak the same language

(applause). Without myself professing to be much of an artist in practice, I may say this,—that I recognise the artistic feeling, the artistic pre-eminence of those men whom Mr. Jackson represents here to-night (applause). And when he speaks of architecture being an art, and being in some way distinct from that which precedes it,—as engineering and construction,—and why should it be said that he is proposing to consider construction to be the work of the builder, and the work of the architect to be the beautification of some other man's construction (applause)? Such criticisms, sir, are utterly unworthy of answer, and I hope Mr. Jackson will not take the trouble of answering them (renewed applause). Now I hope the meeting will understand Mr. Jackson's views, and see what he is contending for as regards art as a substantial, and not an unsubstantial thing. He is contending for this great proposition,—if you will allow me to put it in other language,—that England can afford, and that England ought, to maintain an architectural profession more or less suggestive of pure art. That I understand to be Mr. Jackson's proposition, and that pure art cannot be taught I understand to be his position also. I remember poor William Burges many a time, in his enthusiastic way, railing that to the wall against all opposition. Burges was not a man,—as some few may remember,—to enter into a detailed and logical programme. He went at a conclusion and declared it in a straightforward manner, caring not who opposed him; and those views of architecture which he expressed, and the views Mr. Jackson now expresses, and those which, I hope, will long be upheld in this country (applause). At the same time, I think Mr. Jackson, and those who follow him more closely than I do, will not misunderstand the views of the other side of the question as regards the movement at present on foot. It must be understood very clearly, and borne in mind by every one,—and especially by the young men whom we see here,—that the architectural profession, like all else, is undergoing a very great change at this moment in our country. The profession, as it existed when I humbly entered it, was an entirely different thing, as it seems to me, from the profession into which you are about to enter, and into which some of you have entered. It is not a change in the architectural profession alone, but a change of the whole social scheme of this country. That is a point, however, into which we cannot afford time to go; but it will be quite sufficient to lay that principle down, and I am very sure it will be understood by all thoughtful men, however young. Now, amongst the changes which are taking place, and which have taken place, and more particularly in connexion with our own profession, there is one great change which is taking place,—and I mention it as an illustration,—in the Royal Institute of British Architects, at this moment. Many years ago, when the members were few,—and I do not say more select than at present, because it is a mistake to suppose that they were more select than they are now,—the prominent men were, in a certain sense, more prominent before the public and the world at large, as the representatives of art and learning. The Institute was then almost exclusively a learned society. The time and the necessity for that condition of things have passed away. The existence of the Royal Institute of British Architects as a learned society, pure and simple, on anything like the lines of the other learned societies of London is no longer required by the public. The change that has taken place,—and I cannot go into the minutiae of it,—is caused by the fact that the public and professional necessities of this country, outside and inside the Institute, do not require the Institute exclusively to confine its attention to art and learning. The consequence is that we are running the risk at present of losing touch with art and learning to a great extent. In order to prevent that, many of those who are at the head of affairs in the Institute are now adopting machinery,—which Mr. Jackson has referred to,—and which other gentlemen have referred to,—which is perfectly in accord with the spirit of the age, namely, admission by examination, which constitutes an educational test so far as it can be applied and taken for what it is worth. It is not their intention,—as I understand, for I am not one of them,—to constitute an academical test as we did in the old examination, which

Mr. Jackson referred to,—though I wish that examination were in existence now, for it was a great deal better than the present one (laughter). It is not their policy, as representatives of what may be called the future professional union which the Institute is to constitute, to establish an academical test of education, but it is their policy to establish an ordinary practical test, not for the sake of keeping out so much as of letting in; though, of course, they are pretty much the same thing (applause). Then come my friend Mr. Gough and his adherents with the Registration Bill. What is that? It is a perfectly honest attempt, as I read it, for I like to look at men's principles as being honest until we can prove them to be otherwise, and I see no reason for any jealousy in connexion with the movement they have entered on. Their object is this: to extend the principle of what we may call educational exclusion or inclusion,—call it what you please,—so that it shall operate all over the country. And in course of time, if any registration can be established,—and registration, remember, is simply entering one's name on the register,—if so, in course of time by this simple means you will find that those who are worthy to be architects will be, they say, recognised by the public at large, and that those who are not architects will find they are at a proper disadvantage in consequence. That is a perfectly honest object, though I myself do not believe they can accomplish it. I do not see how it is to be done, and I cannot see any chance of the Bill being read, even for the first time (laughter). At all events, let us give them a fair chance, and believe that their motives are quite as honest as the motives of those who do not think with them. Now, so much for the old Institute, and so much for the new Institute. The times move, and we move with them, and those of you who study the new philosophy will know what I mean when I say that you cannot help yourselves. Now we will turn to the Architectural Association. The Architectural Association, although not a State-recognised body, is an exceedingly useful body in its purposes, and always has been. The object of the Architectural Association is primarily education in a purely practical way, and not in an academical way, to suit the purposes of the time, day by day, whatever they may be. That is the purpose of the Architectural Association, and for want of a better means,—and I do not know that we could have a better means,—we established the means of mutual instruction. We said,—"Let us meet together, and talk, and then we shall find that we shall instruct each other." That is your position now, and I should stick to it (hear, hear). It makes one proud to belong to the architectural profession when one hears a man like Mr. Jackson read such a paper (applause), and what struck my mind in listening to him was this. You, gentlemen, here are full of enthusiasm for your art, and you have the whole world before you, and what occurs to my mind is this, we must not let the art die out; and the question is whether under the pressure of the times the art is to die out or not (cries of "No, no"). I do not wish it to do so. Mr. Jackson has quoted very distinguished names of men who have not been members of the Institute. Why they are not members of the Institute I have never been able to discover; but I know some of them, and I know they are men who never do anything without a reason. I should like to know, then, what their reason is. It may be this. Has the time come when a new body must be formed of distinguished artists, not in the Royal Academy, because it is no use for half a dozen architects to be elected by a parcel of painters (laughter),—has the time come for establishing, probably in the Royal Institute of British Architects, a nucleus of art composed of great artists' architects elected by artist-architects (cheers)?

Mr. Arthur Oates.—I have listened with great satisfaction and pleasure to the admirable paper with which Mr. Jackson has favoured us, and although he has made an onslaught on the Examination, in the success of which I take the deepest interest, I generally and cordially agree with him in his observations with regard to examinations generally. I believe with him that nothing can be more fatal to education, or to the sound acquisition of knowledge, than examinations badly conducted. The examinations of the Civil Service, which are based on cramming, are fatal, not only to knowledge, but also to the power of acquiring knowledge.



The examinations we desire are those which should teach the student what to learn. It is not so much what the student absolutely knows, but he should also have the power of acquiring knowledge, and of how, when, and where to acquire it. Unfortunately, when thirty-five years ago or more this Association proposed to the Institute to establish an obligatory examination, some men, who were very dear friends of mine, thought an obligatory examination undesirable, and fell into what I think was a great error by establishing a voluntary one. Later, an obligatory examination has been established for admission to the Institute, and has been in operation for some time; and, although not quite a success in the way of numbers, it has been a thorough success in the advantages offered to those who have passed it. I know I am speaking to many who have prepared for that examination, and I appeal to them whether the preparation and examination has not been to them an advantage which they would be loth indeed now to forfeit (applause). That examination was established after a considerable amount of discussion, with the view to meet the requirements of all. Since that time the views of the prominent members of the Institute have taken a considerable advance, and it was with very great satisfaction I found at the conference meeting on education that more extended views were supported. And not only by gentlemen living in London, but largely from provincial men, there was a general idea that the architectural student, thrown into the office practically without guidance, with little opportunity given him or direct object in his studies, might most likely waste his time, and find when he quitted the office that he had acquired a great deal that was useless, and very little that was useful; that, in fact, his time had been practically wasted. Now, the desire of those who are now taking a lead in the Institute, and who are pushing the matter forward, is, that from the very moment the young man enters the profession he shall have before him in each year a definite course of study which his principal shall be bound to see that he follows; that he shall, by two or more examinations, have the opportunity of testing the amount of knowledge he has acquired; and nothing is more important than an examination as a test. It has fallen to my lot, within the last few years, to come into contact with a great number of young men, many of whom have told me that they know a great deal. They have said in good faith, and with every confidence, that they were thoroughly acquainted with certain matters, but when I have asked them to give me evidence of it they have said "it had slipped their memory," or that they "did not know it as well as they thought." What we wish to do is to remedy this, to give them a certainty of knowledge, and to help them to cultivate accuracy of expression, so that from the earliest times and from their first entrance into the office the mind, the eye, and the hand shall act together, and that when they read a book they shall read it not simply with their eyes but with their minds and intellect: when they sketch it shall not be merely making a pretty picture, but they shall sketch the subject as a work of architecture, showing appreciation of its construction and the motives of its designer. It is only by a gradual course that the young man can be led up to acquire such habits. Mr. Jackson has taken up a position which he is fully entitled to take, but it is a position, remember, to which few of us can hope to attain. I think it is almost a misfortune that he should have expressed himself in the terms he did in regard to the acquisition of knowledge, because though he himself stands with many others in this position that his own words may be very applicable to himself, it is different with the poor student,—the man of imperfect education; and there is no greater scandal in this country than the way young men are turned out from the public schools, not even taught how to acquire preliminary knowledge; and it is one step towards removing that blot that I hope the Institute will take, when it has instituted a preliminary examination throughout the country, which the young man entering the profession will pass, and for which the schoolmaster will be bound to educate his pupils. These examinations would not be held simply by the Institute, but by all the associated societies throughout the country, and the announcement you made this

evening struck me as one of great interest, when you spoke of affiliated societies. One great object we have in view would be to forward in every great town, and in the provinces, the formation of societies of architectural students, with aims and objects similar to those of the Architectural Association, which would be looking to that Association, and taking from it their aspirations. This working harmoniously would bind the younger members of the profession together in one link throughout the country, and it is absolutely essential for the welfare of the profession that something of the kind should be done, and that thus the young men passing from grade to grade at last would pass the final examination, and enter the Institute. No other stamp should be wanted than membership of the Institute after a course of education such as that. There is no cramming for it. It will be a systematic and thorough education of all essential principles, which are required for the acquisition of the knowledge necessary for the architect. There will be no deviation from those glorious principles of liberty and freedom, of which Mr. Jackson spoke so warmly. There will be no closing of the profession. I cannot imagine anything worse than the idea of establishing a close profession in architecture. But I cannot help thinking that, by the agency of the Institute, with the co-operation of the societies throughout the country, and of this Association, which has already done so much, we shall raise the position of the profession, and give the young men that which they have not now, viz., an opportunity of reasonably acquiring that knowledge which is essential for the practice of architecture (cheers).

Mr. Cole A. Adams proposed a vote of thanks to Mr. Jackson and said he would have done so with even more pleasure had his paper been on some other subject. The matter was hardly a happy one, he thought, to bring before the Association, which was a body of students, to whom questions of art and practice were more useful than the politics of the profession, which were better kept out of sight there. He would not speak upon the question of registration, but hoped that Mr. Jackson would see cause, after what had fallen from Mr. Cates and other speakers, to lend his support to the Institute Examination, and not to throw cold water upon it.

Mr. Edgar Farman seconded the vote of thanks, and said, with regard to the last speaker's remark that he wished the matter had not been brought before the Architectural Association, that it seemed to him that if the proposed measure was going to affect anybody, it would be those students who were at present working for a place in the profession; therefore in his view no better subject could have been selected for debate.

The Chairman said he could not help thinking that Mr. Jackson had done a great service by calling attention to the subject (applause). The more it was discussed the better, and he entirely agreed with what had been said as to the desirability of not making an examination the be-all and end-all of the student's life and education. An examination had no force whatever unless it was purely educational in its purposes and aims. With regard to one very celebrated man, who had been mentioned (Mr. Street), he believed he was at one time strongly opposed to an obligatory examination, but changed his mind, and considered the examination established by the Institute, and the training for it, to be a good thing for students. All students, it should be remembered, had not the advantage of being under the training of a man like Mr. Jackson. As a matter of fact, a great many architectural students had no education at all, and the only way attention could be called to the necessity for education was by establishing some examination which would give them something to aim at. That, he believed, was the sole ground the Institute had taken up, in establishing the examination. He could not quite follow Mr. Jackson's analogy when he seemed to say that three voluntary students had passed per annum, and only twenty or thirty per annum the obligatory examination. When the examination had been made absolutely compulsory, and ten times as many came in, it did not seem to be such an extreme failure. No doubt the Institute would be glad to see more candidates, and certainly the provinces were sending up increased numbers. Indeed, a student educated in a provincial office had turned out to be the

best man of the year, and had gained the Ashpitel prize. Mr. Jackson, again, did not seem to be quite consistent when he said that in connexion with the construction of many of their public buildings, they had the assistance of the District Surveyor, who was trained to look after those buildings. But how did they know that those District Surveyors were properly trained except by their having passed an examination? Surely, also, there were many buildings in the country with which the District Surveyors had no opportunity of interfering. He was not going now to discuss the vexed question of Registration. He entirely agreed with the opinion expressed by Professor Kerr, and he could not see how the Bill was to pass.

The vote of thanks was then put, and met with a very hearty reception.

Mr. Jackson, in reply, said,—I am extremely indebted to those gentlemen who so kindly proposed a vote of thanks, and also to the meeting for so cordially passing it. As I said when I started, registrations and architectural politics are not what I should have liked to talk about to-night. Our business, as I said, is not with ourselves, but with our art; and your society,—which is especially constituted for your mutual improvement by the discussion of our art,—is one perhaps that at first sight does not seem the right one to speak to on the subject. At the same time, consisting as you do principally of the younger members of the profession, who are to make the profession in future, I do think it is a matter you ought to make up your minds about, for it concerns you a great deal more than it does us older men, whether you are to be combined in a close profession from which the promoters of the Bill think all improper persons will be excluded, or whether you will retain that liberty which I have tried to persuade you to-night to retain, and which is essential to your success in promoting the art to which you devote yourselves. Therefore I hope I have done some good by directing your attention to this matter, and I trust that the further discussion which must follow if the Bill is brought into Parliament, will find you to a great extent well prepared to consider it from every point of view. Many criticisms have been passed on my paper, but there is one point which I think has not been touched upon, and perhaps I did not make it so clear as I intended; that is, that any scheme of registration which is to bind architects into a close profession can only have the effect,—if it succeeds at all in doing what is intended,—of preventing builders from calling themselves architects. You will not prevent their going on and building badly; you will probably prevent their ranking themselves nominally among yourselves; but they will find other names under which they will continue their evil practices, and the Registration Bill will do nothing whatever to stop bad building. It seems to me,—and I am confirmed by one of the papers contributed to the interesting collection of papers on education read at the Architectural Conference,—that the Bill would have the effect of forming, not, as the writer said, two classes, but rather, I think, three classes of people concerned in building. There would, first of all, be those who have been called "artist-architects." It is not a name I like, because I believe an architect cannot be such unless he is also an artist (applause). But we will not quarrel about names. Then there will be the "registered architects" (laughter); and there will remain the third class, the "jerry builders" (renewed laughter). The registration scheme will divide us into three classes. We shall all go on our separate ways, perfectly happy, I dare say; but I do not see that any of the three classes will be the better for the change, unless it be the third, for it is pretty certain that the effect will be to throw more work into the hands of the "jerry builder." I am quite certain the other two classes will suffer: if a certain number of men are trained to look upon the mechanical side of our art, what I call the building side, too exclusively, they will degenerate and architecture will lose a great many good men, whereas, on the other hand, if you form a class of men to look only on the artistic side, they will suffer still more. In one matter in which I have been misunderstood, Professor Kerr has been so kind as to correct a false impression. I certainly hoped in all I said to make it clear that I placed the utmost value on the constructional qualifications of the architect. I thought I stated distinctly that no man could be a good archi-



test unless he were first of all a good builder. Good architecture implies good building, and the progress architecture has made in every age and country has come from constructional necessities and inventions, and so it will be in the future. Then, as to what I said about there already being sufficient protection against bad building, it was pointed out that in the country the surveyors are not, perhaps, always up to the mark, and one speaker suggested that the distribution of registered architects over the country might better that state of things; but I understood him also to suggest that country surveyors themselves should be required to be registered architects. I do not see why they would be in any way a different body of men from what they are now. Why do not architects seek those appointments? Because it is not worth their while (laughter); and it will be no more worth their while if the Registration Bill passes. The same class of men will present themselves, and if they are to pass the registration examination, what kind of examination will it be that will allow the local surveyors of country villages to go out to the world stamped as architects? Is that the qualification you expect the public to accept as a guarantee of competency? Another gentleman could not understand what I meant when I said that the true brothers of the architect were the painter and sculptor, and not the surveyor and engineer. He said it was only in large and important buildings that you are able to call in the painter and sculptor, and that people in ordinary practice have no opportunity of employing those persons. That is not what I meant. It is, of course, only on rare occasions that we are able to employ painting and sculpture to any great extent; but what I meant to say was, that the kind of studies to which we should devote ourselves were the studies that would be more akin to those which occupied the painter and sculptor than the mere mechanical pursuits of the surveyor and engineer,—that we should, to a certain extent, be painters and sculptors. An architect who has had no training in the allied arts can have no proper idea of decorating his buildings with painting and sculpture if he has the chance. Training of the artistic kind will, on the other hand, bring him into sympathy with the painter and sculptor, and will reflect itself on his architecture in a different way from the case of a man who is not brought up as an artist (applause). With regard to what Mr. Cates has said, we know his enthusiasm in the cause of education. Like him, I wish that the Examination, conducted by the Institute, should have that educational character and merit which he desires; but I do think that the Institute, in putting the Examination first, has "put the cart before the horse." I would be behind no one in wishing to see some general scheme of education to which all architectural students could be admitted, and I should like nothing better than that the Institute should put itself at the head of such a scheme. They may reply that they are not an educational society, but for my own part I wish they were. I should like to see a regular scheme of education, to which all architectural students could have access; where they will be sure of hearing lectures, and having instruction given in constructional and artistic matters, in the literature of the past, and in the antiquarian study of our art, which they should all know, although it is not architecture. If some general scheme could be arranged, which would put the means of education of that kind within the reach of every student, in a way that no one now is able to find, I think it would be an extremely good thing for architecture, and also the individual. In what I said about examinations, I was careful to distinguish that there are several kinds. There is only one kind necessary, that in which the teachers examine their students for the purpose of seeing if they have understood what they have learned. What I object to is a qualifying examination. In the latter case you simply teach the man to work for the examination; in the former case, you teach him to acquire knowledge, and the examination forms a mode of testing whether he has acquired it or not (applause). The meeting then terminated.

"Architecture in the Past" is the title of a paper by Mr. William Simpson in the last number of the R.I.B.A. Journal.

#### ARCHITECTURAL SOCIETIES.

*Royal Institute of the Architects of Ireland.*—On Saturday last the annual meeting of the Royal Institute of the Architects of Ireland was held in their rooms, 37, Dawson-street. Mr. Thos. Drew presided. Amongst those present were, Messrs. S. Symes, J. L. Robinson, J. R. Carroll, J. J. O'Callaghan, G. C. Ashlin, W. Byrne, —Cochrane, Belfast; J. H. Fullerton, Armagh; C. McCarthy, W. M. Mitchell, R. Miller, W. Stirling, F. Butler, Albert E. Murray, hon. sec. and treasurer, &c. The Hon. Secretary (Mr. Albert E. Murray) read the annual report, which reviewed the work of the Institute during the year. Thirteen meetings of the Council were held, a fact which showed that that body had not been unmindful of the duty entrusted to them. They had to record with regret the death of two of their life members,—Mr. W. H. Thompson, of Belfast, and Mr. Henry Hill, Cork. They hoped to have many new members added to the Institute. The Council had acted very successfully as a Board of Arbitration, and if its services in that capacity were more frequently availed of as between architects and clients, much costly litigation might be prevented. The question of architectural federation was making steady progress, and last year a Bill was printed and circulated, called "The Architects' and Engineers' Registration Bill," the object of the measure being that after its passing, architects should be obliged to undergo an examination before entering the profession. —Mr. Robinson, in moving the adoption of the report, said that no doubt there were a great many people who were not properly qualified at present practising as architects, which was a great grievance to the regular members of the profession. He criticised the action of the Board of Works in furnishing plans for nothing in the case of many buildings to the detriment of the profession.—The Chairman remarked that these plans were frequently totally unsuited to the sites and requirements.—Mr. Robinson said that that was invariably the case. He thought that patronage ought to be more equally divided. The architects as a body were very much dissatisfied with the arrangements which existed at present.—Mr. Carroll seconded the motion, and the report was adopted.—A communication was received from the Committee of the Technical Schools, and it was resolved that a donation of three guineas should be made to them on behalf of the institution. A like sum was also voted to the Architects' Benevolent Society.—The Chairman read a statement with regard to the position of architects in connexion with the Building Acts and the power of the municipal authorities to interfere in the case of new buildings. He advocated that some step should be taken to ascertain the statutory powers of the Corporation in this matter.—The following gentlemen were elected on the Council for 1888: Messrs. Albert E. Murray, Sandham Symes, J. J. O'Callaghan, J. R. Carroll, George C. Ashlin, Thomas Drew, Charles Geoghegan, James H. Owen, William Mitchell, Thomas Deane, and J. L. Robinson.—Messrs. J. H. Fullerton, Armagh, and R. Langishee, Athlone, were elected Fellows. Messrs. J. H. Pentland and T. M. Deane were reappointed auditors.—Mr. S. Symes was presented with an illuminated address on the part of the Institute in recognition of his services as hon. treasurer. The annual dinner was afterwards held at the Grosvenor Hotel.

*The Sheffield Society of Architects and Surveyors.*—The second meeting of this Society for the present session was held at the School of Art on the 13th inst., to hear an address Mr. J. W. Connon, F.R.I.B.A., of Leeds, on "The Legal Registration of Architects." Amongst those present were Messrs. T. J. Flockton (President, in the chair), J. B. Mitchell Withers, C. J. Innocent, C. Hadfield, E. Holmes, W. F. Hemmell, E. M. Gibbs, J. Fawcett, W. F. Ragg, R. Davidson (Borough Surveyor), A. F. Watson, T. Winder, J. M'Inery, E. M'Dougall, A. J. Greenwood, J. W. Wardle, C. Gibson, H. Webster, H. W. Lockwood, W. Potts, S. Kedward, J. Norton, W. J. Taylor, J. E. Benton, J. R. Wigful, C. M. Hadfield, C. B. Flockton, T. W. Moore, W. T. Campsall, W. Watkin, Banks, J. H. Thomas, and W. C. Fenton (hon. sec.). In the course of an able and interesting address Mr. Connon advocated the legal registration of architects on the basis of the existing registration of the legal and medical professions. He showed its advantage (1) to the student, (2) to the architect in prac-

tice, and (3) to the public. He urged the desirability of union amongst architects in pressing this question forward for the consideration of Parliament. A discussion ensued, in which Messrs. Hadfield, Innocent, Holmes, Fenton, Gibbs, and Hemmell took part. Eventually, on the motion of Mr. C. J. Innocent, seconded by Mr. C. Hadfield, a hearty vote of thanks was unanimously accorded to Mr. Connon for his address.

#### COMPETITIONS.

*Gloucester New Public Baths.*—The Corporation called in Mr. T. Roger Smith, F.R.I.B.A., to advise upon the sixty plans received in the above competition, and under his advice have awarded the first premium of 50l. to Mr. J. Fletcher Trew, architect, of Gloucester, for the set of plans under motto "5,680l." and the second premium of 25l. to Mr. J. Cook, architect, of Manchester, for the set of plans under motto "6,000l." It is proposed to publicly exhibit all the plans in the Corn Exchange, Gloucester, on Tuesday and Wednesday, the 3rd and 4th of next month.

*New Barnet Public Building Competition.*—We are informed that the New Barnet Public Building Committee met on the 13th inst. to inspect the eighteen sets of designs sent in by architects. Nine were selected for further consideration at a meeting to be held the first week in January, 1888. From eight to ten o'clock the same evening the public were admitted to view them. Eight of those selected for further consideration bear the following mottoes:—"Ego Animo," "Enterprise," "Justice," "Pro Bono Publico," "Spes" A (there were two designs under motto "Spes" and the Committee marked them "A" and "B" respectively; "B" was rejected), "Well-considered," "1887," "5,000," and the ninth bears a device of a star in a circle. The nine rejected designs were not considered by the Committee suitable for the district.

*Sheffield Board Schools.*—At the meeting of the Sheffield School Board on the 15th inst., Mr. Leader, on the minutes of the Buildings Committee, called attention to the competitions that had recently taken place amongst architects for the best plans for new departments. It seemed to him (according to the report in the *Sheffield Daily Telegraph*) that the competitions were conclusively in favour of the capacity of Mr. Innocent (the Board's architect) to produce the required plans, and he therefore suggested that the Board might very reasonably discount these competitions, which took up a good deal of time, and also involved some expense. Mr. Fletcher (chairman of the Committee) said he believed the views of Mr. Leader were shared to a considerable extent by the Committee.

#### Working Lads' Institute, Greenwich.

On the 8th instant the West Greenwich Ragged School and Working Lads' Institute, Bridge-street, Greenwich, was opened by Mr. F. A. Bevan. The building consists of a reading and refreshment room, entered from the front vestibule; a kitchen, a gymnasium, and an infants' room (with gallery), all on the ground-floor. A wide staircase leads up from the hall to a teachers' room on the Mezzanine floor, and to the first floor, which contains a large school-room with a platform at one end and an open-timbered boarded ceiling; class-rooms and other accommodation. The second-floor consists of two large rooms, which may be used as dormitories for boys, and the caretaker's apartments. Good cellars are provided, and the school is heated by low-pressure hot-water pipes. The total cost, inclusive of lighting, heating, &c., is about 2,000l. The architect is Mr. George Baines, of London, the contractor being Mr. H. L. Holloway, of Duptford.

*Telephones.*—The Equitable Telephone Association has just completed an installation of their "Swinton" telephones at 27, London-wall, whereby all the different floors of the warehouse are put in direct communication with one another and with the general and private offices. The same company has at present in hand a similar installation, with twenty-seven telephones, in the new warehouse and offices of the Co-operative Wholesale Society, Limited, Leman-street, Whitechapel, and has also received an order to fit up telephonic communication between all the different wards of the Hospital for Consumptives, Ventnor, Isle of Wight.



### LINE OF FRONTAGE UNDER THE PUBLIC HEALTH ACT.

NANKIVELL V. THE BOURNEMOUTH COMMISSIONERS.

In this case, heard in the Queen's Bench Division of the High Court of Justice (before Mr. Baron Pollock and Mr. Justice Hawkins), an important decision was given as to sending back to magistrates cases stated by them, to be restated on any point on which, though they have taken evidence, they have not given a finding or a distinct statement of fact, and the Court consider it material and therefore necessary that they should do so. The case had arisen in this way. There had been a complaint against Mr. Nankivell for making an addition to his house, by erecting a stable in his front garden beyond the line of houses in the "street." The houses, as usual in such places as Bournemouth, are detached, standing in gardens, and the stable was not united to the house. The complaint was under Section 156 of the Public Health Act, which provides that it shall not be lawful in any urban district, without the written consent of the urban authority, to bring forward any house or building forming part of any street beyond the front wall of the house or building on either side thereof, nor to build any addition thereto beyond the front of the house or building on either side. The defendant, before the magistrates, contended that the place was not a "street," and that the house was not part of a street within the meaning of the statutes, and that the stable was not an "addition to the house" within the Act. The magistrates, in stating a case for the opinion of this Court, stated that the stable was structurally separate from the house, and stated the question as to whether the place was a street, but not whether the stable, apart from its being structurally separate, was an addition to the house, and whether the house was part of a "street," within the statutes. The case had been opened and partly heard, and the Court were of opinion that they could not decide the case without distinct findings or statements of fact upon these points.

Mr. Foote, on the part of the defendant, submitted that the case should be sent back to the magistrates to be restated on that point. The cases, he said, established that, though the Justices could not alter their judgment, a case could be sent back to them to be restated on any point. [To this the Court assented, though the Master of the Crown Office added "provided they have taken evidence on the point."] No doubt, but here the evidence was taken, so that the magistrates have all the materials before them. And it is submitted that the case should be sent back to them, to be stated (1) by their finding and stating whether the new building was in fact "an addition to the house," if its being structurally separate did not prevent its being such addition; and (2) whether the house was part of a "street" within the 156th Section of the Statute. This latter point, he said, had been distinctly raised before the magistrates, but they had not given a sufficient finding or statement of fact to raise it.

Mr. Bosanquet, Q.C., on the other side, did not object to the case being restated on the last point, as to whether the stable was "an addition to the house," but as to the other point, he insisted that the case could not be restated so as to raise a new question, and the question now raised in the case was "whether the place was a street."

Mr. Foote urged, in reply, that this would not raise the question which he desired to raise and had raised before the magistrates—viz., whether the house was "part of a street" within the Act. It was undoubted and laid down in the Act itself that any road, lane, &c., would be a "street." The real question was whether this house was part of the street.

The Court were clearly of opinion that this was so, and that the magistrates ought to let them know what they had found to be the fact, as to whether this was a new building and an addition to the house, and whether the house was part of the street.

Case sent back accordingly.—*Times*.

### CASE UNDER THE METROPOLITAN BUILDING ACT.

A SOMEWHAT important point was raised last week by Mr. Knightley, District Surveyor of Hammer-smith, before Mr. Paget.

A builder, named Heath, removed some 15 ft. of earth from beneath a bay window of two stories, and underpinned it with concrete. He gave no notice, and on being requested to do so, wrote, refusing, saying he preferred to be summoned.

His contention was that as he had not removed any of the walling, it was only a necessary repair. Mr. Knightley contended that as no brickwork was removed it could not be a repair, but that it was work affecting the construction of an external wall; that the bay window formed part of the enclosing walls of the structure, and that what had been done came within the meaning of the phrase "other work." Section 2 he quoted, also 1st Rule of last Schedule, and By-law 3, which directs the use of concrete for foundations.

Mr. Paget said the question was difficult, and that

he was willing to grant a case, but as both plaintiff and defendant asked him to decide, he said, addressing defendant, "Why did you not give notice? If you were sitting in a chair and someone came and cut off the legs, your position would resemble the bay window after the removal of the supporting earth, and your seat would be found to be very uncomfortable. I shall fine you 10s., 2s. costs, and allow the District Surveyor one guinea for his attendance."

### THE THEATRE MANAGERS AND THE OFFICERS OF THE METROPOLITAN BOARD OF WORKS.

SIR,—In your last issue reference was made to the case, which has since been very widely noticed in the daily press, of the Assistant Architect to the Metropolitan Board. There is little to be said in palliation of the unfortunate error of judgment to which he has owed; but perhaps you will permit me to point out that the conduct of the theatrical managers is an indirect testimony to the steadiness (not unknown to many London architects) with which this official must have insisted on the observance of the orders of the Board. What the managers complain of is not that Mr. Hebb got orders for the play, but that they got nothing in return.

[We may here mention that the case referred to was discussed at the Board meeting held last week, and its further consideration was adjourned until the second meeting after the Christmas vacation.]

### "ST. AUGUSTINE AT ST. ALBAN'S ABBEY."

SIR,—My attention has been called to a letter in your issue of the 10th inst. [p. 824], written by Mr. H. Littlehales, and I dare say you will allow me to correct an error into which he has fallen in his comments on a letter of mine to Mr. Hems, of Exeter. I have not that letter before me, but I am quite sure that I did not, as Mr. Littlehales supposes, allege that the mention of Archbishop Augustine by his name alone without the prefix of Saint, was in any way "an argument in favour of his subsequent canonisation." My point was that my critic was mistaken in arguing that his being so mentioned was a proof that he was not canonised afterwards, and was, in fact, not canonised at all.

I do not think we can recognise Henry or any modern historian as an authority on the subject. They must, of necessity, be only compilers from ancient historians.

To some of those ancient historians Mr. Littlehales rightly appeals, but I do not know on what grounds he considers those particular ones worthy to be ranked among "the best writers of English History." Ordericus Vitalis does, as he says, at least in one passage, call the Archbishop "Augustine," while he calls the Pope who sent him "Saint Gregory." So also does Roger de Wendover, writing at about the same time; but while Roger usually calls him "Vir Domini" and often "Beatus Augustinus," he calls him also "Sanctus Augustinus." I apprehend that one such affirmative instance must outweigh a shoal of such negative instances as those quoted from translations of Ordericus and Jeffery of Monmouth.

Gocelin, a historiographer of St. Augustine (A.D. 1080 or 1090) (see the Acta Sanctorum), calls the Archbishop (as he does also the Pope) sometimes by his name alone, sometimes "Beatus," when writing of his acts in this life, but he calls him also and not seldom "Sanctus Augustinus," and he expressly says that by a decree of the Council of Clovesro, A.D. 747, his name was inserted in the Litany.

Neither Henry nor Hume asserts that Augustine was not canonised; but even if they had done so I should prefer the authority of Roser de Wendover and Gocelin to theirs; and I should be satisfied that Pope Innocent knew what he was talking about when, in 1356, he ordered the Feast of St. Augustine of Canterbury to be kept as a "double."

The negative argument which Mr. Littlehales adduced from the reformed English Calendar would deanonise forty-three out of the fifty-four "black letter" Saints, Popes' councils and formal canonisations to the contrary notwithstanding.

As to the statutes in the high altar screen at St. Alban's, St. Augustine's canonisation was not a necessary condition of his admission into

that company, for I have admitted among the saints some few others, who, for their connexion with St. Alban's, were worthy of such commemoration.

HENRY HUCKES GIBBS.

December 20, 1887.

\* \* \* We cannot find space for any further correspondence on this subject.

### WALTON-LE-DALE SEWERAGE SCHEME.

SIR,—I read with some surprise in the issue of your journal for the 10th inst. [p. 803] that "some little time back" the above Authority advertised for competitive schemes, and that Mr. Thomas Fenwick, C.E., of Leeds, has awarded the premiums.

The words "some little time back," and the name of the adjudicator in this matter, prompt me to write to you to say that "some little time back" means two years within six weeks since the schemes were deposited with the Board. This long delay has, no doubt, been a disappointment to others along with myself; but this is augmented by the news that the adjudicator, to the best of my knowledge, has not carried out a sewerage scheme under the modern requirements of the past twenty years of the Local Government Board.

Therefore, if experts are invited to compete, as I have no doubt some have done, it is most unfair to my mind that a non-expert should be the judge in such matters.

I have refrained from expressing an opinion as to the time the Board have taken, but this case suggests the question whether or not the Local Government Board should not exercise some restrictive power to limit the local authorities from preventing with the time of an industrious class of professional men, to say nothing of the large amount of capital and time expended on a scheme of this magnitude.

COMPETITOR, M. Inst. C.E.

### OWNERSHIP OF DRAWINGS.

SIR,—Can any of your numerous readers inform me who has a right to the plans of the buildings completed under an architect, who wrote to the proprietor as follows:—"According to promise, I herewith enclose my professional charges for preparing plans and details of, and superintending the erection of, your new premises, as above, viz., I agree to charge you for the above works, 5s. per cent. upon the cost of same."

JUNIAS.

\* \* Unless any stipulation to the contrary be made (which does not appear in this case as stated above) we are advised that in law the building owner has the right to the plans; see the case of Eddy v. McGovern, in "Roscoe's Building Cases," p. 31. As a matter of equity we dissent from this, holding that the plans are the architect's means of working in order to carry out a design, and that they should be his property; but the law appears to be the other way.

### PARISH TAKING OVER ROADS.

SIR,—What are the requisites to be fulfilled before the parish takes over a new road?

It is at the pleasure of the Vestry whether a new road shall be taken over or not, although the parties interested may be able to show that the usual conditions have been fulfilled, or is there any, and what, remedy in case of refusal of the Vestry?

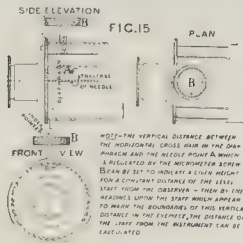
Reference to statutes or cases will oblige.

FREEHOLDER.

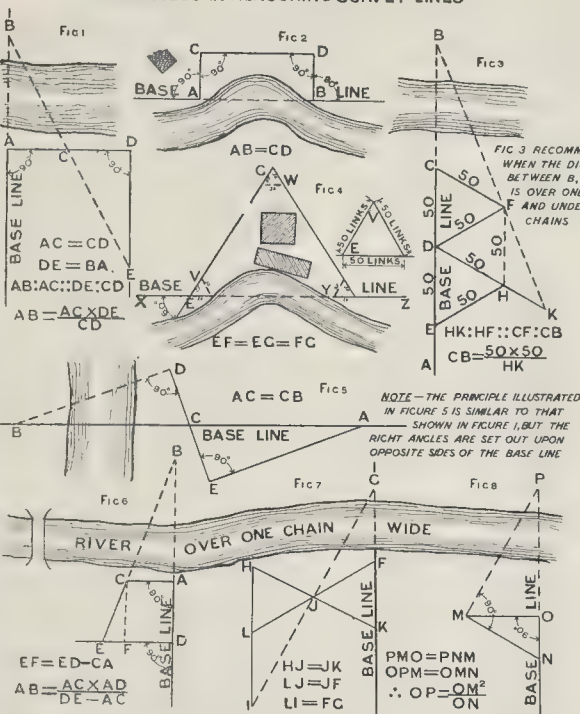
"Whiteley's."—The "Universal Provider's" premises in Queen's-road, Bayswater, are rapidly rising from their ashes. As we have on two or three occasions mentioned, the "Doulton-Peto" hollow terra-cotta or fire-brick flooring is being adopted throughout the new buildings. We published a section and full description of this flooring in the *Builder* for Dec. 19, 1885, p. 877, and a section of it is now appearing in our advertisement columns. By the use of this flooring the iron joints are entirely covered and a good key is left for plastering. The flooring is light, and permits of ready and rapid fixing with very little support in the way of centering, which can be suspended from above, and struck as soon as the cement joints are set, when the plasterers can commence work underneath. The same system is being adopted for the roofs of the new buildings, which will be flat. This method of flooring deserves to be better known than it is, on account of its lightness, rapidity of construction, and fire-resisting qualities. About 116,000 ft. super. of flooring are now being laid at Whiteley's on this system. Mr. W. Brass is the general contractor, and Alderman J. E. Saunders is the architect.



## WELL'S APPARATUS FOR JUDGING DISTANCES



## OBSTACLES IN MEASURING SURVEY LINES



### The Student's Column.

## LAND SURVEYING AND LEVELLING.

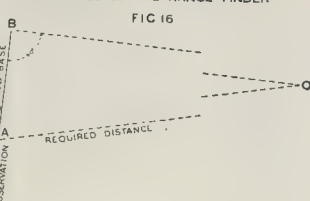
XXVI.—DETERMINING DISTANCES.

**F**IG. 15 illustrates Wells' apparatus, which can be fixed to the diaphragm of any levelling telescope for the purpose of judging distance when taking trial levels without chaining the horizontal distance. It can also be introduced for the purpose of check on chain measurements. The vertical distance between the horizontal cross-hair and the needle-point, A, can be regulated within the limits marked "Traverse of needle" in the diaphragm by means of the micrometer screw B, the top of which, as shown in the plan, is graduated to serve as a reference for setting the needle-point to any given distance. The index-pointer to this graduated circle is fixed upon the front of the breech end of the telescope, over the eye-piece, as shown in the front view. The needle-point is set up and down by the micrometer screw B, while in the same vertical plane as that in which the cross-hairs are fixed. To set the needle measure any distance, say 100 ft. upon level ground, set up the level so that the telescope stands over one end of the measured distance, while the staff is held at the other end. Focus the telescope accurately, and move the needle-point A in the diaphragm by the screw-head B,

until exactly 1 ft. of the staff image is enclosed between the needle-point and the horizontal cross-hair in the diaphragm. In this way a datum "distance reading" may be obtained, from which other distances of varying lengths can be easily calculated. The divisions upon the top of the screw B (see plan), where the index-point touches, should be noted for future reference.

Fig. 16 illustrates the principle upon which Range-finders are constructed. If A O equals the distance to be found, three well-defined points or pegs are employed, and B is so placed that the angle A B O is a right angle, while C is placed perpendicular to A B at a constant measured distance in order to find the length of A B by actual measurement. The surveyor, standing at A, observes the quantity by which B A O is short of a right angle, and the measured base, A B, being arrived at, the instrument determines B O automatically. Practically, as A B is very short compared with the length of B O, the distance A O is the same as the distance B O. Thus the measurement is mechanically exact. The non-parallelism between B O and A O determines the distance of the point O. The base may be chosen any convenient length, but it is evident that accurate results can only be obtained when the distance is small compared with the distance required to be found. Among the best instruments may be mentioned the Beta range-

## PRINCIPLE OF THE RANGE FINDER

finder, the Watkin range-finder, and Labbez tele-  
meter.

Distances may also be arrived at without the use of an optical instrument by measurement upon lines adjacent to the required base line, when set out so as to form any one of the geometrical constructions shown in figs. 1 to 4. Although in figs. 1, 2, 5, 6, and 8, the right angles can be most readily set with the aid of a cross staff (*Builder*, Jan. 29, p. 203) or an optical square (*Builder*, Jan. 1, p. 65), the perpendicular lines may also be set out by means of the chain only, as explained in the *Builder*, Sept. 17, p. 412. In fig. 1, the measured distance, D E, is equal to the required distance, A B. In fig. 2, the measured distance, C D, is equal to the required distance, A B. In fig. 3, the only distance required to be measured is K, and this can be best done with a tape. The quadrilateral triangles are set out in fig. 3 in the same way as fig. 4, by having each end of the chain at two points, one of the chain links apart, and then pulling out the chain tight by means of the middle brass indicator to determine the third point in the triangle. The construction of the remaining figures is explained by the diagram.

## RECENT PATENTS.

## ABSTRACTS OF SPECIFICATIONS.

11,407, Fire Escapes. R. B. Longe.

According to this invention, a simple form of ladder is laid horizontally across a frame mounted on wheels and pivoted to the frame at one end. When in use the free end is raised, while the other drops upon the ground. The topmost step of the staircase is made broader to serve as a platform over which one may pass from an upper window. A handrail is so pivoted to the side of the ladder that it can easily be raised or lowered as required.

678, Slag Paving Blocks. E. W. Jones and C. Brand.

In the manufacture of the paving-blocks, according to this invention, a turn-table on which the moulds are arranged rotates under the spout of the furnace, and the moulds are filled with as little waste as possible. The slag is guided by special distributors to the moulds. In annealing, a series of ovens, connected with one or more chimneys, and with passages or flues for hot air, is used. The blocks have wavy or indented sides to form a lock with the adjacent blocks.

698. Water-waste Preventer. O. Elphick

The object of this invention is to provide a syphon delivery to ordinary double or single valve flushing-cisterns. For this purpose a chamber is formed at the bottom of the cistern, having a syphon leading from it to the delivery pipe. The cistern and chamber are connected together by a valve worked by a handle or pull of the closet or the like, and the opening of this valve is made of sufficient size to allow the contents of the flushing-cistern to quickly pass into the syphon-chamber so that the water therein is immediately released almost immediately after being pulled down into the syphon-chamber for the water to transfer itself from one receptacle to another. From the syphon-chamber the water is delivered by means of the syphon.

756, Improved Kitchener. B. C. Sykes and  
G. Blamires.

The fire-grating of this kitchener is arranged near the floor line, the bottom of the range being preferably solid. The oven is placed immediately over the fire. The flues and dampers control the heat for one, two, or three ovens, and the water-heating appliance consists preferably of a coil of iron or copper pipe placed partly underneath the oven and behind the same in the fire space.

1,954, Door-fasteners. G. G. Smith.

This fastener consists of a swinging bolt which catches on a pivot pin made partly round and partly square, the square portion of the pin receiving an angular socket on the swinging bolt.

5,796, Automatic Discharge Valve. W. L. Holland.

This invention has for its object the construction of valve apparatus for discharging the contents of a cistern or tank in such a manner that when the ordinary discharge-lever, handle or other appliance has been actuated, all the water will be allowed to discharge itself from the cistern, whereupon the discharge outlet is then automatically closed. The novelty consists in the use of a valve which when closed resists the pressure of water in the cistern, and when open remains open until the cistern is emptied of its contents, and then closes again and remains closed until opened by means provided for that purpose.

## NEW APPLICATIONS FOR PATENTS.

Dec. 9.—16,963, A. Illidge, Opening and Closing Fanlights, and Retaining them in any Position.—16,976, S. Jones and R. Roberts, Tenoning or Mortising Machines



Dec. 10.—16,989, A. Hobson and J. Croft, Heating Air for Warming and Ventilating, &c.—16,997, H. Parker and A. Winder, Water-closet Cisterns.—17,005, H. Steven and J. Walker, Domestic Fire-grates.—17,041, T. Martin, Gate Latch.

Dec. 12.—17,100, F. Vergara, Substitute for Glass for Ornamental Purposes.

Dec. 13.—17,121, J. Lister, Sash Locks.—17,136, A. Carter, Automatic Flushing Tanks or Cisterns.

Dec. 14.—17,189, F. Cook, Preventing Air and Dust passing under Doors.—17,179, H. Frost, Flushing Cisterns and Water-waste Preventers.—17,197, A. Bayley, Fixing and Securing Ornamental Substances for the Decoration of Bar Fittings.—17,205, T. Bailey, jun., Window Fasteners.—17,206, A. Hopkins, Water-closet Apparatus.

Dec. 15.—17,271, J. Honeyman, Water-closet Cisterns, &c.—17,281, S. Tuddenham, Ornamentation of Art Metal Work by the Use of Glass Globes or Balls.—17,285, H. Hancock, Curing Smoky Chimneys.—17,294, C. Wright, Telescope Screw Fasteners for Windows, Doors, &c.

#### PROVISIONAL SPECIFICATIONS ACCEPTED.

15,034, W. Baldwin, Preventing Concussion in Water-pipes.—15,159, J. Leo, Groove and Tongue Cutting Machines.—15,306, J. Pauwels, Water Motors.—15,644, J. Petter, Joints of Gas, Water, and Other Pipes.—15,739, J. Stephens, Portland, Roman, and Other Cements.—15,773, F. Crane, Varnishes.—15,839, T. Grimbley, Double Bar Lock Roofing Tile.—15,995, W. Lako, Preventing the Slamming of Doors.—16,234, J. Sheldon, Wall Ties or Bond Iron.—16,262, F. Seyde, Metallic Lathing or Backing for Plaster or Cement Partitions and Ceilings.—16,289, A. Illidge, Opening and Closing Fanlights, Skylights, &c., and Retaining same in any Position.—16,390, J. Knight, Reversible Metallic Tread, for Steps, Stairs, &c.—15,902, W. Wade, Sheet Steel Panels for Doors.—16,137, R. Deacon, Stop and Catch for Doors, Windows, Gates, &c.—16,238, C. Onions, Flushing Cisterns.—16,300, O. Elphick, Automatic Flushing Tanks.—16,322, W. Birdthistle, Draught and Dust Excluder for Doors, Windows, and Skirtings of Rooms.—16,339, E. Kent, Automatic Ventilating Apparatus.—16,456, F. Cook, Preventing Air and Dust passing under Doors.—16,505, W. Phillips and E. Verity, Sash Windows.—16,507, F. Collins, Indicator for Door Fastenings.—16,529, S. Bond, Apparatus to be used in the Manufacture of Bricks, Tiles, &c.—16,577, J. Turtel, Automatically Closing Doors.—16,801, O. André, Glazed Roofs.—16,610, R. Adams, Opening and Closing Swing Windows, &c., and Fastening same at any desired Angle.—16,677, E. Nunn, Metal Laths for Building Purposes.

#### COMPLETE SPECIFICATIONS ACCEPTED.

##### Open to Opposition for Two Months.

16,512, W. Illingworth, Joiner's Adjustable Bench Stop.—414, T. Whalley, Water-closets.—2,112, J. Harris, Water-closets, and Ventilating Soil Pipes of same.—2,113, A. Walker and D. Bell, Raising, Lowering, and Securing Window Sashes.—2,305, H. Doulton and W. Rice, Ornamenting Pottery, Tiles, or Glass.—4,033, R. Nines, Casement Stay.—9,457, S. Hill and R. Hodges, Spring Hinges for Swing Doors.—15,096, S. and A. Fonn, Fireplaces of Kilns or Ovens for Burning Bricks, Tiles, &c.—1,414, W. Barnes and Others, Paint Brushes, &c.—2,423, Sir G. Chubb and H. Ball, Locks and Door Fastenings.—9,039, F. Naumann, Faced Bricks.—12,304, W. Heath and W. Geddes, Fireproof Curtains for Theatres, &c.—15,002, H. Reinicke, Ventilating Closets.

#### RECENT SALES OF PROPERTY.

##### ESTATE EXCHANGE REPORT.

###### DECEMBER 12.

###### By JOHN LEES.

Crowthurst, Surrey—Freehold Brick and Tile Works; the residence called Drewshere; the Brickmakers' Arms public-house; and Waste Farm, together about 106 acres, including mortgage £5,020

###### By J. BAKER & SON.

Battersea—5 to 11 odd, Afghan-road, 90 years, ground-rent 274. 830  
2 to 12 even, Khyber-road, 90 years, ground-rent 32. 1,240  
111 to 125 odd, Ingrave-street, 52 years, ground-rent 251. 1,125

###### By WEATHERALL & GREEN.

Soho—13, Greek-street, freehold. 1,520  
Clapham—17, Lambour-street, 67 years, ground-rent 61 6s. 330  
19, Offerton-road, 80 years, ground-rent 61 10s. 330  
Peckham—154, 156, and 172, Camden-grove North, 79 years, ground-rent 121. 745  
127, Camberwell-grove, 79 years, ground-rent 81. 325  
Chislehurst, Sussex—Holly Grove, and 12½ acres, copyhold. 3,520

###### By W. HALL.

Haverstock-hill—3, Marlford Park-road, 64 years, ground-rent 91. 450

###### By DRIVER & PERFECT.

Stoke Newington—2 and 6, Millard-road, 85 years, ground-rent 11. 445  
Islington—401, Caledonian-road, 60 years, ground-rent 1 l. 305  
Canonbury—54, Pyrland-road, 62 years, ground-rent 81 6s. 410  
Gray's Inn-road—44, Acton-street, 50 years, ground-rent 21. 300  
Whitechapel—10 and 12, Sutton-street, 10 years, ground-rent 161. 75

###### DECEMBER 13.

###### By DRIVER & CO.

Regent-street—An improved rent of 6391, 3s. 4d., term 29 years. £9,000

###### By CHURCH, GAWWERT, & CO.

City, Carter-lane Freehold rent of 2421, reversion in 8 years. 8,500

###### By BROAD & WILTSCHIRE.

Finsbury Park—10, Portland-road, 71 years, ground-rent 161 10s. 600  
Peckham—3, East Surrey-grove, and 2, Caistor-street, 76 years, ground-rent 101 10s. 270  
Old Kent-road—23 and 25, Kinglake-street, and 60, Surrey-grove, 20 years, ground-rent 121. 100  
Camberwell—173, Beresford-street, 18 years, ground-rent 101 18s. 75  
Deptford—Ground-rent of 101 5s., term 56 years By RUTLEY. 115  
Fulham—1, Ashbocking-terrace, 83 years, ground-rent 61 1s. 315

###### DECEMBER 14.

###### By D. J. CHATTELL.

Gray's Inn-road—13, Calthorpe-street, 32 years, ground-rent 101. 375  
Widmore, Kent—The Old Wesleyan Chapel, freehold. 135

###### By T. WOODS.

Hampton, Wolsley-road—Christleton Villa, 97 years, ground-rent 41. 170

###### By W. B. HALETT.

Bovey Heathfield, Devon—An improved rental of 251 a year, term 32 years. 180

###### By REYNOLDS & ELSON.

Croydon—1 to 9, Croydon-cottages, freehold. 1,620  
1, Elmwood-road and stabling, freehold. 460  
Two plots of freehold land. 450

###### By MOSS & JAMESON.

Soho—12, 13, and 13A, Greek-street, and a ground-rent of 561, reversion in 34 years, freehold, area 10,800 ft. 19,000  
Holborn—3, Fullwood-street, freehold. 380  
Harrow—A plot of freehold land. 28

###### DECEMBER 15.

###### By RUSHWORTH & STAVENS.

Brompton—13, South-street, 37 years, ground-rent 81. 310  
25, Alexander-square, 151 years, ground-rent 41. 605

###### By FARRER, PALMER, & CO.

Paddington—13, Edbrooke-road, 75 years, ground-rent 71. 600

###### By G. A. WILKINSON.

Peckham—3 and 4, Staveley-road, 56 years, ground-rent 71 1s. 910  
Chelsea—An improved rent of 791, term 21 years Whitehead's-grove—The Brompton County Court, 31 years, no ground-rent. 1,295  
Greenwich—11 and 13, Church-street, freehold. 1,230  
1 to 5, Pennell's-court, freehold. 250  
1 to 4, Conduit-terrace, 34 years, ground-rent 161. 290

###### By E. SIMSON.

Brixton-road—35, Holland-street, 12 years, ground-rent 41 8s. 161  
Rotherhithe—94, Albion-street, freehold. 1,158  
Lambeth—35, Lambeth-walk, freehold. 315  
83 and 85, Cornwall-road, 35 years, no ground-rent. 450

###### By C. P. WHITELEY.

Horne-hill—143, Dulwich-road, 79 years, ground-rent 11. 310  
Brixton—3, Fulross-road, 76 years, ground-rent 41 10s. 235  
Clapham—48, Landon-road, 60 years, ground-rent 41 10s. 245  
9 and 10, Willington-road, 57 years, ground-rent 101 10s. 360  
Merton—1 to 6, Wandie-terrace, freehold. 900

###### By RICHARDSON & BALTON.

Notting-hill—10, Ernest-street, freehold. 780

###### By BRADSHAW BROWN.

Poplar—5, 6, and 7, Lodore-street, freehold. 500  
Stepney—126, Eastfield-street, freehold. 160

###### By Messrs. CHURCH.

Chelsea—40, Walton-street, 42 years, ground-rent 81 8s. 1,260  
41, Orington-street, 44 years, ground-rent 61. 1,570  
Maida-vale—12, Carlton-road, 61 years, ground-rent 81. 800

###### By DOWSETT & CO.

Rotherhithe—25, 26, 28, 29, and 30, Adam-street, freehold. 1,040

###### By SHAW & CO.

Shadwell, Surrey—West-street—Freehold chapel; Shadwell, Devon—The Woodlands, and 11 acre, freehold. 4,500  
Wokingham—An enclosure of freehold land, 65 acres Crowthorne Farm, 29a. 2r., freehold. 1,400

###### By NEWTON & HARDING.

Islington—213, Liverpool-road, freehold. 175  
38, High-street; and 1 and 2, Smith's-buildings, freehold. 1,450  
255 and 267, Liverpool-road, freehold. 1,560  
182 and 183, Upper-street, copyhold. 2,000  
52, 54, and 56, High-street, freehold. 3,920  
Holloway—36 and 38, Holloway-road, freehold. 910  
Fitzroy-square—12, Fitz-street, copyhold. 1,010  
Notting-hill—11, Lansdowne-road, freehold. 1,400  
Tottenham, High-road—Salisbury House, copyhold. 860

###### By SALTER, REX, & CO.

Blandford-square—27, Broadley-terrace, 50 years, ground-rent 31 4d. 530  
St. John's-wood—29, New-street, 40 years, ground-rent 51 6s. 420

###### By CHADWICK & SONS.

Mill-end—127, Ansell-road, 59 years, ground-rent 51. 320

###### By PATTING, SOX, & BLYTHE.

Fitzroy-square—14 and 15, Pitt-street, copyhold. 1,240  
16 and 18, Pitt-street, copyhold. 1,235

###### By DYER, SON, & HILTON.

Lee—31, Southbrook-road, 76 years, ground-rent 31. £400

###### By TOWERS, WILLIAMSON, & ELLIS.

Paddington 16, 18, and 20, Brindley-street, 57 years, ground-rent 21. 675

###### By Mr. MASON.

Notting-hill—70 and 72, Ladbrooke-grove, freehold. 2,000  
West Kensington—6 and 8, Neisherwood-road, freehold. 1,740  
10, Netherfield-road, freehold. 660  
A Ground-rent of 81, reversion in 16 years. 200

###### By R. REID.

Charing Cross-road—The letting on lease for 80 years, a plot of land, area 4,180 ft., realised 3101 a year. By Mr. MASON.  
Adjoining lot, 1,246 ft., 1851 a year.  
Shafesbury-avenue—2,950 ft., 1201 a year.  
3,450 ft., 6101 a year.  
3,220 ft., 9101 a year.  
3,890 ft., 1,5201 a year.

#### Miscellaneous.

##### The Building Sites in the New West End Thoroughfares. Important Lettings.

The second public letting of the building sites in Shafesbury-avenue and Charing Cross-road, belonging to the Metropolitan Board of Works, took place at the Auction Mart on Friday, the 16th instant, in the presence of a very crowded attendance of builders and capitalists, one of the largest rooms at the Mart being inconveniently filled. The plots submitted were six in number, and comprised the most valuable sites in the two thoroughfares. Mr. Robert Reid conducted the auction. The sites were described as having commanding frontages to Piccadilly-circus, Charing Cross-road, and Shafesbury-avenue, and as especially suitable for the erection of banks, insurance offices, residential chambers, or other public buildings. The first lot submitted comprised a plot having a frontage of 83 ft. 5 in. to Charing Cross-road, and covering an area of 4,160 ft. It was stated that as regards this lot the Metropolitan Board, by deed dated November 25th, 1887, had granted to the Marquis of Salisbury and the trustees of a settlement of the family estates, a perpetual right of way over a portion of the land comprised in the lot, to be formed into a roadway 12 ft. in width, with a headway of at least 12 ft. in the clear to and from Charing Cross-road, and that the lessee would have to take the lot subject to this grant. After some spirited bidding the lot was let on a rental of 3101. per annum. All the other lots were also let in rapid succession; a plot in Charing Cross-road, adjoining the last-named lot, having a frontage of 40 ft., and covering an area of 1,246 ft., being let for 1551. per annum. A plot at the corner of Shafesbury-avenue and Dyott-street, Bloomsbury, having a frontage on the north-west side of Shafesbury-avenue, and 52 ft. on the west side of Dyott-street, and covering an area of 2,950 ft., was let for 1201. per annum. Another plot at the corner of Shafesbury-avenue and Denman-street, Soho, and close to Piccadilly-circus, having a frontage of 56 ft. on the north-west side of Shafesbury-avenue, and of 98 ft. 9 in. on the south side of Denman-street, and covering an area of 3,400 ft., was let for 6101. per annum. This was followed by another lot in Shafesbury-avenue, adjoining the last lot, having a frontage of 75 ft. and covering an area of 3,220 ft., which was let for 9101. per annum. The last lot was described as a very important and commanding plot at the corner of Shafesbury-avenue and Piccadilly-circus, having a frontage of 108 ft., and covering an area of 3,650 ft. The auctioneer drew attention to its being on the direct line to Regent-street, and as one of the most valuable sites at the West End. It was let for 1,5201. per annum, the aggregate amount of the lettings being 3,6251. per annum, on leases for a term of 80 years. The lowest amount to be expended in building on the six sites is 27,0001. The conditions provide that the several buildings are to be erected subject to the approval of the Board or their architect, that plans are to be submitted by the several lessees within three months after the date of the letting, and that within two months after the plans have been approved, the construction of the buildings is to be commenced.

**The Mission Church, Lowden-road, Horne-hill,** was re-opened on Monday last. A chancel has been erected, and rooms for Bible classes and mothers' meetings, the additions being in exact accordance with the original building. The work has been executed by Mr. C. Good, builder, Camberwell, under the direction of Mr. H. Lovegrove, F.S.I., who has given his services.



**British Archaeological Association.**

At the meeting of this Association on Wednesday, December 7th, Mr. Thomas Morgan, F.S.A., in the chair, Mr. Earle Way described further discoveries of Roman remains at Southwark, during the progress of the works for the new street through the Mint. These include evidences of the existence of buildings of various kinds, the water-supply to them having been by terra-cotta pipes, several of which about an inch in bore and 25 in. long were found. Considerable quantities of Roman pottery have been discovered at a level about 12 ft. or 14 ft. below the present surface. Not the least curious of the finds was that of a dog's skull, with some of the teeth purposely broken, possibly to prevent certain kinds of game from being destroyed. It was found on part of the site of the palace of the Dukes of Suffolk. Mr. R. Howlett exhibited an ancient MS. of the early part of the fifteenth century, curious for a record by which it is apparent that 180 of its pages were written between February 4, 1102, and April 22nd. The parchment has been that of a still more ancient MS. put over to an even surface. From a word or two that can be detected, the earlier MS. was one on Canon Law. A paper was then read on a Roman bronze sword found at Bessington, Hants, by the Rev. Canon Collier, F.S.A., read in the author's absence by Mr. Loftus Brock, F.S.A. Mr. Romilly Allen, F.S.A. Scott, described the remarkable cross at Rithwell, N.B., which has recently been set up within the church in a very praiseworthy manner by the Rev. M. McFarlane, aided by a Government grant. A paper was next read by the Chairman on the work of the Association during the past session, and the proceedings were brought to a close by another paper on "Relics of Mary Queen of Scots," prepared by Mr. H. Syer Cuming, F.S.A. Scott.

**Artisans' Dwellings, Lisson Grove.**

The Artisans', Labourers', and General Dwellings Company, whose houses of the cottage type at Shaftesbury Park (Clapham Junction), Queen's Park (Harrow-road), and Noel Park (Hornsey), are well known, are taking a new departure in the erection of dwellings in flats. This the Company's first experiment of the kind, consists of large buildings in Lisson Grove, providing accommodation for 250 families, the tenements being mostly of two or three rooms each, though there are single-roomed tenements and four-roomed tenements. The buildings are being carried out by the Company, from plans by Mr. F. T. Pilkington, architect, Mr. Wear being the managing foreman on behalf of the Company. The buildings are solid and substantial, with the principal façades of red brick and moulded concrete, the general architectural effect being more elaborate and less monotonous than that of most blocks of buildings of the kind. The concrete dressings, crasses, copings, &c., also the concrete steps of stairs, flue-blocks, and partition walls (3-in. elabs stiffened with iron) have all been made in situ. The iron girders, &c., have been supplied by Messrs. Measures Brothers, and the flat roofs have been covered with asphalt by the French Asphalte Company (Limited), of Cornhill, in an admirable manner. We may possibly have more to say of these dwellings later on.

**The Vacant District Surveyorships.**

At the meeting of the Metropolitan Board of Works on the 16th inst., Mr. W. Shepherd moved the adoption of the Building Act Committee's report with reference to the decease of Mr. E. Woodthorpe, late District Surveyor for the District of the Northern Division of the City of London, and the District of St. Anne, Limehouse, St. John, Wapping, the Precinct of St. Katherine, and the Hamlet of Ratcliff, and recommending—(a) That a District Surveyor be appointed for each of the two districts; that the usual course be taken for filling the office of District Surveyors for such districts; that advertisements be issued inviting candidates for the appointments, and that the Board do proceed to the elections on Friday, the 13th January, 1888. (b) That Mr. J. D. Mathews, Mr. G. Elkington, jun., and Mr. O. Foulsham, District Surveyors, who have addressed the Board on the subject, be informed of the course taken. This was agreed to.

**Appointments.**—Mr. F. S. Granger, M.A., A.R.D.P., Nottingham, has been appointed Lecturer in Classics and Philosophy to the Nottingham University College. We understand that this appointment will not interfere with Mr. Granger's other duties.

**Crystal Palace School of Practical Engineering.**

The certificates of merit to the students of this school in the winter term just closed were distributed on Saturday last at the school by Mr. W. H. Precoe, in the presence of a large number of the students and their friends. Mr. Shenton, the Superintendent, having read the report of the examiners, which was of a satisfactory character, Mr. Precoe delivered an address to the students, in the course of which he said the art of engineering was constantly embracing a wider and wider area. In days of old it was said that an ounce of practice was worth a ton of theory, but that notion was now thrown to the winds, and at the present time theory and practice must go hand in hand. It was impossible for an engineer to visit that school and see the drawings and models and apparatus without feeling that the course of instruction pursued in it was of the most satisfactory character. There was a close attention to detail which was the root of all human progress, and the result was that the students of that school had acquired a high reputation in all parts of the world to which they had been sent.—Mr. Wilson, the principal, stated that, including those now in it, there had been 690 students in the school since it began fifteen years ago; that 172 of them became Students of the Institution of Civil Engineers, and that out of that number sixty-six had already passed to the grade of Associate-members of that institution.

**Obituary.**—The *Newcastle Chronicle* announces the death, on the 14th inst., of Mr. John Lowry, the senior partner of the well-known firm of John and William Lowry, builders and contractors, Corporation-street, Newcastle. Mr. Lowry, who was in his sixty-fourth year, was a son of the late Mr. Joseph Lowry, builder, Raffles, near Carlisle. He came to Newcastle about forty years ago, and in conjunction with his brother has carried on an extensive business as a contractor during that period. During the great strikes that occurred many years ago in this district in connexion with the building trade, Mr. Lowry was the Chairman of the Master Builders' Association. He leaves a widow, two sons, and two daughters.

**Compensation for Defective Drainage.**

Damages for injury brought about by defective sanitary states of dwellings are by no means common, and for this reason alone it is worth recording that towards the close of last month 100l. were awarded as compensation to a gentleman who had lost his daughter by reason of the defective drainage of the house he occupied.

We are not aware of the particular circumstances of this case, but as a general principle we think that the responsibilities of landlords who seek to make gain by letting houses which are, in point of health, unfit for human habitation need to be strongly pressed home; and every such case as the above aids in this direction.—*Lancet*.

**A New Hot-Water Pipe-Joint** has just been invented at the Tyldesley Ironworks, owned by Mr. John Grundy, of London. It is to be used in the fitting up of his combined apparatus (pure warm air and hot water) for heating churches, schools, and public buildings. It is claimed for the new pipe that it is impossible for the joint to blow off or become loose during expansion and contraction. Provisional protection has been secured by the patentee.

**Shakespeare Memorial Tower.**—The magnificent gift of Mr. George Childs, of Philadelphia, presented to the town of Stratford-on-Avon, was specially designed by Mr. J. A. Cossins, architect, of Birmingham. The clock is by Mr. J. W. Benson, of Ludgate Hill, London, and strikes the hours and quarters upon hemispherical bells.

**Blinds.**—We understand that Messrs. James & Son, Aldersgate-street and Piccadilly, have received the appointment of Blind Makers to Her Majesty's Works and Public Buildings in the London District, also to the Royal Palaces, and at Hampton Court, Kew, and Richmond, the museums, post-offices, Houses of Parliament, Royal Law Courts, &c.

**Messrs. Pontifex & Wood.**—It is announced that the old-established business of engineers, copper-smiths, white lead and chemical manufacturers, carried on by the above-named firm for upwards of a century, has been converted into a limited company. No shares, however, will be issued to the public.

**Horeham Hurst, Sussex.**—In our notice of this building, under "Illustrations," last week, the words "filled in between the double lath and plastering" should have been "filled in between with double lath and plastering."

**London.**—Messrs. T. & W. Farmiloe have just completed and fixed a stained-glass window at Christchurch, Jamaica-street, E. The subject is "The Ascension."

**PRICES CURRENT OF MATERIALS.**

		£.	s.	d.	£.	s.	d.
TIMBER.							
Greenheart, B.G.	.....ton	4	10	0	7	15	0
Teak, E.I.	.....load	8	0	0	12	10	0
Sequoia, U.S.	.....foot cube	0	2	3	0	3	0
Ash, Canada	.....load	3	0	0	4	10	0
Birch	.....	2	0	0	3	10	0
Elm	.....	3	10	0	4	10	0
Fir, Dantais, &c.	.....	1	10	0	4	0	0
Oak	.....	2	10	0	4	10	0
Canada	.....	8	0	0	6	0	0
Pine, Canada red	.....	2	0	0	3	10	0
" yellow	.....	2	0	0	4	0	0
Lath, Dantais	.....fathom	3	0	0	5	0	0
St. Petersburg	.....	4	0	0	5	10	0
Waincoat, Riga	.....log	0	0	0	0	0	0
" Odessa, crown	.....	2	10	0	3	0	0
Deal, Finland, 2nd and 1st. std. 100	.....	7	10	0	8	0	0
" 4th and 3rd	.....	6	0	0	8	0	0
Riga	.....	5	10	0	7	10	0
St. Petersburg, 1st yellow	.....	8	10	0	14	0	0
" 2nd	.....	7	0	0	8	0	0
" white	.....	6	10	0	8	0	0
Swedish	.....	6	15	0	15	0	0
White Sea	.....	0	0	0	16	10	0
Canada, Pine, 1st	.....	18	0	0	24	0	0
" 2nd	.....	10	0	0	15	10	0
" 3rd, &c.	.....	7	0	0	8	13	0
" Spruce, 1st	.....	8	0	0	10	10	0
" 3rd and 2nd	.....	6	0	0	7	0	0
New Brunswick, &c.	.....	5	0	0	7	0	0
Battens, all kinds	.....	4	0	0	10	10	0
Flooring Boards, 99, 1 in. prepared, first	.....	0	8	0	0	11	6
Second	.....	0	8	0	0	7	6
Other qualities	.....	0	4	0	0	6	0
Cedar, Cuba	.....foot	0	0	0	3	0	3
Honduras, &c.	.....	0	3	0	0	0	3
Australia	.....	0	0	0	2	0	3
Mahogany, Cuba	.....	0	0	0	4	0	7
St. Domingo, cargo average	.....	0	0	0	4	0	0
Mexican	.....	0	0	3	0	0	3
Tobacco	.....	0	0	4	0	6	6
Honduras	.....	0	0	4	0	6	6
Maple, Bird's-eye	.....	0	0	5	0	7	7
Rose, Rio	.....ton	8	0	0	11	0	0
Balm	.....	7	0	0	9	0	0
Box, Turkey	.....	0	0	18	0	0	0
Satin, St. Domingo	.....foot	0	0	5	0	9	9
Porto Rico	.....	0	0	8	0	10	10
Walnut, Italian	.....	0	4	0	0	8	8
METALS.							
Iron—Bar, Welsh, in London	.....ton	4	15	0	5	0	0
" in Wales	.....	4	5	0	4	10	0
" Staffordshire, London	.....	5	10	0	6	0	0
COPIES.							
British, cake and ingot	.....ton	0	0	0	0	0	0
Best selected	.....	0	0	0	0	0	0
Sheets, strong	.....	0	0	0	0	0	0
Chili, bars	.....	80	0	0	0	0	0
YELLOW METAL	.....lb.	0	6	0	0	0	0
LEAD.							
Pig, Spanish	.....ton	15	5	0	0	0	0
English, common brands	.....	15	10	0	0	0	0
Sheet, English	.....	16	10	0	0	0	0
SILVER.							
Silesian, special	.....ton	20	10	0	21	0	0
Ordinary brands	.....	22	0	0	20	10	0
TIN.							
Strait	.....ton	160	10	0	0	0	0
Australian	.....	160	10	0	0	0	0
English ingots	.....	0	0	0	0	0	0
OILS.							
Limeoil	.....ton	19	0	0	19	7	6
Cocount, Cochín	.....	24	0	0	30	0	0
Ceylon	.....	23	15	0	0	0	0
Palm, Lagos	.....	21	10	0	0	0	0
Rapeseed, English pale	.....	22	10	0	0	0	0
" brown	.....	25	0	0	0	0	0
Cottonseed, refined	.....	19	15	0	20	0	0
Tallow and Oleine	.....	25	0	0	25	0	0
Lubricating, U.S.	.....	5	0	0	8	0	0
" refined	.....	5	0	0	12	0	0
TURPENTINE.							
American, in casks	.....cwt.	1	4	9	0	0	0
TAR.							
Stockholm	.....barrel	0	15	0	0	0	0
Archange	.....	0	10	0	0	0	0

**TENDERS.**

[Communications for insertion under this heading must reach us not later than 12 Noon on Thursday.]

**BATH.**—For repairing and re-covering roof, and restoring the elevations of the Guildhall, Bath, for the Bath Corporation. Mr. C. E. Davis, City Architect.—T. Laver (accepted) £280 5 0.

**CROYDON.**—For additional class-room, lavatory, and cloak-room (boys' department), taking down and erecting boys' and girls' playshed, &c., at the South Norwood Schools, for the Croydon School Board. Mr. Robert Ridge, Surveyor to the Board, architect. Quantities by the architect.—

Paternan & Son	.....£850	0	0	1
Acworth & Co.	.....	750	0	0
Smith & Bulled	.....	740	0	0
Henley & Co.	.....	682	0	0
Verrall	.....	679	0	0
Bowyer & Son	.....	653	0	0
King Bros.	.....	606	0	0
Ryan	.....	616	0	0
Marriage	.....	596	0	0
Barlow	.....	580	0	0
Smith & Son	.....	587	0	0
Wyatt & Co.	.....	528	0	0
Caplin (accepted)	.....	496	0	0



## CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

## CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Alterations and Additions to Premises	Wandsworth, &c., Un.	T. W. Aldwinckle	Dec. 29th	ix.
Lock-up, Watford	County of Hertford	Urban A. Smith	Jan. 3rd	ix.
Card and Implement Shed	Brighton Town Council	P. C. Lockwood	do.	ix.
Jubilee Clock Tower, Margate	The Committee	Stoner & Sons	do.	ix.
Wood Paving	Hammersmith Vestry	Official	Jan. 4th	ix.
Masons' and Paviors' Work, Wood Paving, &c.	Westminster B. of Wks.	G. E. W. Wheeler	do.	ix.
Road-Making and Paving Works	Hammersmith Vestry	Official	Jan. 9th	ix.
Corn Store, Canterbury	Mr. H. E. Taylor	Hall & Jennings	Jan. 10th	ix.
Painting, &c.	St. Pancras Guardians	Official	Jan. 18th	ix.
Furnishing Ironmongery	St. Board for London	do.	Not stated	ix.
Works and Materials	Liverpool Corporation	do.	do.	ix.

## PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Foreman of Roads	Chelsea Vestry	120l., &c.	Dec. 28th	xv.
Architect's Assistant	Met. Board of Works	120l.	Dec. 31st	xv.
Borough Surveyor	Burnley Cor.	350l.	Jan. 7th	xv.

EASTBOURNE.—For new infirmary, Eastbourne Union, Sussex, for the Guardians. Mr. F. G. Cooke, A.M.C.E., architect, 8, Hyde-gardens, Eastbourne. Quantities by Mr. C. Stanger, surveyor, 21, Finsbury-pavement, E.C.1.

Rowland Bros.,* Horsham	£8,900 0 0
Coster, Eastbourne	6,750 0 0
Smith, Worthing	6,750 0 0
W. Martin, Ramsgate	6,750 0 0
Longley, Crawley	6,500 0 0
Newman & Hart, Eastbourne	6,455 0 0
Robson, Snaresbrook	6,437 0 0
Peters, Horsham	6,425 0 0
Mark Martin, Eastbourne	6,410 0 0
Peckles, Eastbourne	6,372 0 0
Wood, Eastbourne	6,300 0 0
Parker, Eastbourne	6,135 0 0
Tomkinson, Eastbourne (accepted)	6,100 0 0

[Architect's estimate, 6,350l.]

\* Received too late.

HAMPSTEAD.—For erecting house at Netherhall-gardens, for Mr. E. Filletter. Mr. Geo. Sherrin, architect.

Holland & Hansen	£23,488 0 0
J. W. Falkner	3,469 0 0
Hall, Biddall, & Co.	3,459 0 0
Stimpson & Co.	3,180 0 0
Lawrence	3,109 0 0
J. Chapman, Hackney	2,987 0 0

KENSINGTON.—For repairs to No. 29, St. Mary Abbot's-terrace, Kensington, for Dr. Dent. Messrs. George & W. Ralph Low, architect.

Barrett & Jordan, Earl's-court	£287 11 6
Holliday & Greenwood, Brighton	245 10 0
Dove Brothers, Islington (accepted)	185 0 0

KINGSLAND.—For erecting glass-room, &c., at the Birkbeck Middle-Class Schools, for the Trustees. Mr. J. J. Thomson, architect. Quantities by Messrs. Northcroft, Son, & Neighbour.

Lang	£567 0 0
Whitehead & Co.	655 0 0
Sargeant	525 0 0
Scott	617 0 0
Exton & Burton, Birkbeck Works, Kingland	499 0 0

LONDON.—For additions and alterations to 83, Cadogan-terrace, Mr. E. W. Buche, architect, 83, Bedford-row. Quantities by Mr. T. W. Goodman, 8, Buckingham-street, Strand, W.C.1.

Wall Bros.	£1,679 0 0
Adamson & Sons	1,655 0 0
Grover & Son	1,630 0 0
Roberts	1,669 0 0
Dove Bros.	1,676 0 0
Nightingale	1,620 0 0
Bywaters	1,485 0 0
F. Sanders	1,483 0 0

LONDON.—For erecting warehouse premises, Bishopsgate-street Without, Messrs. Lander & Beddall, architects, 8, John-street, Bedford-row, W.C.1. 19,470 0 0

Lawrence & Son	£20,710 0 0
Colls & Son	20,540 0 0
Williams & Son	21,235 0 0
Outwaite & Son	19,591 0 0
Brass & Son	19,771 0 0
Asby & Horner	19,640 0 0
Brown & Co.	19,523 0 0
Nightingale	19,470 0 0
Stephenson	19,199 0 0
Mattock Bros.	19,133 0 0

LONDON.—For building a warehouse in Star-court, Broad-street, for Messrs. Copstock & Co. Mr. Charles Innes, architect, 27, Queen-street, City.

J. & J. Greenwood	£23,849 0 0
Colls & Son	3,670 0 0
E. Conder	3,693 0 0
T. J. Messon	3,620 0 0
Rider & Son	3,588 0 0
Hall, Biddall, & Co.	3,560 0 0
Prestige & Co.	3,543 0 0
J. M. Macey & Sons	3,460 0 0
Brass & Son (accepted)	3,393 0 0

LONDON.—For alterations and additions at 102, Holland-road, Kensington, for Mr. James Caldwell, M.P. Mr. Edward Tidman, C.E., architect, Connaught-mansions, Victoria-street, Westminster.

Forster	£212 0 0
Bennett	188 0 0
Hall & Co.	168 0 0
Correy & Son	160 17 6
Kelland	84 18 0

PUTNEY.—For the erection of stabling, shed, smithy, cottage, &c., at Cheverton-road, High-street, Putney, for the London General Omnibus Company, Limited, under the superintendence of Mr. G. T. Lanham. Quantities by Mr. A. J. Bolton.

Flew & Co.	£24,118 0 0
Sabey & Son	4,086 0 0
Turtle & Appleton	3,980 0 0
Harvey	3,976 0 0
Stephenson	3,693 0 0
Haynes	3,450 0 0
Hunt	3,440 0 0
Frank	3,410 0 0
Knight	3,400 0 0
Toms	3,376 0 0
Parker	3,349 0 0
Garrad	3,277 0 0

SOUTHAMPTON.—For the erection of out-patients' block, covered way, and dispensary, at the Royal South Ham Infirmary, Southampton, as a Jubilee Memorial of Her Majesty's reign. Mr. W. H. Mitchell, architect, Southampton.

John Witt, Bitterne, near South-

ampton (accepted) £1,888 3 0

[Twelve Tenders were received.]

SOUTHAMPTON.—For re-instating damage done by fire, and sundry repairs, at 109, East-street, Southampton. Mr. W. H. Mitchell, surveyor, Southampton.

T. J. Jones, Freemantle, South-

ampton (accepted) £235 0 0

WILLESDEN.—For making-up private roads, for the Willesden Local Board.—Contract No. 34.

	Dean Road.	Cherter Road.	Lechners Road.	Huddystone Road.	Stoke Road.	Hill Road.	Unwin's rth Road.	College Road.	Parves Road.	Felxtown Road.	Gryphon Road.	Mayo Road.	Park Road.	Melville Road.	Tavistock Road.	Woudow Road.	Tubbs Road.	Nightingale Road.	Honeywood Road.	Daral Road.	Victoria Road.	Park Mews.
Neave & Son	681	419	489	470	901	676	455	755	859	541	637	1130	163	363	298	117	1059	649	320	489	290	369
Nowell & Robson	602	381	445	428	822	690	543	867	850	595	700	1030	178	401	292	128	1165	943	391	437	255	311
Fulton	709	431	469	470	871	636	492	840	918	570	679	1072	176	383	298	118	1116	914	398	407	277	313
Boyer	—	408	541	517	—	734	558	972	1057	659	816	—	—	—	—	—	—	—	—	—	—	—
Cailey	661	395	485	475	815	—	—	—	—	—	—	—	170	366	—	—	—	—	—	—	—	—
Mowlem	758	445	517	491	941	652	489	871	936	573	701	1171	169	396	311	125	1181	950	378	496	293	356
Rowland Bros.	723	445	575	490	907	666	495	852	937	577	703	1080	169	357	298	125	1165	943	391	437	255	311
Jones	661	395	485	475	815	—	—	—	—	—	—	—	170	366	—	—	—	—	—	—	—	—
Bell	641	383	461	445	845	782	472	759	846	528	653	1009	158	352	293	127	1087	885	319	454	241	298
Nelson	685	389	472	453	840	615	462	818	878	565	651	1040	158	352	293	127	1087	885	319	454	241	298
Neal	651	363	455	440	891	563	429	750	787	505	609	999	154	340	273	121	1090	798	330	441	266	352
Hall	626	401	505	510	960	676	542	839	1004	628	768	1174	178	417	341	127	1256	983	391	532	348	325
R. Ballard	624	312	439	423	792	582	427	779	854	611	600	—	368	368	325	1017	839	333	421	280	377	—

\* And 13s. 4d.

† And 10s.

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# The Builder.

VOL. LIII. No. 2343.

SATURDAY, DECEMBER 31, 1887.

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### Some Recent Illustrative Works.



HERE has probably been no period when there were so many illustrative books of architecture brought out, and of so high a class generally, as in the present day. If some critics think we have forgotten how to build in these days, we at all events know how to draw buildings, and the collections both of measured drawings and of picturesque views of architecture drawn by architects during the present generation will be regarded by our successors as a very noteworthy contribution to the illustration of the architecture of the past. We are speaking here not of books which have a special literary value,—essays on history or topography accompanied by illustrations,—but of books which are of value as collections of illustrations, apart from any literary matter in connexion with them. We noticed one at some length the other day, a work on sepulchral monuments, with, as dealing with a subject which has not received much systematic illustration, seemed to claim special attention; and we have three others now before us, each with a special interest of its own.

Mr. Ernest George's book of views in Venice,\* represents that type of architectural illustration in which the architectural and the purely artistic elements are combined in about equal proportions. His etchings are all of architectural subjects, but they are of value not so much as representations either of architectural topography or architectural detail, but as artistic pictures from architectural materials. Etching is a form of execution peculiarly suited for this artistic treatment of buildings. It is not the best method by which to give their detail as it would strike an architect. But it is one of the very best mediums for rendering the picturesque and poetic aspect of architecture, the expression of its deep shadows and its broad sun-lit masses. In searching in Venice for examples of architectural effect adapted to treatment by etching, Mr. George has in the main avoided the most well-worn ground. The only one of the prominent and world-renowned architectural features of Venice which he has included among his subjects is the Dogana and Santa Maria behind it, from the lagoon, which he has treated in a manner characteristic of etching, the buildings with their solid masses and deep shadows forming the only worked-up portion of the

picture, the sky and the water hardly touched, the latter only sufficiently to give the requisite effect of reflection. Etching in its purest form is taking darks out of a pervading light, just as engraving in its purest form consists in taking lights out of a pervading dark; and a subject for etched effect is pre-eminently one with plenty of light in it, broad masses of light which can be passed over almost untouched by the needle and give the full value to the darks which are worked out of the plate; and there is nowhere greater scope for an effect of this kind than in a place like Venice, where water, with its wealth of reflected light, pervades every scene, and leaves the etcher so many opportunities of broad and striking contrasts of light and shade. The Rialto nominally forms one of the illustrations, but it is not the familiar view of the whole bridge, but a drawing showing one end of the bridge and one of the approaches to it. In the other illustrations we are taken into the smaller canals and under the shade of gloomy old walls and dark little bridges, not showing much architectural detail that is of any special interest, but full of the artistic incidents of light and shadow to be found in such combinations of houses, bridges, and water, the possible beauty and poetic suggestiveness of which are, perhaps, better realised by the medium of drawing than by the sight (and smell) of the scenes themselves. The bridge behind the Fondaco dei Turchi, with the picturesquely corbelled out balcony or gangway on the right of the picture, is one of the best of these back canal drawings; the next, the Rio de Baratter, with its perspective of bridges, is nearly as good, only the bridge crossing the front of the scene is a little too black and loaded for the rest of the drawing, on which it forms rather too prominent a black space. One of the best points in this drawing is the excellent rendering of the character of the long poles rising out of the water on the left,—two of the well-known painted poles used for boat-mooring and as "fenders"; the rather bent line of these long poles, and the way they rise out of the water, convey an idea of their mobility in comparison with the masonry adjoining; they seem to quiver in the water. The dark corner near San Stefano, with the mass of dark crumbling wall on the left and over the bridge, intensified in its grimness by the piece of sunlit building standing up white on the left, and the sky reflection from the centre of the canal, is another most effective picture. The view of the bridge from the portico of the Scuola de San Rocco is another which may be picked out as especially effective, particularly in the sunlit effect given to the bridge by the slight manner in which it is touched. The interior of St. Mark's is one of the least successful of the series, partly because the subject is

one that does not take so kindly to etching as those out-door scenes amid the light of the waters and the sky: the effect is grim and dirty rather than rich; it seems to us that the surface has been too much covered, and that a more light and reticent touch, more of sparkle and less of covering the spaces with lines, might have been more successful. In general, however, this is a collection marked throughout by a perception of picturesque effect, as well as of the true powers of etching. The few words prefixed to each plate, on a separate page, hardly constitute anything that could be called a literary contribution to the subject; they serve to explain the plates, and it can hardly be said that the author is as picturesque with his pen as with his etching-needle. We may note one point, however; that Mr. George does not admit that Venice is so much spoiled as people say; he is moderate in his remarks about the steam launches,—“They are restricted to the Grand Canal, and they are a boon to the poor, who alone use them.” Most visitors, who go either to sketch or write about Venice, regard it so entirely as a place made for their enjoyment of the picturesque, that we are glad to come across an artist who does seem to remember that there are native inhabitants, and that they have some rights of their own to improved accommodation and transit.

While Mr. George has been etching corners of Venice in this catholicity of spirit, Mr. Niven has been etching in different quarters of London with a more definite purpose, that of making a record of London churches which have been destroyed, and a practical protest against the threatened destruction of others. His volume\* consists mainly of etchings, but with a few photolithographs, giving drawings of churches which have gone, from authentic sources, and drawings of those which remain, but whose existence is supposed to be threatened. Drawing with this special object, and with a view to exhibit the architectural qualities of each of these ungratefully-used edifices, Mr. Niven does not probably aim at anything like the artistic effect and broad contrasts of light and shadow which characterise Mr. George's Venetian sketches. His drawings of the exteriors of the churches included are clear and precise, not heavily worked up or shaded, but intended to show the architecture clearly, with a little effect given by touches here and there; one or two of the interiors, as that of St. Mildred's, Bread-street, are highly finished, and are good examples of what may be termed the engraving style of etching, and in the view

\* Etchings of Venice. By Ernest George. London: The Fine Art Society. 1888.

\* London City Churches, destroyed since A.D. 1800, or now threatened. Illustrated and described by W. Niven, F.S.A., architect; with eighteen etchings and seven photographs. London: Pettitt & Co. 1887.



of St. Michael, Bassishaw, there is a striking effect obtained by showing the church tower white between an avenue of darkly-shaded warehouses,—a true etcher's effect. This is a book, however, with an object apart from artistic effect.

The buildings illustrated are all Wren's, and the author in his preface takes the conservative side unreservedly, and quotes various opinions as to the evil and barbarism of removing any of the old churches from the city. Among these is a rather far-fetched argument from Mr. W. Morris, that every loss of a church from the city is the loss of a part of a great design, "for it was, no doubt, in the mind of Wren that all the churches should form a support to the grand central mass of St. Paul's." We should doubt very much that there was any such definite idea in Wren's mind. A certain number of churches had been destroyed, and were to be rebuilt; and Mr. Niven himself remarks on a point which he thinks has been overlooked, that in rebuilding a church Wren, even while employing his own style, endeavoured to build it in somewhat the same general outline and proportion as before; if it had had a spire, he would create a spire in classic form to replace, to a certain extent, that which was gone. We should think this both reasonable and right in itself, and very likely to occur to Wren; but it is not in favour of the idea that he was regarding the whole of the new churches *en masse* as supporters to St. Paul's, but rather that he was regarding each on its own merits and the special requirements of the site. With Mr. Niven's conservative attitude, nevertheless, we are, as far as our feelings and preferences go, in entire sympathy; we would not willingly see a single church of Wren's pulled down if it could reasonably be avoided; but there are cases in which it can hardly be said that it could be reasonably avoided. We have nothing to do in these columns with religious or ecclesiastical questions as such; but we see as a matter of fact that many of these churches, owing to circumstances (chiefly the decline of residence in the City on the part of those who do business there), are practically empty and only keeping up a sleepy ceremonial service attended by a few persons; and in that case it needs either a very firm belief in the future resurrection of daily worship in churches, or a decided value and interest in the architecture of the church, to justify people in saying that this or that church ought to remain intact as long as it will last, as an architectural monument, when the ground is so much wanted practically for other purposes, in a region which is yearly becoming more and more crowded. There are cases in which this ought to be said; that of St. Mary-le-Strand is one of them. To remove that would be to remove most of the picturesqueness of the Strand, for it is St. Mary's with its steeple which fills the vista and forms its architectural effect and interest. But take such a church as St. Ethelburga in Bishopsgate Ward (Plate 5 in the book), which Mr. Niven "greatly regrets is now seriously threatened"; it is certainly of interest historically, but is it otherwise a kind of building to lament over or make any scruple about removing for the use of the site for modern purposes? One can never see an old thing go without a pang; but there must be a limit to this kind of conservatism, and in a crowded city especially it is impossible that every building, merely because it is of historical interest, can be preserved independently of modern requirements.

Such a consideration, however, does not lessen,—on the contrary, it rather increases,—our debt to Mr. Niven for giving us such an interesting and well-executed pictorial memorandum of churches which have gone and churches which may have to go; and the illustrations afford an interesting group of examples of the simpler forms (mostly) of Wren's architectural treatment of churches; sometimes, it must be confessed, of his weakness as well as his strength. For instance, Mr. Niven laments over the destruction of the tower of All-hallows, Bread-street, which he speaks of as "decidedly handsome,"—a rather dreadful sort of phraseology for an architect to use. We

must say that we cannot see much reason to lament the decease of a tower with such very weak general design and such *rococo* details,—garlands sculptured in relief over the belfry window, and long sticks of pinnacles with rosettes hanging down their sides: these things represent the poorest type of architectural detail, and it is better, on the whole, to forget that Wren ever did anything so bad than to struggle to keep them in existence in honour of his memory, or because they are there now, and have been there a long time. The interior of St. Mildred's, Bread-street, was well worth giving, and is worth preserving, if possible, as an example of one of Wren's admirably-treated domical interiors, in spite of the bad character of some of the decorative detail, which cannot spoil the generally fine design of the interior. St. Bene't, Gracechurch, and St. Michael, Crooked-lane, were towers of much more architectural value than All Hallows; in the latter Wren seems to have been imitating the outline and general disposition of a Late Gothic tower, and travestied the proportions of its pinnacles; in St. Bene't and St. Michael he was inventing spire-like terminations to the towers in accordance with his own taste and style, and was much more successful. Mr. Niven does not narrate the circumstances under which St. Bene't was pulled down in 1867, "to the disgrace," he says, "of all concerned." There may have been two sides to this matter also. St. Bene't Fink, destroyed in 1844, was a highly characteristic example, with its pentagon plan contrived for making the most of an awkwardly-shaped site, a relic which it was a great pity to have lost, as it illustrated a characteristic feature of Wren's practice, his ability in planning and in turning to account an unpromising site. The interior of St. Mary Abchurch, with its curious and effective arrangement of the pendentives under the dome, is done justice to in one of the best etchings in the book. The tower of St. Antholin, given on plate 14, goes far to vindicate those who protested against its destruction; it is one of the best designed of that type of Wren's towers which imitated Gothic lines and terminated in a spire; we may add, however, that it looks much better in Mr. Niven's cleanly-executed and delicately-finished drawing than it did in the reality,—in those latter days of its existence, at least, when it was darkened with soot and weather. We join with the author in regretting the destruction of St. Michael, Queenhithe (Plate 19), in consideration of the admirably characteristic arrangement of its windows,—a circular upper or clearstory window resting on the keystone of each of the lower windows; Wren's variety in this matter of the grouping of details was very great. The tower has character, too; but what would be said to an Institute or an R.A. student who were to submit such a design now?

Whether we agree or disagree with the views expressed as to the claims of all these churches to be or to have been preserved, there can be no question that Mr. Niven has done an excellent piece of work in getting together illustrations of those which have disappeared, and giving admirable drawings of those which are or may be threatened; in the latter case the illustrations may be of service in calling attention to their value (where they are really valuable) before it is too late, and, if the destruction is inevitable, in furnishing a record of them drawn from the actual building while yet existing. One or two of the illustrations we have made arrangements with the author to reproduce at an early date, both as examples of the book and of interest to themselves. Mr. Niven has added plans of some of the churches in which the plan has any special character, and also, what is of considerable interest, a plan of the City, showing the churches at the beginning of the present century,—those that are still remaining being shaded, those that are destroyed shown black. The plan serves to show at a glance that we have knocked a good deal more out of Wren's London than most people probably realise. We have every now and then the question coming up, whether a church should be removed, and


people think "it is only one church, after all," but they would, perhaps, be surprised to see on this map how many are gone.

Mr. Niven's book is a holograph, in a sense; our next is a monograph, that of Long Melford Church,\* by Mr. E. L. Conder. The Institute of Architects, Mr. Conder mentions in his preface, had for many years recommended Long Melford Church as a subject for their measured drawings competition; Mr. Conder's partial drawings of the church gained him a silver medal, and he wisely determined to carry through what he had begun. He has produced a very fine and complete monograph of a very remarkable church, one of the finest specimens of its date and style which exists. We visited it many years ago, that and the perhaps still finer church at Lavenham, in one day of glorious summer weather, and shall never forget the joint impression of the church and the scene in which it stood; the long elaborately-decorated building, and the long sloping lawn, which might be accepted as the village green, with a row of noble trees overhanging one side of it. The church is thus an old friend, but we should not the less have appreciated such an excellent and careful series of measured drawings as this in any case. The church is, as every one knows, of very late date and style, but it is an unusually rich example of a parish church of that date, and of unusual size, its appearance of external richness being increased by the extensive use of stone inlay in flint walling, as common in that district. The Lady-chapel, placed on one side of the east end (i.e., it is of the width of the centre and south aisles, excluding the north one), is the most remarkable part of the church, and is full of rich and delicate work, both internally and externally; it seems to have been through an extraordinary history, having been converted in 1670 into "a publick schoole for Melford"; and after it lost this office it was entirely neglected, and in 1823 the windows were blocked up with lath and plaster, and the chapel used as a store-room and coal-cellar. Mr. Conder observes that the clearing off of the whitewash, and the repair of the inner roofs, is all that is now wanted to put the Lady-chapel into a reputable condition. It is to be hoped this may be accomplished. Mr. Conder shows the hideous western tower with strict accuracy. We cannot but wish the removal of that were made another part of the restoration. It is well worth pulling down.

Mr. Conder's monograph does not come under the category of those in which the literary text is a mere perfunctory accompaniment to the illustrations, for he has taken a great deal of trouble to collect what can be collected of the history of the church, and his book contains a good deal of interesting information as well as careful drawing.

## RAILWAY MAKING IN THE HIGHLANDS.

THE NEW ARGYLLSHIRE LINE.

HE mainland of Scotland to the north-west is so essentially mountainous, and moreover so cut up by transverse arms of the sea which in numerous cases penetrate many miles into the interior, that one glance at a map of the requisite orographic clearness seems to shut out definitely all prospect of the district ever becoming traversed by railways. And the region is withal so comparatively denuded of population, and so unproductive in merchandise much sought after in the southern markets, that, in this regard, but small inducement is held out to railway enterprise, even were the country an eminently accessible one, as it is the reverse. Fish, cattle, and sheep are the only important products in demand for distant markets, and the industries herein concerned have been greatly hampered in development owing to the very tedious modes of transit so long existent. But the north-west of Scotland, though otherwise comparatively poor, is very affluent in magnificent scenery; so affluent

\* Church of the Holy Trinity, Long Melford, Suffolk. A monograph by E. Lauriston Conder, Architect, London: Dryden Press (J. Davey & Sons). 1887.



that, in large measure to assist visitors to an easier participation in these fine scenic effects, it is slowly but surely becoming pierced by the enterprise of the railway capitalist, aided by the ingenuity and plenitude of resource brought to bear by the railway engineer. The north-west coast is already touched at two points:—Strome Ferry, opposite Skye, by the Dingwall offshoot of the Highland Railway from the east coast; and Oban, 60 miles to the south, by the farthest north-west reach of the Caledonian system, approach being made by way of Stirling, the Perthshire straths, and the Pass of Brander, Loch Awe. A Bill was sanctioned in last session of Parliament which will add a third point of touch with the outer ocean, namely, Crinan, on the Sound of Jura, in the track of an increasing stream of summer traffic, and long well known to travellers by the Royal West Highland route of the Macbrayne service of steamers. Crinan is fully thirty miles on a bee line from Greenock and Helensburgh, where may be said to terminate a variety of railway projections from Glasgow and inland, the Firth of Clyde and its numerous branching arms seeming here to bar all further progress to the west on the part of the iron horse. These impending stretches of sea might certainly be "got round," in the engineer's sense, with the result of extending the railway system whose

at the cost of about thirty miles of added way, and with the part compensation of catching up Inveraray by the detour; but Inveraray, though the county town, is really a very small place, and thirty miles of track in the Highlands mean a good deal of money. The loch is temptingly narrow, and it has been decided to "float" the metals over instead, and that ever, the line,—a single one of the ordinary narrow gauge,—bends sharply round to the south-west down the loch side as far as Newton Bay, which is the chosen point of passage, with the hamlet of Furnace on the opposite side, a mile away. Newton Bay Ferry is one of the most notable features of the undertaking. The wider ferry between Helensburgh and Sandbank will (in the goods department of the traffic) be served by the North British Company's Burntisland and Granton truck-bearing steamers, now, and for a long series of years, successfully at work on the eastern firth, but destined to be relieved from east coast service altogether on the completion of the Forth Bridge, and the consequent discontinuance of the Burntisland ferry, so far, at least, as truck-transit is concerned. But the mode of transportation at the Loch Fyne crossing will differ widely from that so long in use on the Firth of Forth, and differ also from all other modes hitherto employed anywhere. Quite a new

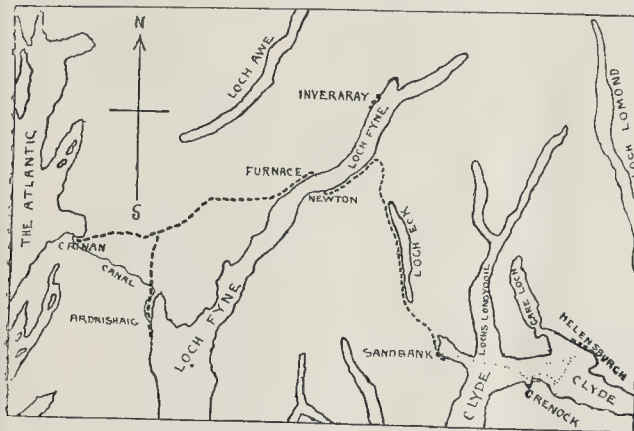
matematically almost, one by one to the varying levels of the meeting tracks, the aforementioned pivot arrangement permitting the pontoon, with its embraced ferry steamer, to alter bearings for the few feet necessary at each succeeding change of tide-level. The metals of the steamer connect readily with those of the gangway, and the entire train steams easily on board, and *vice versa*. This loading and unloading contrivance is, of course, duplicated on the other side of the passage. As another highly interesting feature it may here be mentioned that it is in contemplation on the part of the engineers to exact from the crossing locomotive the steam necessary to set the engines of the train-bearing boat in motion,—in short to cause it to "work its passage," the chief motive herein being a very nice minimising of the oncost charges of the service.

From Sandbank on Clyde waters to Newton Bay Ferry on Loch Fyne the distance by the chosen track is twenty miles, an excess of only about five miles over the direct distance, and a very reasonable result withal, considering the rather unaccommodating character of the surface of this part of the country. The steepest gradient is 1 in 60. Leaving Furnace, on the western shore of Loch Fyne, the line keeps the waterside for a short distance downwards, after which, parting with the loch on a gradually rising slant, it strikes inland, and shortly, with the aid of two trifling bits of tunnelling, clears the 400 feet summit level of this western section of the work, and at once commences descent to the Atlantic. The route here is through the beautiful Glen Add, a section which for grandeur of scenery is one of the finest of a very fine series. For about a mile the River Add passes through a very narrow gorge flanked by almost precipitous hills. Down this gorge the railway threads its way, the engineers having taken advantage of a mere foothold of margin, quite at the edge of the torrent, for the purpose of carrying their work through a pass which, to the ordinary observer, seems impassable. The scenic effect here will be magnificent. Fifteen miles from Furnace the seaboard terminus is reached on the shores of Loch Crinan, an inlet of the Sound of Jura, which in its turn is a readily accessible arm of the outer ocean. A fork five miles in length leaves the main line at Kilmichael Market (a noted emporium for Highland cattle, situated a short distance to the north-east of Crinan), and bending south-eastward, once more catches up Loch Fyne waters in order to find terminus at Ardrishaig, the centre of the Loch Fyne fish traffic, and forming the eastern mouth of the well-known Crinan Canal, as the other or main terminus (Crinan) is the western end of the same.

The financial scope of the work, which is to be styled the "Clyde, Ardrishaig, and Crinan Railway," is 180,000*l.*, with borrowing powers to the limit of 60,000*l.* more. Operations are to be commenced early in the year, and it is reckoned that from eighteen months to two years will suffice for completion. Immense quantities of fish are captured in Loch Fyne and within the outer seas, and the line, although built primarily out of other inducements, will no doubt carry off a large share of this traffic, bringing perishable goods to suitable markets at a great saving of time, and with much thrift in the matter of labour in trans-shipping. From Newton Bay a steamboat service will connect with Inveraray, the county town, situated ten miles higher up the loch on the other side. The new railway has been privately promoted; under agreement, however, with the North British Railway Company, who are to work it, and with the prospect, no doubt, of ultimate amalgamation, as in the case of the Glasgow Underground Railway.

#### NOTES.

**S**INCE going to press last week more full and explicit information has reached us as to the proposed excavations in Cyprus. The Society for the Promotion of Hellenic Studies has issued a preliminary programme. The



present terminus is Helensburgh, on the north shore of the Clyde; but this so obviously involves a wearily tortuous track thrice or four times multiplied in length and cost, with no set-off worth mentioning in the way of additional traffic inducement, that such an expedient is not to be thought of, not at least simply and exclusively as a means of getting to the nearest Atlantic seaboard. The feat is to be attempted on another plan, the authors of which are Messrs. Formans & McCall, Civil Engineers, Glasgow. By a service of saloon passenger steamers of the highest Clyde class, with another service of railed truck-bearing goods craft superadded, the North British system, from the existing terminus at Craigend Pier, Helensburgh, with a call perhaps at Greenock and Gourock, is to be made to leap the ten miles of firth and loch barrier over to Sandbank on the Holy Loch, where the newly-designed Argyllshire Railway is to begin.

Here the untutored eye discerns nothing but huge mountainous masses barring the track-maker's way even more effectually than the broad firth water did; but by hazarding a detour to the north through the narrow defile in which Loch Eek lies, a natural fault in its made use of as a pass, and the banks of Loch Fyne are touched at Strachur after about fifteen miles of progress, and that without encountering a higher summit level than 120 ft. above that of the sea. From this point the head of Loch Fyne might have been doubled,

type of railed craft is to be provided for the service. Passenger trains as well as goods trains, and these in all cases accompanied by their respective locomotives, will run on board directly they arrive, steaming off on the other side also with a minimum of delay, the calculation being that fifteen minutes will fully suffice for the single mile of crossing, reckoning from the instant of train arrival on the one side to that of train departure on the other. Tide deviation at Newton Bay has 10 ft. as the extreme limit, and in order to meet the very stringent requirements of the Board of Trade as affecting permissible gradients on which to embark and disembark trains, recourse has been had to an ingenious contrivance. Some short distance away the single line of rails branches out into five separate tracks; these arrive at the water edge abreast, so to speak, but on divergent levels, the difference being 2 ft. between each, or 10 ft. (the full range of the tide) between the highest and the lowest, an arrangement which, it will be seen, leaves at disposal one practicable level at all times of the tide. The ferry steamer is received into a kind of chair or dock, composed of a huge pontoon rising and falling with the tide, which pontoon is anchored, as it were, to a vertical pivot whose foundation is firmly imbedded in the rock below. (Connecting the pontoon with the shore is a gangway, metalled, and identical in dimensions with the track itself. As the tide rises or falls the shore end of the gangway shifts and adjusts itself, auto-



Society itself contributes 150*l.*, and the Managing Committee of the British School at Athens contribute the like sum on condition that the control of the exploration be in the hands of the Director of the School, Mr. Ernest Gardner, and that those who take part in the work enroll themselves as students of the School. Cambridge and Oxford send out respectively Mr. M. R. James and Mr. D. G. Hogarth, both names already known to archaeology. Zoology and the interests of natural science generally are entrusted to Dr. F. H. H. Guilmard, and an architect, Mr. R. Elsey Smith (as was stated in our report of the Institute meeting last week), is to be sent out at the joint cost of the Royal Institute of British Architects and the British School at Athens. The British Museum, in the past and present, is represented by the active sympathy of Sir Charles Newton and Mr. A. S. Murray. Sir Charles Newton has long been unwearied in his efforts to call national attention to this archaeological field. The Committee wisely refrain from stating precisely what sites they intend to begin operations with; ample discretion is to be left to Mr. Gardner when he reaches the field of action. His work at Naukratis has abundantly proved his capacity. Nothing seems wanting but money, and it remains to say that subscriptions may be sent to either Mr. Walter Leaf, the Hon. Treasurer, Old Change, E.C.; or to the account of the Cyprus Exploration Fund, at Messrs. Roberts, Lubbock, & Co.'s, Lombard-street, E.C.

**A**N enthusiastic writer in the Roman paper *La Riforma*, commenting on the law recently passed in the Italian Chamber for the preservation of national monuments, alludes in terms of admiration to the law passed in England in 1861 (he says, but he must be wrong in his date), punishing the destruction or mutilation of public works of art. He also refers to the Ancient Monuments Protection Act (Sir John Lubbock's Act), to which he attributes a scope and power which it is far from possessing. The English law, he says, provides that the cost of preserving national monuments shall be defrayed by the State; local inspectors are to be appointed to report on the condition of public monuments; persons defacing or injuring a public monument, are punishable with fine or imprisonment and the cost of the reparation; in the case of the offender being the owner of the monument he is judged as if he had no property in it; the several things in the schedule of the Act as well as the necessary space for preserving them are declared to be national monuments, and the Government have power to enlarge the schedule after the passing of the Act. The writer concludes by saying that in England every building, whether it be public or private property, is a national monument if it serves to embellish or to illustrate the history of the country. This will be news to most people here, and it would appear that the Italian author has not learned to discriminate between compulsory and permissive legislation, and has overlooked the fact that Sir John Lubbock's Bill does not deal with buildings at all. As regards the preservation of antiquities, England is far behind.

**C**LOSE on the announcement of the valuation of the metropolis for 1886-7 comes the report of the estimated requirements of the Metropolitan Board of Works for 1888. This amounts to the formidable sum of 1,805,449*l.*, of which 1,075,551*l.* is to be raised by rates. In consequence, the rate for the ensuing year is placed at 8*39d.* in the pound, being more than four times the rate struck by the same authority in 1856, which was 2*09d.* in the pound. The rateable value in 1856 was, in round figures, 11*5* millions; that for 1886, 30*5* millions. The total incidence of metropolitan rates for 1884-5 was 6,531,317*l.*, of which 759,514*l.* was for the Metropolitan Board of Works. The rating of this body has, therefore, increased by nearly 42 per cent. in four years. The interest on borrowed money now amounts to 940,586*l.* in the year, being about the same figure as the addition made to the loan debt in the same time.

**T**HE quinquennial increase in the gross rental of the metropolis has been little more than half as much between 1881 and 1886 as that which took place between 1876 and 1881. In the earlier period the increase was very nearly 21 per cent.; in the latter, it has been a little under 11*5* per cent. For the decade 1876-1886 the increase has been 36*6* per cent. This we may compare with the increase of population in the decade 1871-1881, which was 22*6* per cent. For the last ten years, therefore, the rise in rent has been by 60 per cent. more rapid than the increase in population; or, in other words, while each Londoner had to pay 6*l.* 5*s.* rent in 1876, he has to pay 7*l.* rent in 1886. In 1881, however, for which year we have both census and valuation, he had to pay also 7*l.* It remains to be seen whether there has been a diminution in the rate of growth of the population during the last five years, or whether there has been a real check on the steady increase of house-rent per inhabitant.

**W**E have received the prospectus of "The Italian Exhibition," to be held in the coming year, 1888, in the buildings and grounds lately occupied by the American Exhibition at Earls Court, Kensington. We are promised an "exhibition of the arts, manufactures, and products of the newest Great Power of the Old World, United Italy." This sentence, and some others in the prospectus, are perhaps due to the fact that the proposed Exhibition is being engineered (perhaps "bossed" would be the better word) by Mr. John R. Whitley, the "Organiser and Director-General" of the late American Exhibition, concerning which we could not find much to say at the time, from the almost utter dearth of exhibits of interest to our readers. Let us hope that the Italian Exhibition will be more worthy of a visit than was its American predecessor. Mr. Whitley says he believes that "the display in every branch of fine arts [sic] will be the most important ever made by Italy in a foreign country." Whether ancient or modern works, or both, are here included we are left in some doubt, probably because Mr. Whitley himself has no very clear idea on the subject, as may be inferred from the following paragraphs from the prospectus:—

"It is impossible, until the various contributions are sent in and arranged, to state in what way and to what extent each constituent of the wonderful whole which the name of Italy brings before the cultivated mind is to be displayed in the capital city of the modern Italians' warmest national friends and allies."

Suffice it to say, that from Etruscan tombs, from Rome and the Campagna, from the buried cities of Pompeii and Herculaneum, from the relics, Italian in origin and character, which the legends left behind them in these northern islands, ample guidance may be obtained for reconstructing something of that ancient life, the study of which forms so important a part of modern education. Every boy and girl who learns history, and every grown person who has heard of Virgil or Horace, is interested in this part of the subject."

Among other attractions, we are promised "models of celebrated Roman, Florentine, and Venetian buildings." This item alone, if adequately conceived and carried out, would of itself constitute a rather "large order." No doubt there is much which Englishmen would like to see in an Italian Exhibition, and we can only hope that the performance will be worthy of this preliminary flourish of trumpets.

**A**NOTHER of the liberal advertisements to architects who may be supposed to be willing to compete for anything or everything appears in our advertisement columns of this week; an offer of 5*l.* 5*s.* for a sketch design to the respectable dimensions of 4 ft. to an inch, for a front elevation in the old English half-timbered style. The designer is not to be engaged to carry out the work, but the advertisers want to get hold of his ideas at a cheap price. If they want anything worth having it is worth a great deal more than that, and all the answers they will get will probably be from needy persons of no standing in the profession, who will respond to any invitation of the kind on any terms. But this is nothing to another announcement in our advertisement

columns to the effect that the Managers of St. Andrew's School, Guernsey, invite "School Architects and others" to send in designs for re-building their schools,—"5*l.* will be given for the best design." It is difficult to understand whether this is impudence or ignorance; we presume it is the latter. What sort of persons do the advertisers imagine will respond to that kind of invitation? Possibly some architects' pupils who want to try their hands, though we should doubt if even they would not think it beneath them. There is one point which the promoters of the school would do well to consider, viz., that it is their moral duty to build schools on the best sanitary principles; that it is a very great wrong to bring children into ill-constructed and ill-ventilated schools; and that it is out of the question that they can have the plans and advice of any competent person for the sum they are ignorant enough to offer, unless he gives it them out of charity.

**I**N the course of next month the Royal Academy will have three new Associates to elect. Mr. W. B. Richmond is spoken of as a very probable candidate, and certainly has high claims, though we have never been able to like his mannered style of portrait-painting. It is rumoured that there should be place found for an architect among the three; if so, Mr. Ernest George certainly has about the best claim among the outsiders. We know not whether it is contemplated to do tardy justice to Mr. Alfred Hunt by electing him an Associate; to our thinking, the justice would now be so exceedingly tardy that it would hardly be a compliment.

**T**HE list of awards in the Art Department of the Adelaide Jubilee Exhibition is rather amusing reading. The prizes are distributed in classes of first, second, and third order of merit, and the manner in which the three degrees of comparison are apportioned is curiously significant of the attitude of the Colonial mind towards painting. Mr. F. G. Cotman comes into the first order, for "A Rebellious Sitter," Mr. Holman Hunt's "The Ship" is in the second order. This is not one of the best examples of what Mr. Holman Hunt can do, but to be let down to the second order of merit is sad indeed! Mr. Mark Fisher is let down to the third order; Mr. Faed (for "Seeing them Off") is advanced to the first order. The P.R.A. gets a first order; so does Mr. C. E. Perugini, while Mr. W. B. Richmond is reduced to the second order. In water-colours Mrs. Allingham is in the second order (!) while Mr. Callow and Mr. Dobson are in the first order, and Mr. Walter Duncan and Mr. Fulleylove in the third order! After this it may be said, what is the good of sending art to Adelaide? There seems to have been some enthusiasm for English architecture, however, for all the architects who are selected for awards are put in the first order. They are Mr. Aitchison, Mr. Jas. Brooks, Mr. Edis, Messrs. Ernest George & Peto, Mr. T. G. Jackson, and the "Royal Institute of Architects" generally for "a series of Photographs of Buildings erected from designs by Members and Associates of the Royal Institute of British Architects." This is satisfactory so far, and English architecture ought to feel complimented; but the pictorial awards certainly "give us pause."

**C**ABLE tramways have not as yet found much favour on this side of the Atlantic, but there are places where horse-power is inapplicable, and the cable becomes a necessity if a tramway is to be constructed. Edinburgh, being a city built upon hills, is one of these places. The steep gradients between Princes-street and the northern parts of the city have proved most trying to horses, and it is really pitiable to see an omnibus, drawn by three or four horses, toiling up the steep incline from Pitt-street or Stockbridge. A complete cable tramway, between the southern end of Hanover-street and the northern end of Inverlith-row, has just been completed. The length of the cable is 17,000 ft., and its approximate weight twelve tons. It is made of crucible steel wire,



3 in. in circumference. The engines are situated in Henderson-row, and the cars provided are each fitted for the accommodation of sixty persons. This additional facility of access to the vicinity of Newhaven, Trinity, and Granton will doubtless be gladly taken advantage of, not only by the inhabitants, but also by visitors to the city, and it may also give a stimulus to building operations in and about these marine suburbs.

**A**LTERATIONS have been effected in Dr. Rowand Anderson's design for the Buccleuch memorial, in order to fit it for the reception of Mr. Boehm's statue of the Duke, which has now been set up in its place. The statue is enveloped in canvas, awaiting the day when it will be unveiled, for which ceremony arrangements are being made.

**A** BOOK on "Detail and Ornament of the Italian Renaissance" is to be brought out shortly by Mr. G. J. Oakeshott. The author says his object has been to bring together a collection of fine examples of Italian Detail in a small compass, such as may be useful to architectural students and art workmen, taking the examples from notable buildings, but avoiding such as have already been much illustrated. Mr. Oakeshott's ability and painstaking qualities as a draughtsman will ensure a good execution of the examples selected, and the book will, we hope, be one of considerable interest and value.

**T**HE late Dr. William Chambers, of Edinburgh, during whose occupancy of the civic chair the last City Improvement Act was carried through, and who, after the expiry of his tenure of office, restored, at his own cost, the Cathedral Church of St. Giles, is to be commemorated by a statue erected to his honour. The site chosen is in Chambers-street, which is the most important of the improvements effected under his auspices. The statue is to be of bronze, 10 ft. high, placed upon a stone pedestal, and a sum of 1,000*l.* is to be expended upon it. It is proposed that the work should be thrown open to competition among British sculptors. The late Sir George Harrison, another chief magistrate of the city, is to be commemorated by the erection of an ornamental gateway at the eastern approach to Blackford Hill, which was secured by Sir George as a public park when he was Lord Provost. Out of a number of designs submitted, one by Mr. Sydney Mitchell has been accepted. A monumental character will be imparted to the gateway by the introduction of a bronze medallion of Sir George Harrison, after the bust in the Council Chamber by Mr. Charles M'Bride, sculptor.

**T**HE *Bookbinder* for December 23 gives four examples of recent bindings or covers specially designed for various publishers, of which, however, one only has any merit at all, the remainder being merely coarse sprigs of flowers, &c., with no design of any kind in them. The one which has something of artistic effect is Miss Orrin Smith's design for a Tennyson, bound by Jas. Burn & Co., for Macmillan & Co.; this is a diaper design in gold on a black ground—the kind of thing which Rossetti initiated in the design for binding his own poems: it represents an oak leaf and an acorn alternated, but the leaf is poorly designed, and the whole thing rather thin. If this is the best that can be produced of contemporary binding, we are in rather a poor way. One or two fine illustrations of old buildings are given as usual: the *Bookbinder* will form as it goes on an interesting repertory of these.

**T**HE collection of drawings by Mr. Russell Dowson, chiefly illustrative of Eton, at the Galleries of the Fine Art Society, is well worth looking at. The topographical interest of many of the Eton scenes, showing various corners of old picturesque buildings, is considerable, and the execution and artistic feeling of these drawings is of a high standard. We may mention especially "Arch into Playing

Fields" (1), "The Rafts" (2), "Old House in Weston's Yard" (8), "Head Master's House from Weston's Yard" (17), "Slough Road looking North" (37). Mr. Dowson is, we believe, connected with the school as a teacher of art, and has made a very good use of his opportunities in giving these pictorial illustrations of Eton.

**T**HE collection of foreign pictures at the Goupil Gallery is not a very remarkable one, though it contains some good things. There is a large work by Professor Müller, representing the Courtyard of the Doge's Palace in old Venetian days, with a group of Oriental visitors; it is drawn and painted with the artist's usual learning, but the arrangement of the figures is theatrical, and the prevalent tone of the architecture dull and unreal. Artz's "Orphelinat de Katwyk" is a very good interior and figures, of similar merit to some others that we have noticed by the same artist. There is a *Gérôme*, fine in its way, "A waking," but even more than usually devoid of feeling or sentiment. Among other works that may be mentioned are two very good little pictures of Venetian canal scenes, by Signor F. del Campo; "Breakfast on the Banks of the Seine," by Mr. Ridgeway Knight, equally good in landscape and figures; "Grandmother's Comfort," by Israels (not a very good specimen of the master); pictures by Daubigny and Dupré, of which the same may be said; a Corot, "The Storm"; and "Salomé," by M. Carolus Duran, a picture showing some very fine painting, though very unattractive.

#### THE PANAMA CANAL.

MR. H. B. SLAVEN, the chairman of an American Dredging Company, which has been engaged in the shallow waters at the Atlantic end of the Panama Canal since the commencement of the works, has given an opinion as to the general state of the enterprise, which is published at length in the *Bulletin du Canal Interocéanique*, under the heading "Une Opinion Compétente." The facts stated or admitted by Mr. Slaven are of value as being the evidence of a strong supporter of M. de Lesseps, and one who has a deep personal interest in the continuance of the works for which he contracts.

Mr. Slaven, by way of introduction, repeats the familiar statement that the Canal is more than half made. As the last return of excavation given in the *Bulletin* only amounts to 39,000,000 out of an estimated total of 150,000,000 cubic metres, it would seem that Mr. Slaven is regarding the lengths taken in hand by contractors rather than the bulk of earth moved. There is now, he tells us, a length of 20 kilometres open to ships drawing 15 ft. of water. This depth, it appears from the section published in the *Bulletin*, is only three-fifths of the designed depth; and in many parts the 11 ft. left in consists of hard rock, which cannot be dredged without blasting. We pass over any estimate of what will be done at any future time, as well as the comparisons made between the efficiency of French and American contractors. The total contents of the first 20 kilometres, measured from Colon, do not exceed, according to the detailed estimates given formerly in the *Bulletin*, ten millions of cubic metres, or one-fifteenth part of the total cutting, so that the amount actually dredged in the seven years during which operations have been going on is not by any means overwhelming. It requires some explanation to justify the statement that more than half of the work is done.

"There remains," says Mr. Slaven, after some remarks in the future tense on other parts of the line, "a section of the length of 25 kilometres, which includes the crest or dorsal spine of the isthmus. The heights vary from 50 ft. to 387 ft. above the mean tidal level"; that is to say, that the cutting will vary from 76 ft. to 413 ft. in depth. "After mature examination, after having reckoned that this will take more time and will cost more money than he at first supposed, M. de Lesseps has concluded that he must enable ships to cross the isthmus in the shortest possible time. For that he has modified his plans by constructing temporary locks for this section, and he will thus

gain much time for the opening of the Canal." Mr. Slaven continues that this is the same course that was taken with the Suez Canal,—a comparison than which nothing could be more misleading. There are no locks in the Suez Canal, nearly the whole of which is made through sand easy to dredge; and the deepening of which, by the same method by which it was commenced, was a very simple and easy operation. In the Panama Canal, the 100 ft. or 120 ft. which it is proposed to leave in below the "temporary" waterway consists mainly of rock, and its removal could only be effected by a repeated series of very costly operations. Meantime, the "temporary" line would still have to be carried through a cutting from 293 ft. to 313 ft. deep at the summit.

Being asked how many "temporary locks" were to be made, Mr. Slaven replied that this was not yet determined. He supposed four. M. Eiffel, who is called "the constructor of the tower of 300 metres at Paris," is to be contractor for these works, "which will be made principally of iron, and worked by hydraulic force." These data would give a lift of from 50 ft. to 60 ft. to each lock, involving a water-pressure the resistance to which would be questionable even for the most solid works, and which would at once sweep away any lock which it was attempted to construct, as proposed by M. de Lesseps, *dans les barrages même*. The largest lock in the world is at St. Mary's Falls, in the United States. It is 515 ft. long, 80 ft. wide, and 18 ft. deep. At Birkenhead a head of 13 ft. gives a velocity to the issuing water which destroyed the outlet works. The most absolute solidity of construction would be required for any works intended to raise large vessels, by any method, to a height of 100 ft. or 120 ft. above sea-level, and it is evident, from Mr. Slaven's remarks, that the question of what he calls temporary locks is one as yet unstudied.

We do not, on the present occasion, intend to do more than call attention to the evidence unconsciously given by Mr. Slaven. It is a highly significant fact that at a time when M. de Lesseps, having already incurred a liability to shareholders and bondholders of 1,347,552,500 francs, is applying to the French Government to aid him to raise 600,000,000 francs more, having done little more than a quarter of the work estimated, and that of the easiest kind, he has ceased to supply his shareholders with the accounts hitherto given of the monthly progress. For July last 911,000 cubic metres are returned as excavated during the month, and for August 1,052,000, instead of the 3,000,000 a month promised. But the *Bulletin* has given no monthly summary since August, although there are not a few notices of the stoppage of many of the "chantiers" by continued rain. But to find that Mr. Slaven, with every wish to say what is most favourable to the enterprise, can only point to the execution of three-fifths of the easiest part of the easiest section of the work in seven years is highly instructive. No let or hindrance has opposed this part of the work with the exception of the one grave difficulty of the climate. Dredgers can work under continued rain, which excavators can not do. Too much has been said as to the progress of the Panama Canal in the future tense. We should like to have a little more information in the present tense.

#### SIR ROBERT RAWLINSON, C.B.

THE long-expected retirement of Sir Robert Rawlinson from official life is at last about to take place. At the ripe age of seventy-six, Sir Robert thinks it is time to rest from the toils of office. He has held his appointment of Chief Engineering Inspector to the Local Government Board ever since that Board was formed, and his name is synonymous with the progress of sanitary engineering, of which he may be said to be the father.

Born in 1810, at Bristol, Robert Rawlinson, whose father was a builder and an engineer, commenced his career at an early period under the paternal eyes. At the age of twenty he was sent to Jesse Hartley, the famous dock engineer, and remained with him at the Liverpool Docks for five years. He was then engaged for four years under Robert Stephenson on the London and Birmingham Railway, now part of the North-Western, and here he was resident engineer on the important cutting near Blisworth. He underpinned up-



wards of a mile in length of rock resting on clay, in a cutting 55 ft. deep, and executed the whole of the masonry, bridges, culverts, &c., of the heaviest cutting on the line. When, in 1840, the line was completed, he obtained the appointment of Assistant Surveyor to the Corporation of Liverpool, which post he retained for three years. He then was recommended by Jesse Hartley for the post of Engineer to the Bridgewater Canal Trust, in which he remained for four years, during which time most important works in connexion with the feeding of the canal, and its improved working, were brought about by him.

His next public work was in connexion with the building of St. George's Hall, Liverpool, of which Mr. Elmes was the architect. In 1847 Mr. Elmes became a victim to consumption, and was compelled to leave this country for a milder climate. Before leaving he confided the completion of his great work to Sir Robert. The late Sir William Tite supposed that young Rawlinson held but a subordinate position, and was clerk of the works, but this Sir Robert has refuted. He has satisfactorily proved that Mr. William Hughes was clerk of the works, and that he himself really took the place of Mr. Elmes, in regard at least to the constructive portion of the work.

The water-supply of Liverpool next engaged his attention, and he submitted a scheme for supplying the town from Bala Lake and the River Dee. This scheme, the wisdom of which has been justified by events,—for Liverpool has had recently to adopt something very similar in taking water from the River Severn,—was considered too vast for the wants of Liverpool, and was therefore rejected.

When, in 1848, the Public Health Act was passed, Mr. Rawlinson was appointed first Engineering Inspector, and ever since that date his career has been inseparably bound up with the progress of sanitary engineering. He inspected a great number of towns, commencing with Dover, and completely reorganised the drainage and sanitation of the principal provincial towns of this country. He retained his appointment for seven years, at the end of which he found his private practice increasing to so enormous an extent that he retired from office and devoted himself to the more lucrative occupation of consulting engineer. He was consulted for upwards of fifty towns, and devised schemes of water-supply for Birmingham and Wolverhampton. The city of Carlisle owes its sewerage system to him, which he completed at a cost of less than 23,000*l.*, though other engineers had estimated the cost at as much as 70,000*l.* and 80,000*l.* During this period he constructed upwards of a hundred miles of sewers.

In 1855 Mr. Rawlinson was appointed Engineering Commissioner to the Sanitary Commission that was sent out to the seat of war in the Crimea. The operations of that Commission are matter of history, and it will suffice to say that whereas before the arrival of the Commission the death-rate among the troops had reached the alarming figures of 420 per 1,000 per annum, when they left it had declined to but little over 2 per cent. Here Rawlinson was wounded whilst in the pursuit of his duties, and he had to return home to be cured; but his services were not forgotten, and when a Permanent Army Sanitary Commission was formed in 1860, he obtained a seat on it which he has always retained.

Mr. Rawlinson's next great work was the administration of the fund raised for the Lancashire Cotton Famine. He carried out public works in ninety-three Lancashire towns, involving an expenditure of 1,650,000*l.*, every penny of which has been refunded. The administrative charges did not amount to more than 3s. 6d. per cent. The cotton operatives were saved from starvation and pauperism, and the Lancashire towns were drained and paved. It is estimated that the streets and roads thus improved represent an area of 800 acres, and a length of 400 miles. For his distinguished services to his country, Mr. Rawlinson was made a C.B. Subsequently, on the recommendation of Mr. Gladstone, he received the honour of knighthood in 1883.

Sir Robert Rawlinson has served on numerous Commissions, and was Chairman of the Rivers Pollution Commissions of 1865 and 1868, and of the Royal Sanitary Commission of Dublin of 1879. He is a Vice-President of the Society of Arts, and a member of Council of the Insti-

tution of Civil Engineers. Sir Robert is the author of numerous scientific reports and papers, and of "Suggestions" for the use of local surveyors and sanitary engineers, which have been accepted as authoritative both in England and abroad. His work on "Chimney Shafts" is also well known to the readers of the *Builder*.

#### THE ROOF OF THE NATIONAL AGRICULTURAL HALL, KENSINGTON.\*

THE erection of a National Agricultural Hall in the west end of London was the original conception of the late Major Burnaby, M.P. for Leicestershire, who, taking great interest in the military tournaments which had been so successfully carried out at the Agricultural Hall, Islington, naturally desired to see these displays executed, not only in an area of larger dimensions, but in a situation more readily approached than that in the north of London. The position chosen was a site formerly occupied by a market garden upon the western side of the Addison-road Station of the West Metropolitan Railway, to and from which station frequent trains run in connexion with the suburban lines of the metropolis and all the principal main railways of the kingdom. The site occupies 6½ acres of ground and commands three good entrances, a railway entrance upon the east side, a carriage entrance approached from the Hammersmith-road upon the south side, and a goods entrance approached at the north-west corner from Blyth-lane. (See Plan in the *Builder* of October 3, 1885.)

As soon as a company was agreed to be formed, the late firm of Messrs. Henry E. Coe & Stephen Robinson were selected to be the architects. They consulted the author with Mr. Max am Ende, M. Inst. C.E., as to the best form of structure to be complete in itself for covering as much unimpeded space as practicable, and the capital of the company was fixed at 200,000*l.* Shortly afterwards a design in iron was ordered to be prepared by Messrs. Max am Ende and A. T. Walmisley, and it was agreed that they should be engaged as joint engineers to assist the architects in the preparation and carrying out of the ironwork contract. This design was illustrated in the *Builder*, dated October 3, 1885. The light appearance of the construction which has been adopted was attained not by any sacrifice of safety, but by adaptation of every detail to meet the various stresses found by calculation in order to avoid any unnecessary surplus material, and by a careful study of all the possible stresses resulting from equal and unequal loading, including the effects of wind pressure in varying directions. In bridge construction, where the various parts are perpetually exposed to a damp atmosphere, or in a railway station roof, constantly subject to the influence of the fumes from the locomotives, the use of webs and flange plates seems quite reasonable, but in a roof such as that now under consideration, where all the ironwork is under cover, and where such deteriorating influences are seldom at work, it was felt that an opportunity was presented for a greater development of the parts, and a design remarkable for an entire absence of long wide plates and webs was accepted in which the various parts of wrought-iron work are composed wholly of flat bars and angle irons riveted together, plates being only introduced where required for covers in the joints. This arrangement gives a light appearance, and is especially appropriate for wrought-iron construction (see illustration). The death of the chief promoter to the undertaking, Major Burnaby, M.P., and also of one of the architects, Mr. Robinson, caused some delay, but subsequently a contract for the erection of the whole building was let to Messrs. Edwin Lucas & Son, of Kensington, for 131,000*l.* (see the *Builder*, May 23, 1885, p. 748), the execution of the ironwork, amounting to about 1,200 tons, being sublet to Messrs. Handyside & Co., of Derby, and the glass and zinc work to Mr. T. W. Helliwell, of Brighouse, Yorkshire. Messrs. Franklin & Andrews were appointed the quantity surveyors. Shortly after a portion of the work was completed, the resignation of the architect, Mr. Henry E. Coe, on account of ill-health, and his death very soon afterwards,

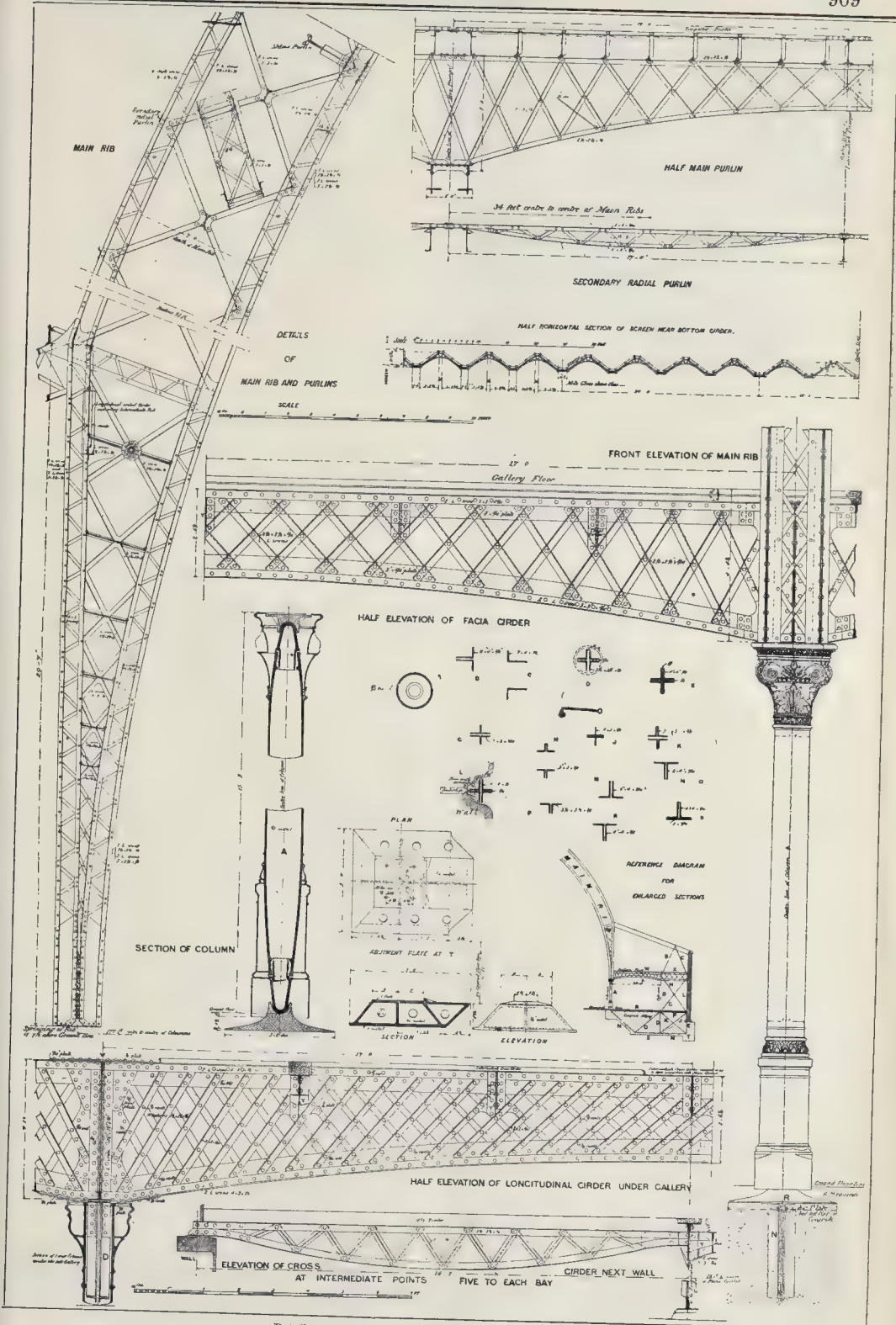
\* By Mr. Arthur T. Walmisley, M. Inst. C.E., being a paper read before the Civil and Mechanical Engineers' Society, at the Town Hall, Westminster, December 21, 1887, Mr. R. E. Middleton, M. Inst. C.E., President, in the chair.

caused the course of events to become somewhat altered.

Mr. James Edmeston, F.R.I.B.A., was appointed architect to the National Agricultural Hall Company, and was entrusted with the execution of the work. Messrs. Handyside & Co.'s and Mr. T. W. Helliwell's contract were each transferred, so as to be held by them direct from the Company, Messrs. Lucas & Son being left to carry out the whole of the remaining building operations, which included Company's offices, refreshment-rooms, and a minor hall, the details for which were prepared by the architect, Mr. James Edmeston. The minor hall forms an annexe to the great hall, and it is intended to be used separately for smaller exhibitions or concerts. It is situated close to the north-east corner of the main building, and is very easy of access, being the nearest portion of the building to the booking-office upon the west side of the railway station. The railway entrance to the main building displays good architectural features. This elevation, designed by the late Mr. H. E. Coe, is of an Italian character, with a façade of brick and stone (see *Builder*, Oct. 3, 1885).

The Great Hall of the main building covers a rectangular space of over two acres and a half, being 440 ft. by 250 ft. between walls, and its erection was personally superintended by Mr. am Ende and by the author. The main ribs have a clear span of 170 ft., and are placed 34 ft. apart, forming eleven bays between the end screens. The clear height to the crown of the roof is about 100 ft. The main ribs are of box girder shape, 7 ft. deep and 2 ft. wide, the lattice construction adopted, enabling the material to be placed further away from the axial lines than is usual when plates are introduced. Although the soffit of each main rib is semicircular from a level of 15 ft. 9 in. above the ground, the central portion of the main rib itself springs from a higher level, and should, therefore, be properly described as a segmental rib. The open space under the curved roof amounts to 374 ft. by 170 ft., or nearly an acre and a half in the clear. This is surrounded by a gallery, 40 ft. wide upon the north, the west, and the south sides, and 26 ft. wide upon the east side. The gallery is covered by a lean-to roof, which abuts against the curved rib upon the north and south sides, and is attached to the horizontal member of the screens upon the east and west sides. Below the top of the roof over the side galleries the arched rib forms on each side an ornamental spandrel (see small view on p. 911), which rests upon a column, the resistance to the thrust being assisted by the lean-to roof over the gallery. The connexion between the main rafter of the side roof, and the arched rib is formed by a top plate, which practically acts as a hinged or spring joint, whereby the complication of a fixed connexion does not occur in the calculation of the stresses. The main rafters of the side roof are connected to a braced vertical frame of 14 ft. effective depth, and the thrust is thus conveyed down to a foundation girder 12 ft. deep, which is continued horizontally underground to carry the base of the columns supporting the main arched ribs. Thus the surrounding brickwork is not called upon to resist any portion of the thrust of the arched roof, as the side frames through which the gallery floor passes form a self-contained system of ironwork in which the thrust is ultimately conveyed to the ground. The chief points of support to these side frames are formed in each case of two main concrete blocks, one placed at the lower outside corner under the outside wall, a cast-iron bed-plate being built into this concrete block to receive the side frame, and the other concrete block placed under the base of the pivoted column. The foundation girder of the side frame is buried with its top flange laid 6 in. below the floor level, and is embedded in a mass of concrete to protect it against the effects of dampness.

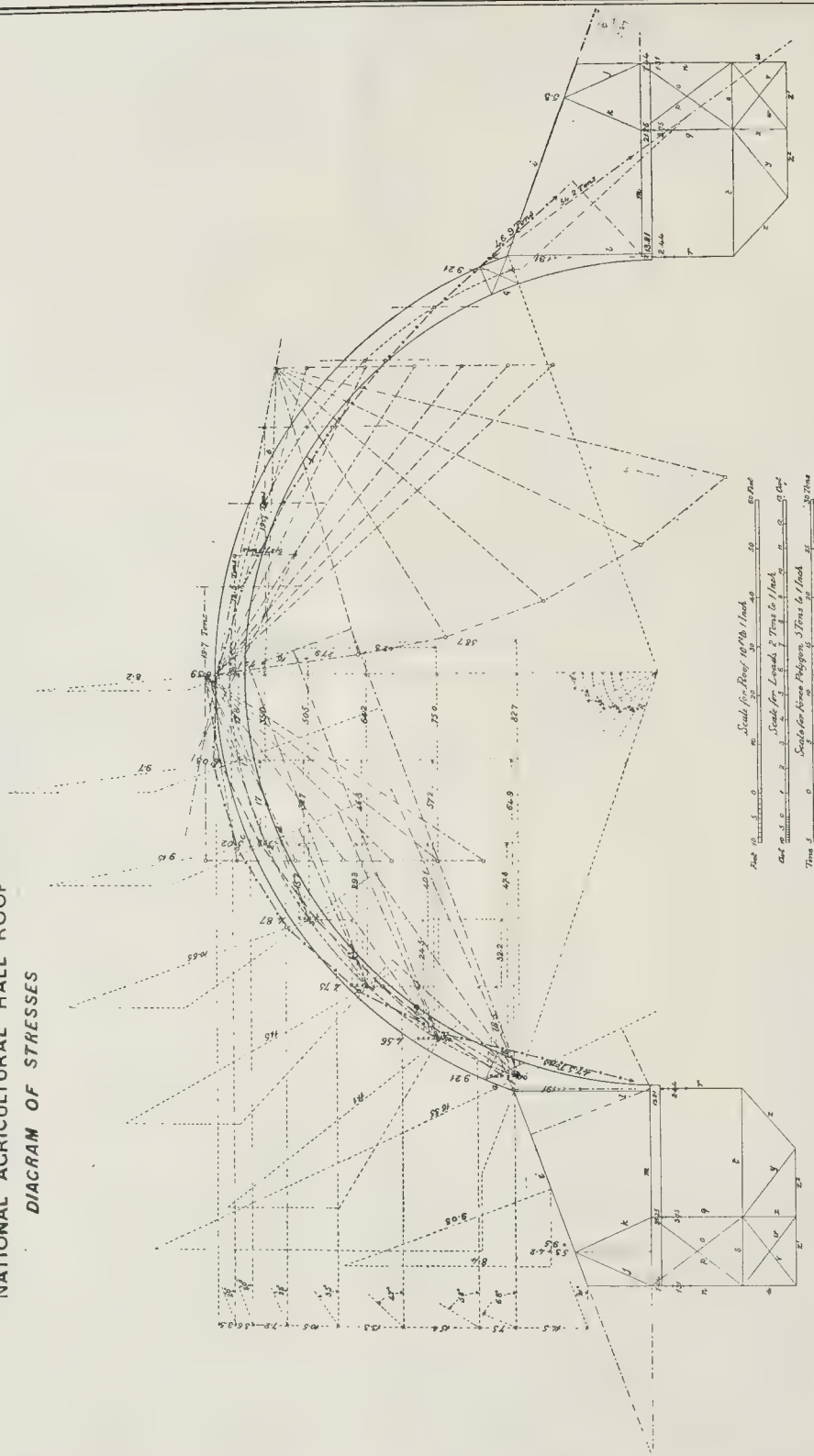
The mechanical couple required at the springing of the rib to maintain its rigidity is supplied by the main rafters and the transverse floor girders of the side galleries. The upward pressure below the column is neutralised by the whole weight of the structure resting upon the column, which is, under all circumstances, sufficient to resist the upturning action of the abutment when the wind is blowing upon the opposite side. If this result were not obtained, some anchorage would have been required to resist the upturning



Details of Roof, National Agricultural Hall, Kensington.



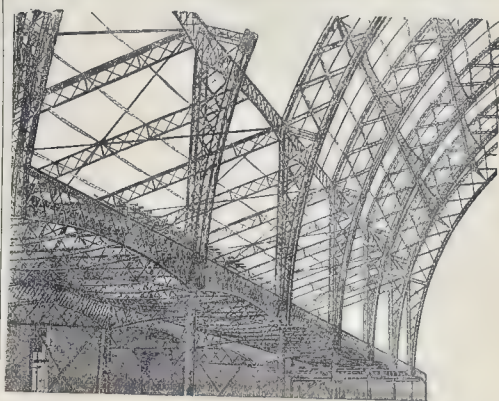
NATIONAL AGRICULTURAL HALL ROOF  
DIAGRAM OF STRESSES



S<sup>T</sup> PANCRAS STATION.  
M.R.CURVE OF EQUILIBRIUM FOR DEAD LOAD THUS  
CATENARY THUS .....  
PARABOLA THUS .....

SPRINGING LINE

CENTRE LINE



National Agricultural Hall, Kensington.

force. Upon the author's assumption that the wind may be taken as acting normally, the maximum and minimum loads upon the pivoted column under the springing of the rib amount to 82½ tons and 49½ tons respectively. These columns are made of cast iron, and are constructed with a true ball-and-socket bearing at each end, which is concealed at the top by a foliated capital, and at the base by a casting which gives the appearance of an ordinary column.

By the introduction of the pivoted connexion, the strains which these columns resist are always vertical, and therefore definite. This would not be the case if the connexions were made rigid, as the fascia girders supporting the inner sides of the gallery are continuous girders, and would be constantly exerting excessive bending moments of various intensity in the columns, to say nothing of the indeterminate stresses which might be caused by the ribs. These fascia gallery girders have curved bottom flanges and continuous girders of the same type are placed vertically immediately below the point of junction of the side roof with the curved rib and radially throughout the curved rib at distances, 18 ft. 6 in., to act as main purlins. These purlins have been made continuous from screen to screen, not only to provide longitudinal resistance to the lateral pressure produced by the wind upon either screen rib, but also to avoid the necessity of strengthening the flanges of the purlins in the centre between the main ribs, and for appearance's sake to avoid great differences in the size of the diagonal bars forming the web. Another point of detail is the simultaneous application in the arched roof of radial and tangential purlins. Between each main rib is fixed an intermediate rib supported by the main purlins, dividing the bays into longitudinal distances of 17 ft. Under the ventilator surmounting the curved roof these intermediate ribs are made of additional strength, and the secondary purlins to which the covering is attached are introduced at about 6 ft. apart. They are fixed in a radial direction between the main purlins, and are placed in a tangential direction over them, thus not only supporting the weight, but also resisting any tendency of the glass and zinc covering to gravitate downwards over the curve of the roof. Between the ventilator and the side roof a steel-framed ladder of light construction is introduced in place of the ordinary gables upon either side. These ladders travel upon a rail fixed parallel to the gutter at the springing of the rib, and run upon a girder at the junction with the ventilator roof.

The screens which close the semicircular ends of the arched roof consist of a vertical ridge-and-furrow construction, whereby the appearance of the usual heavy horizontal members in a gable screen is avoided. This construction offers great resistance to wind pressure, combined with a minimum amount of weight and material. The framework of this part of the structure is made of mild steel.

The covering follows the zigzag-shaped surface resembling corrugations, and presenting a near approach to a folded curtain screen.

The wind bracing has not been indiscriminately introduced throughout, as is so often done, but has been confined to the side roofs and the two end bays of the curved roof, the nine intermediate bays of the curved roof where it is not required being free.

The inner longitudinal girders to the gallery floor, at a distance of about 14 ft. from the outside walls upon the north and south sides, are continuous girders. The cast-iron columns upon which they rest contain the wrought-iron member of the braced framework. This member, which is formed of four angle-irons in a cruciform section, takes the tension produced by the thrust of the roof, and is jointed by cover angle-irons to permit the body of the column being slipped over it during erection. The caps and bases to these columns were made as split castings, i.e., castings made very thin (about 1-16th inch in vertical lines) upon opposite sides, but of the proper thickness all round, so as to be easily divided into two upon these vertical lines when required to be fixed, and so as to provide a true curved surface at the joints. They are then joined by a plate let into the surface and connected by tap screws. This vertical member is thus constructed to act both as a strut and a tie. The intermediate roof girders and the intermediate purlins in the arched roof have their bottom flange constructed in a fish-belly shape, with the object principally of preserving a uniform section for the diagonal bars. At the east and west ends the columns are also placed 34 ft. apart, the same as those upon the north and south sides, dividing the span of 170 ft. under the screens into five bays. The travelling stage employed and designed by Messrs. Handyside & Co. for erecting the ironwork was illustrated in the *Builder*, May 29, 1886, p. 775. It included a substantial staircase and top platform, made 62 ft. wide, so as to overhang 14 ft. in a longitudinal direction upon each side of two adjacent main ribs (34 ft. centres) during erection. Compared with other roofs of large span, the ironwork is both a little wider and a little higher than St. Pancras Station. The outline of the main rib of this roof differs both from the form of the catenary and the parabola, to which curves it has sometimes been erroneously compared. The main ribs in this roof are firmly bolted down to massive abutments by four 3-inch bolts at the foot of each principal. Owing to the spread given to the feet of the ribs and the holding-down bolts being placed at a distance apart of 11 ft. 5 in., they act with considerable leverage and prevent the stresses in the rib causing any change of angle at the feet of the rib. The theoretical effect of this arrangement is similar to that produced by making girders continuous over piers, and reduces the stresses in the rib to about half the amount that would exist if the ribs were hinged or unsecured at the abutments. By this means a great saving of metal is effected, which is an important consideration

in roofs of large spans, as the load increases in a much greater ratio than the span. In addition to the massive abutments there are also horizontal girders running across the station below the level of the rails to carry the platforms, the underneath portions being let for cellars; and with a view to ensure perfect stability, a wrought-iron tie runs below these girders, consisting of a ½ in. plate riveted on to the bottom flange of the wrought-iron main floor girders.

The roofs over St. Enoch's Station, Glasgow, 198 ft. span, and the Central Station, Manchester, 210 ft. span, are similar in type to the roof over St. Pancras Station, London (240 ft. span). The anchorage plate in the St. Enoch's Station is made to spread principally upon the inside of the main ribs, whereas in St. Pancras Station it spreads principally upon the outside.

In the Central Station, Manchester, it spreads both upon the outside and the inside of the main rib. In St. Enoch's Station the feet of the main ribs are constructed of cast iron. These are bolted down to massive foundations by four anchor bolts, 2½ in. diameter, with a distance between the bolts of 19 ft. 7 in. The thrust of the rib in the Central Station, Manchester, is resisted in a similar manner, but here the distance between the anchor bolts is 17 ft. 6 in. It will be seen from the above description that the only difference with regard to the way in which the thrust is resisted is, that in the case of the St. Pancras rib (M.R.) the abutments are aided by a tie across the floor connecting the feet of the main ribs, but as the horizontal thrust of this roof must be practically taken by the heavy brick piers acting as abutments, and secured by the anchor bolts, the theoretical conditions in each roof are the same. In the form adopted for the National Agricultural Hall roof, as previously remarked, no anchor bolts are necessary. In the main roof over the Crystal Palace building at Sydenham (104 ft. span), although the depth and section of the ribs are such that the arches throw a very small horizontal thrust upon their supporting structure, the whole force of the wind has still to be resisted, and to effect this the columns are thoroughly braced together by cast-iron girders and wrought-iron tie-rods. The same method has been adopted in the roof over the Royal Aquarium, Westminster, which has a span of 35 ft. 6 in., the only difference being in that the diagonal bracing is not spread out so much, comparatively speaking, as at the Crystal Palace.

In the roof over the Derby Market Hall, which has a span of 43 ft. 3 in., it might be supposed upon first entering the building that the thrust of the roof was communicated to the walls through the side galleries, whereas the upper parts of the gallery framing, with some additional parts, are constructed to form horizontal girders, the inner flange being supplied by the cast-iron gutter, while the outer flange and bracing are supplied by the additional wrought-iron plates and bars



which are introduced. These girders, being connected together at the ends, form a rigid horizontal framework, and are as effectual in their action as ties across the roof.

In the roof of the Albert Palace, Battersea, unlike previous roofs of arch construction, the thrust produced by the arched roof is communicated through the roof over the side galleries to the columns by a cast-iron fan-like bracket, forming a rigid connexion. The effect of this is to produce a cross strain upon the columns, owing to the absence of bracing, and therefore the supporting columns are thickened where required to give the necessary strength.

The Royal Agricultural Hall at Islington was designed by the late firm of Messrs. Peck & Coe, of which firm the late Mr. Henry E. Coe, the original architect for the National Agricultural Hall, was a member.

The building at Islington covers a space of 384 ft. by 217 ft., occupying less than two acres. The thrust of the main span is taken by a double row of columns placed 11 ft. apart, and braced together in couples by strong cast-iron framework, assisted by brackets above the capitals to the columns. The whole forms a wide base, and is firmly bolted down to brick-work foundations.

In the Coventry Market Hall, designed by the late firm of Messrs. Coe & Robinson, the thrust is taken by the side brick arches assisted by the base of columns being bolted down at the foundation. The space here occupied by the side arches is economised in the National Agricultural Hall building by the form of the main rib, these being carried down vertically (see illustration) below the junction of the side roof, to the supporting columns, so that no portion of this part of the main rib occupies space in the vertical area of the gallery. The impediment produced by the diagonal bracing in the gallery of the Crystal Palace, Sydenham, is also avoided in the National Agricultural Hall, the only portion causing obstruction in the gallery of the latter building being limited to 14 ft. nearest the outside wall, the remaining 26 ft. of floor space nearest the gallery railing being quite free from all obstruction. The building was opened Christmas, 1886.

The cost of the iron and steel work erected complete has been from 26l. to 27l. per square of 100 ft. superficial area. The building has, since its completion, been styled "Olympia" for sake of brevity, a title particularly appropriate to the Exhibition which the managers of the Paris Circus Company are now conducting.

The author has subjoined a calculation of the stresses in the main ribs, assuming the wind to blow horizontally and to act normally upon the curved surface with a wind pressure of 30 lb. per foot square. The Metropolitan Board of Works have no fixed rule upon this point. The unit pressure they adopt depends upon the height and position of the building under consideration, and the method which is best to adopt in estimating the amount of pressure is also much open to dispute. Further experiments need to be made before a satisfactory conclusion can be arrived at.

#### CALCULATIONS ACCOMPANYING DIAGRAM OF STRESSES.

The equations have been deduced from the following works:—"Civil Engineering," by Professor Rankine; "Die Lehre von der Elasticität und Festigkeit," by Winkler; "Stresses of Rigid Arches," by W. Bell, M.Inst.C.E.; and "The Theory of Arches," by Max am Ende, M.Inst.C.E., have been employed in the following consideration of the calculation of stresses in the main principal:

$$\begin{aligned} \text{I. } E - Fx + 2H(\delta + y) &= 0, \\ \text{II. } E Fy - 2Hy(\delta + y) &= 0, \\ \text{III. } E Fz - 2Vz &= 0. \end{aligned}$$

E = Sum.

F = Force at the various points.

z = Leverages of forces.

H = H. rizontal thrust at the crown.

y = Vertical distance of H from the crown.

z = Horizontal distances of points round which moments are taken from crown.

e = Vertical shearing force at the crown.

#### Table showing Values of y and y<sup>2</sup>.

y	y <sup>2</sup>
1.8	3.24
7.2	51.84
16.0	256.00
27.9	778.41
42.3	1789.29
58.7	3445.69
153.9	6324.77

Table showing Values of w occurring in Equations.

Points.	1	2	3	4	5	6
1	17.8	17.0				
2	35.1	32.7	15.7			
3	59.5	46.3	29.3	13.6		
4	84.2	57.2	40.1	24.5	10.9	
5	82.7	61.9	47.8	32.2	18.5	7.7
Totals.	325.2	218.1	132.9	70.3	29.4	7.7

Table showing Values of Fx.

Point.	Products.
1. $3.2 \times 17.8$	56.960
2. $3.2 \times 35.1 + 6.03 \times 17$	214.510
3. $3.2 \times 59.5 + 6.03 \times 32.7 + 5.02 \times 15.7$	438.595
4. $3.2 \times 84.2 + 6.03 \times 46.3 + 5.02 \times 29.3 + 4.87 \times 13.6$	697.947
5. $3.2 \times 75.0 + 6.03 \times 57.2 + 6.02 \times 40.1 + 4.87 \times 24.5$	967.308
6. $3.2 \times 82.7 + 6.03 \times 61.9 + 5.02 \times 47.8 + 4.87 \times 32.2$	1,175.744
+ $4.75 \times 10.9$	
+ $4.75 \times 18.5 + 4.56 \times 7.7$	
E Fx = 3,541.084	

Tables showing Values of Fy.

Point.	Fx.	y.	Fy.
1	58.91	1.8	102.638
2	214.51	7.2	1544.972
3	437.585	16.0	7001.520
4	897.947	27.9	14472.718
5	957.308	42.3	40464.124
6	1175.744	58.7	68916.170
E Fy = 137,631.532			

Statement of Equations for Dead Load.

Load being symmetrical.

Equations I. and II. only will be required.

$$\text{I. } -2 \times 3541 + 2 \times 6H + 2H154 = 0$$

$$\text{II. } -2 \times 137631 - 2H154 - 2H934 = 0$$

Solving H = -19.7

δ = +3.3

Table of Wind Pressures.

Unit pressure 39 lb. per square foot.

Points.	Area of inclined surface.	Angle of incl. sur. sec.	Normal pressure per sq. ft.	Total normal pressure in lbs.	Total pressure in tons.
0	315	20°	13.60	4277	1.91
1	629	20°	13.60	8555	3.82
2	629	23°	15.44	9711	4.33
3	629	32°	22.38	14077	6.21
4	629	47°	27.50	17257	7.72
5	629	50°	28.56	17964	8.02
6	315	85°	39.00	9450	4.24
Side roof..	1428	21°	14.20	20377	9.05

Table showing Values of z and z<sup>2</sup>.

Point.	z.	z <sup>2</sup> .
1	17.8	316.84
2	35.0	1225.00
3	59.5	3540.25
4	84.2	7089.64
5	75.0	5625.00
6	82.7	6839.29
Totals.	325.2	20078.02

Table showing value of a for Wind Forces.

Points.	1	2	3	4	5	6
1	17.25					
2	35.25	17.8				
3	52.75	35.7	17.90			
4	69.75	52.5	35.00	18.00		
5	85.00	67.7	50.75	35.20	18.00	
6	97.75	81.5	64.30	50.80	35.00	17.90
Totals.	357.75	254.2	167.85	104.00	53.00	17.90

Table showing values of Fz.

Points.	Products.
1. $1.91 \times 17.25$	32.9475
2. $1.91 \times 35.25 + 3.82 \times 17.8$	135.3235
3. $1.91 \times 52.75 + 3.82 \times 35.7 + 4.33 \times 17.9$	314.2005
4. $1.91 \times 69.75 + 3.82 \times 52.5 + 4.33 \times 35.0 + 4.87 \times 18.00$	598.5425
5. $1.91 \times 85.00 + 3.82 \times 67.7 + 4.33 \times 50.75 + 4.87 \times 35.20$	1001.0795
6. $1.91 \times 97.75 + 3.82 \times 81.5 + 4.33 \times 64.30 + 4.87 \times 50.80 + 7.72 \times 35.00 + 8.02 \times 17.90$	1505.8215
E Fz = 3588.0150	

Table showing values of Fy.

Point.	Fx.	y.	Fy.
1	32.9475	1.8	59.305
2	135.3235	7.2	974.349
3	314.2005	16.0	5027.208
4	598.5425	27.9	16699.335
5	1001.0795	42.3	42345.663
6	1505.8215	58.7	88397.591
E Fy = 151503.430			

Table showing Values of Fzz.

Point.	Fx.	z.	Fzz.
1	32.9475	17.8	586.465
2	135.3235	35.0	4728.323
3	314.2005	59.5	18667.125
4	598.5425	84.2	50426.438
5	1001.0795	75.0	75080.963
6	1505.8215	82.7	124539.707

E Fzz = 256927.010

Statement of Equations for Wind Forces.

$$\text{I. } -3588 + 2 \times 6H + 2H154 = 0$$

$$\text{II. } 151503 - 2H154 - 2H934 = 0$$

$$\text{III. } 256927 - 2V90678 = 0$$

Solving.

H = +12.5

V = +6.27

Strains in Abutment Framing.

These strains are worked by the method of moments, combining the thrust of the arch rib with the loads on the galleries as they occur in the various members.

The following letters are the reference letters attached the different parts shown in the diagram.

+ denotes compression.

- tension.

Table of Maximum Strains in Abutment Framing on the Weather Side.

	Tons.
i	+10.28
j	+37.27
k	+14.08
l direct stress, curved flange + 33.18	+110.89
l from bending moment " + 77.70	-44.52
l direct stress, straight flange + 33.18	+13.98
m bending moment " " + 20.20	-6.49
n " " " " " " " "	+7.06
o " " " " " " " "	-0.88
p " " " " " " " "	+82.66
q " " " " " " " "	+1.53
r " " " " " " " "	+76
s " " " " " " " "	-71
t " " " " " " " "	+1.13
z <sup>1</sup>	+1.13
z <sup>2</sup>	-1.13

Maximum Strains in Abutment Framing on the Lee Side.

	Tons.
i	+37.27
j	+63.10
k	-33.30
l direct stress, curved flange + 16.55	-3.65
l bending moment " " " " " "	+36.75
l direct stress in straight flange + 16.55	-3.6
l bending moment " " " " " "	+59.60
m " " " " " " " "	-66.97
n " " " " " " " "	-27.20
o " " " " " " " "	-27.80
p " " " " " " " "	+49.60
q " " " " " " " "	-33.06
r " " " " " " " "	+49.60
s " " " " " " " "	-38.90
t " " " " " " " "	+37.70
z <sup>1</sup>	+59.60
z <sup>2</sup>	+59.60

The greatest stress in the flange of the arch rib occurs where the curve of equilibrium is farthest removed from the neutral line of the rib by taking moments round the flanges.

Stress in flange at a = -16.83

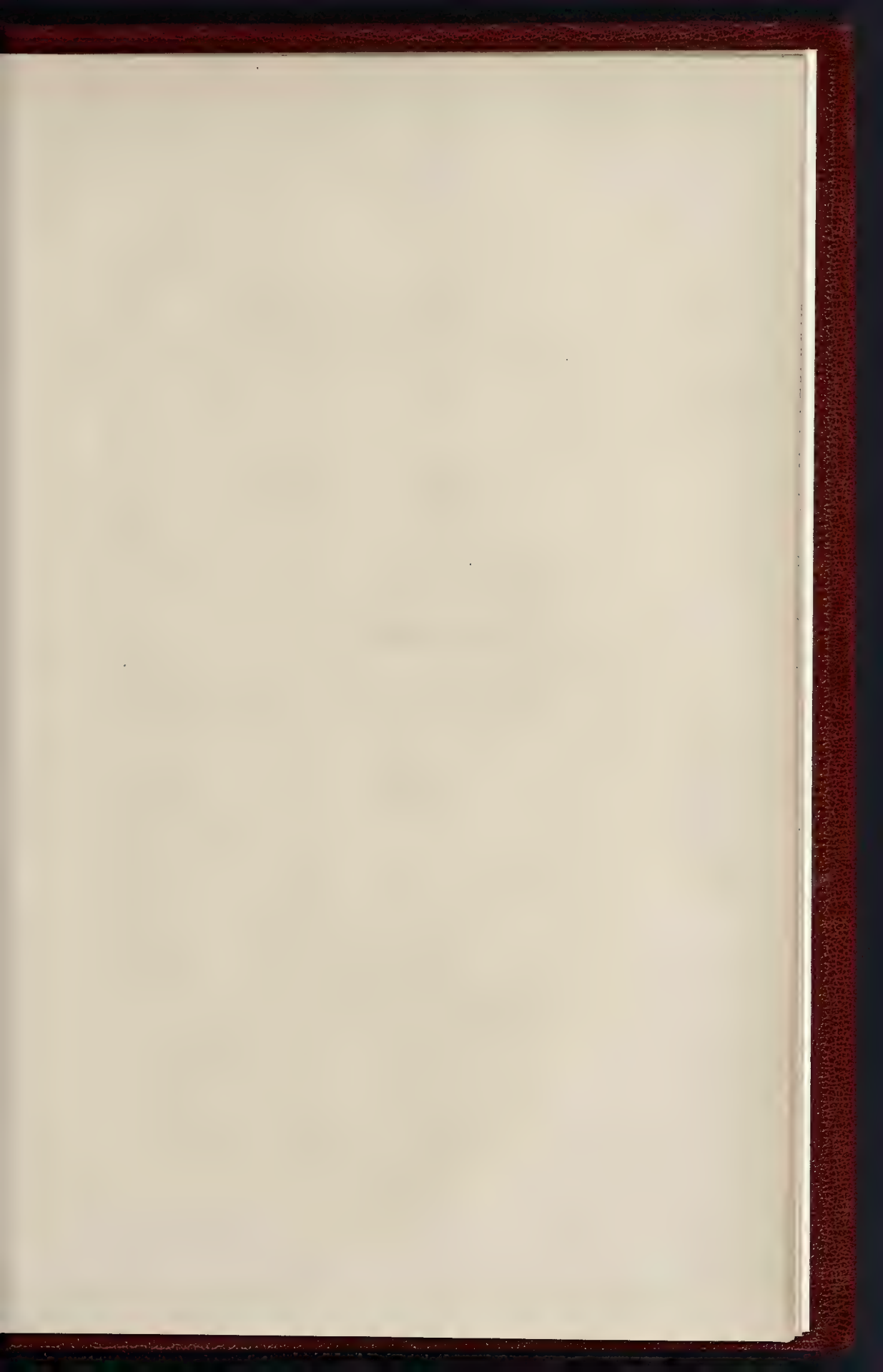
" " " " " " " " δ = +63.33

Stress in one set of diagonal " " " " " " " " δ = +63.33

between a and b = 6.5 tons, each set being in duplicate, stress in each bar = 3.10

A vote of thanks to the author, proposed by Mr. James B. Walton, seconded by Mr. B. Houghton, was carried unanimously.

**New Market for Carlisle.**—The foundation-stone of the new market here was laid on Tuesday, the 20th inst., by the Mayor of Carlisle, Mr. W. J. R. Crowder, J.P. The external walls are of red stone, from quarries at Annan, Newbigin, and Wetheral. The glazed bricks for lining the inside of the market are supplied by Messrs. Craig, of Kilmarock. The concrete flooring is by Mr. Omerod, of Carlisle; the iron roofing by Messrs. Robertson, of Workington; builders' work by Messrs. H. & R. H. Hodgson, of Workington; and carpenters' and joiners' work by Messrs. W. & H. Davidson, of Carlisle. Mr. Henry Creswell Charlton is the clerk of works. The architects are Messrs. Cawston & Graham, of London; and the buildings are to cost 30,000l. Externally the building is of rock-faced ashlar up to the plinth, with quoins, cornices, and window jambs tooled; the general walling is of random snecked rubble. There are six principal entrances, with circular columns and carved capitals. An arcade entrance from the principal street, and a Jubilee tower, 160 ft. high, at the north-west corner, are features of the building. There are terraces on two sides, supported on stone columns.







"SUMMER" DESIGN FOR DECORATIVE PAINTING

*Awarded the Royal Academy Prize for Decorative Painting, 1887*

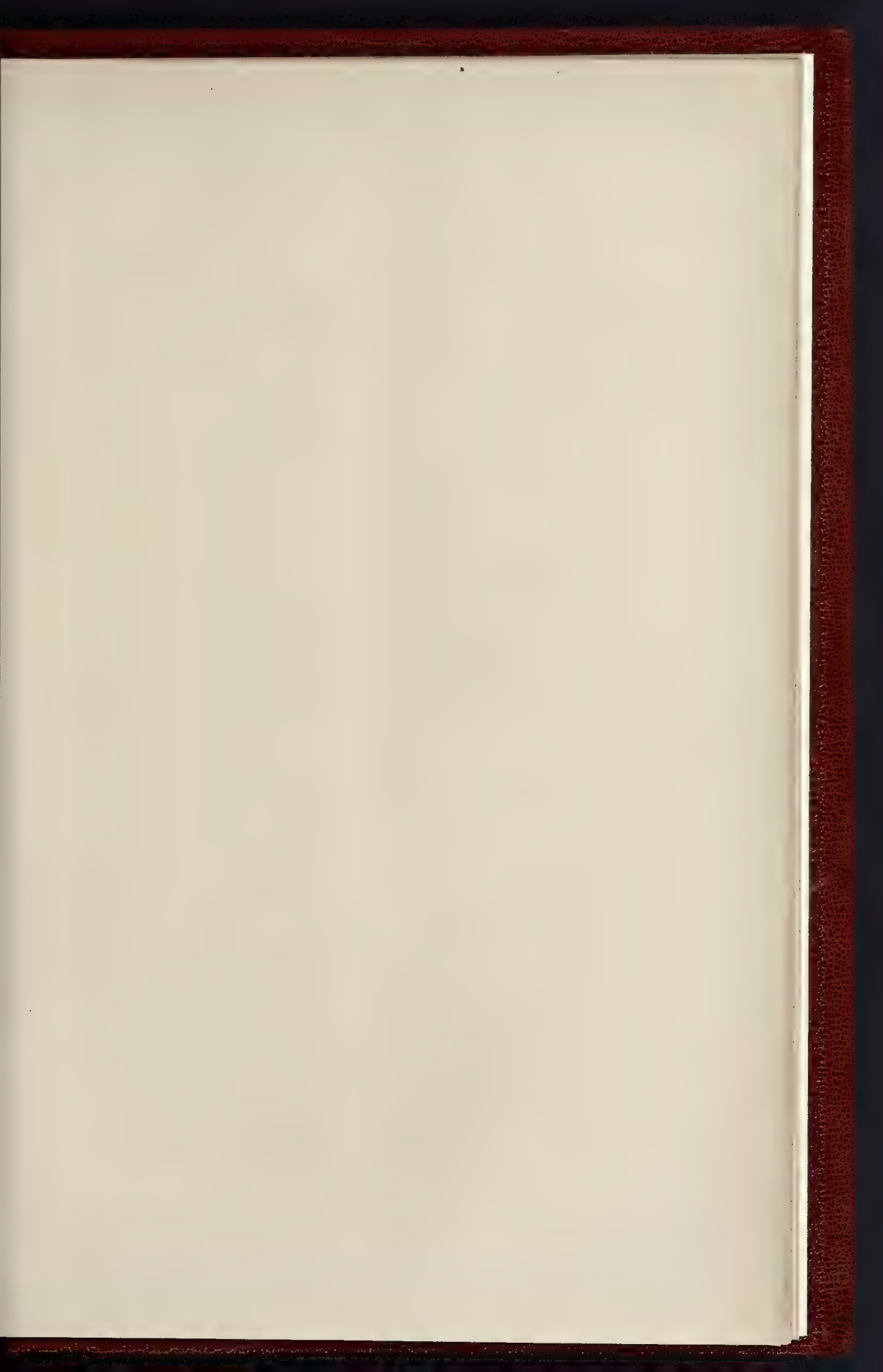


PLATE 1. THE RECLINING FIGURES. BY MR. E. R. STEPHENS. 22, MARTIN LANE, LONDON, E.C. 4.

TION—BY MR. E. R. STEPHENS.

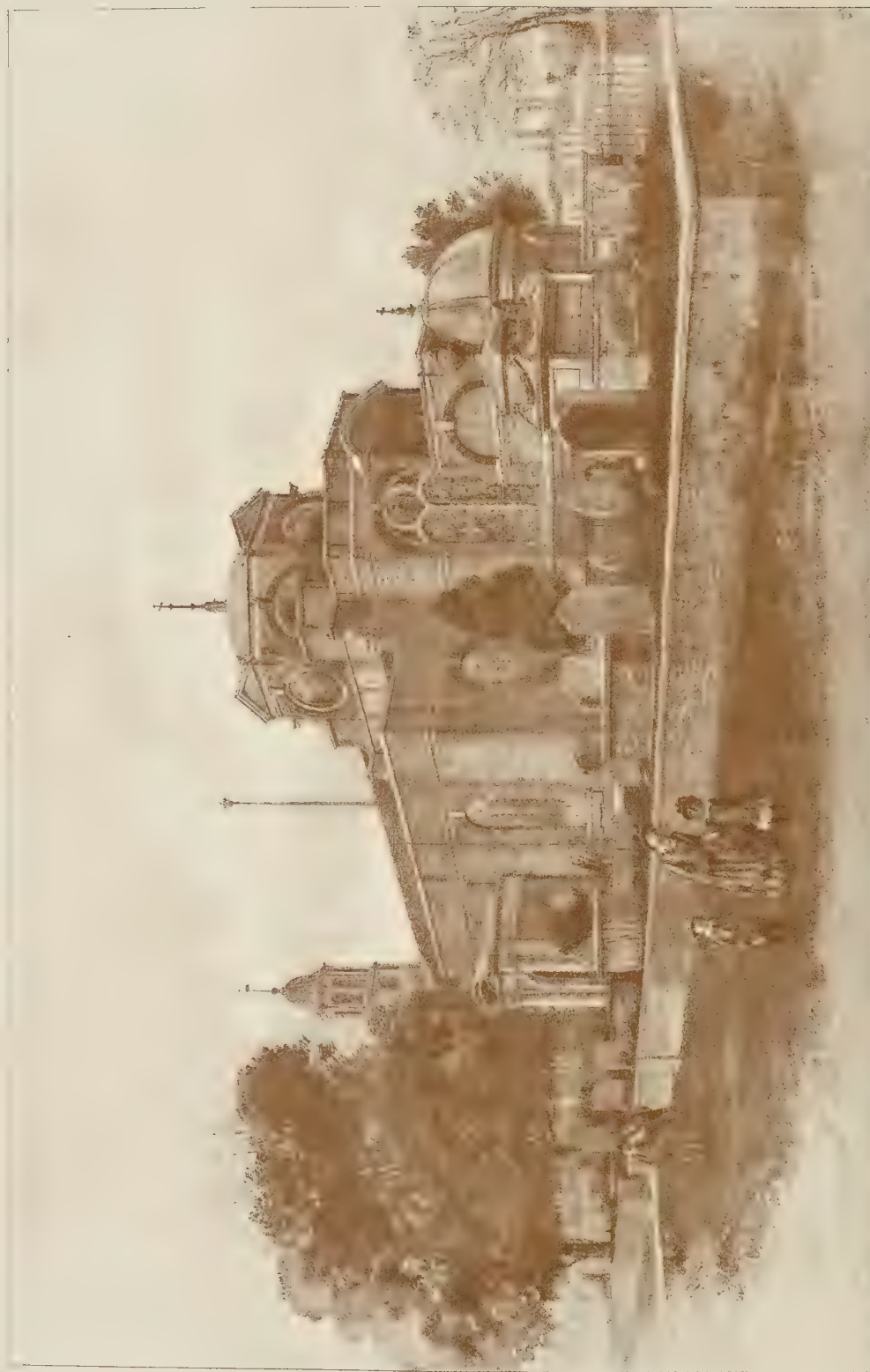




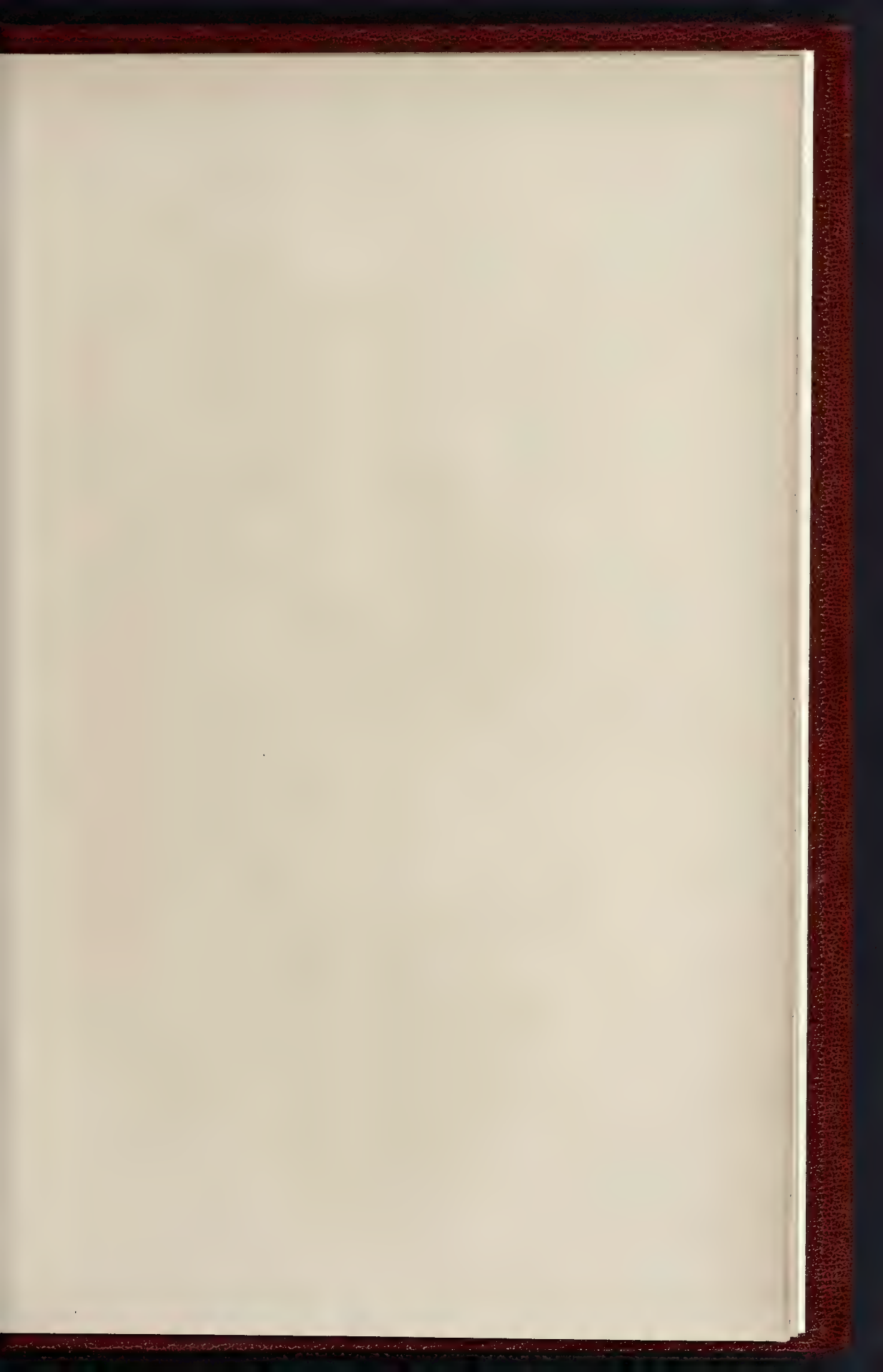




THE BUILDER, DECEMBER 31, 1887.

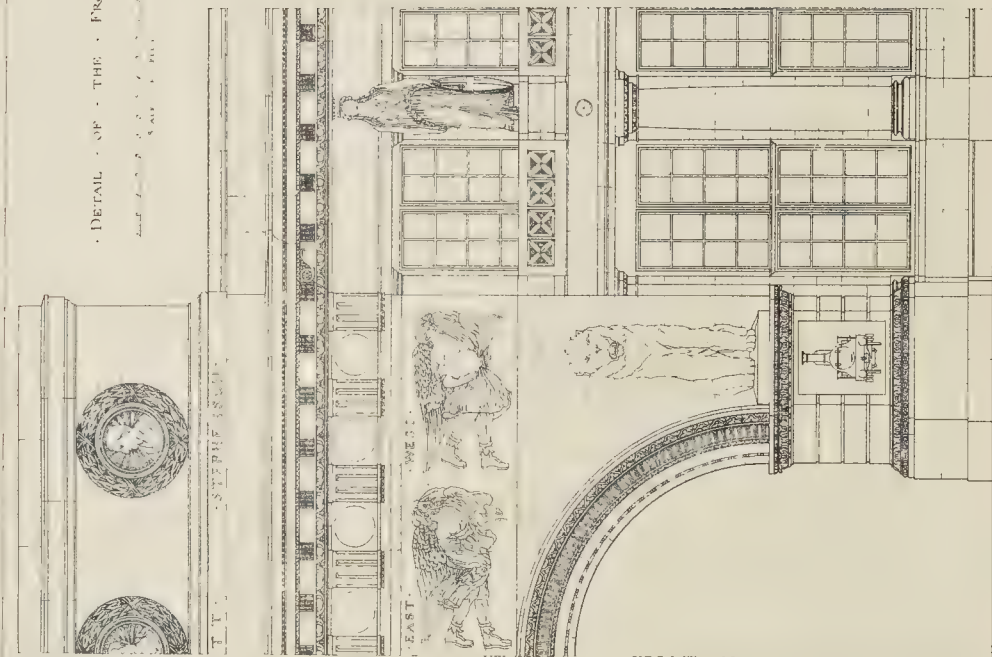
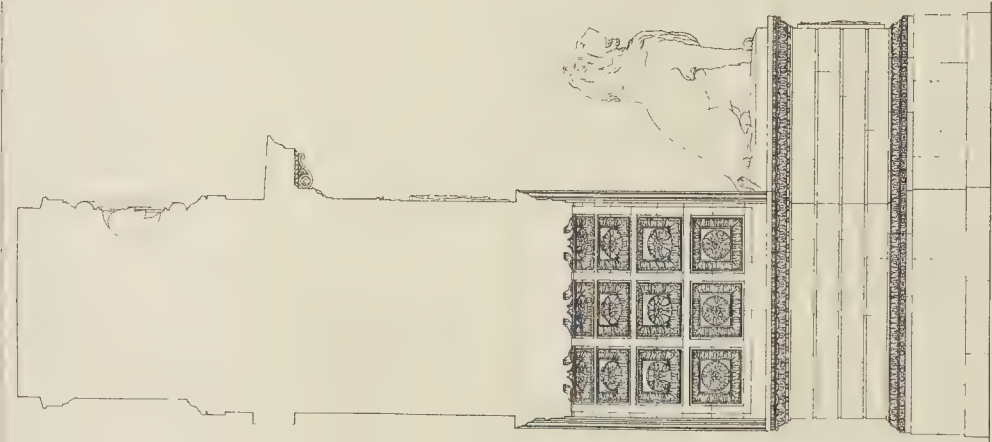


ENLARGEMENT OF KEW CHURCH.—MR. HENRY STOCK, F.R.I.B.A., ARCHITECT.





THE BUILDER, DECEMBER 31, 1887.



DETAIL OF THE FRONT

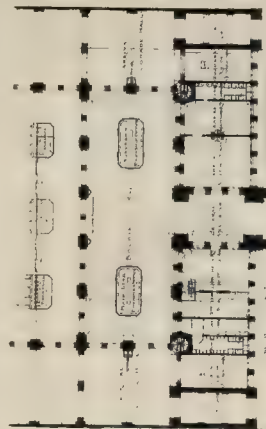
Scale 1/4" = 1'

DESIGN FOR A RAILWAY STATION.—By MR. R. WEIR SCHULTZ.

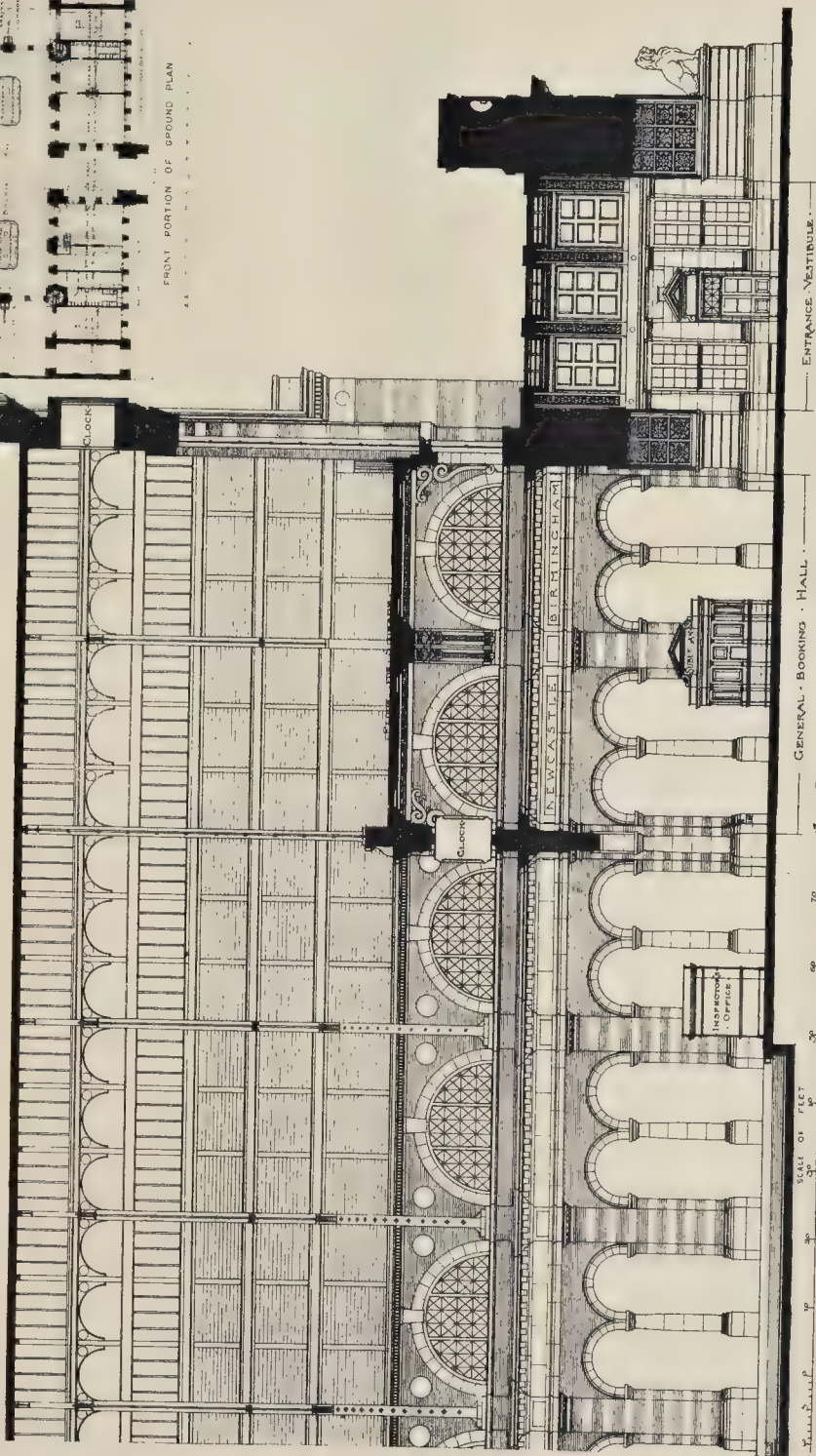
DETAILS.

Awarded the Royal Academy Gold Medal and Travelling Studentship, 1887.

PHOTO LITHO. PARABLE & CO. 25, NANTING, LANCANON ST. LONDON, E.C.



FRONT PORTION OF GROUND PLAN



DESIGN FOR A RAILWAY STATION.—By MR. R. WEIR SCHULTZ.  
SECTION & PLAN.

*Awarded the Royal Academy Gold Medal and Travelling Studentship, 1887.*

THE BUILDER, DECEMBER 31, 1887. 28 MARK LANE, LONDON, E.C.



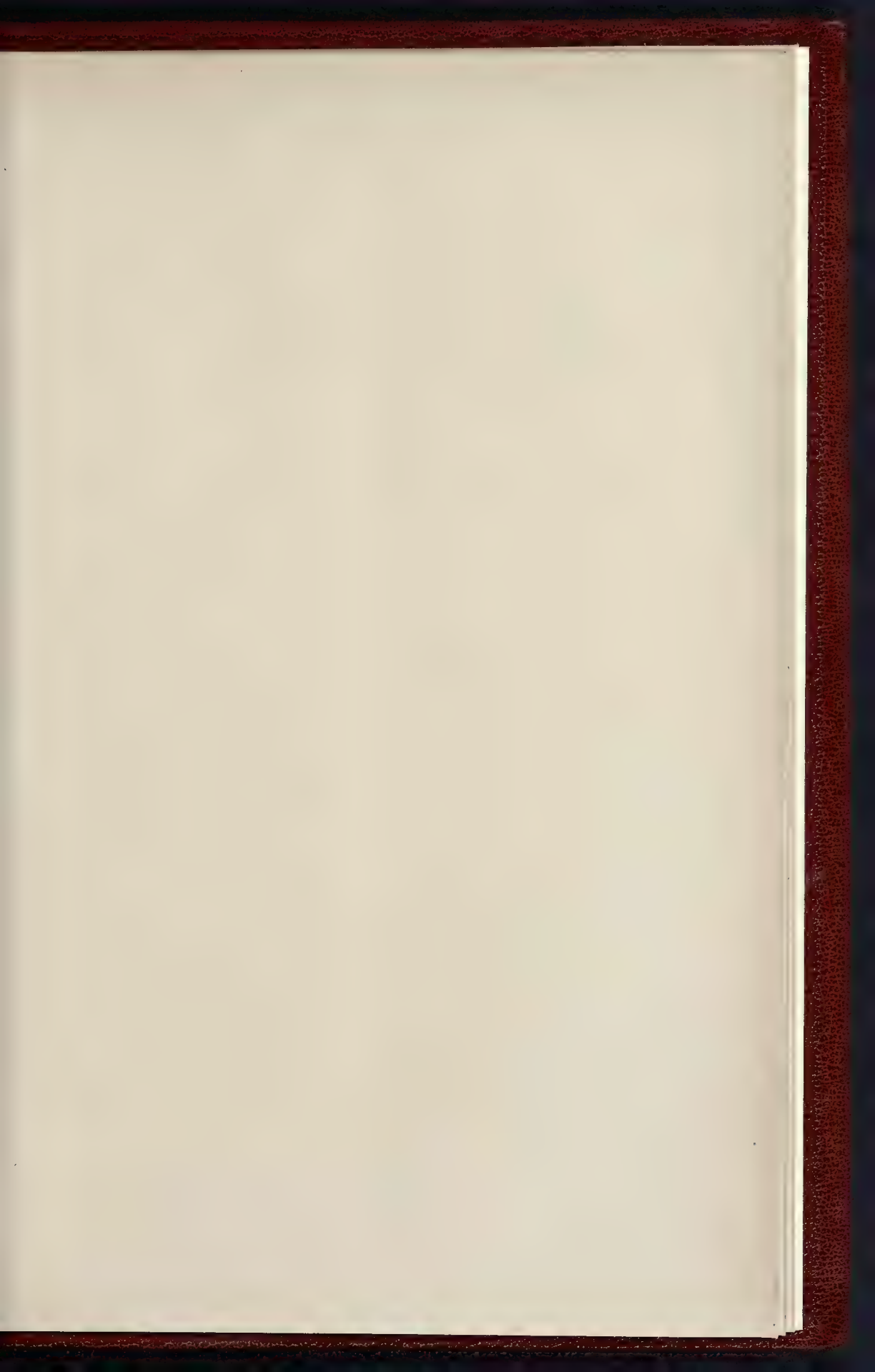




ENLARGEMENT OF KEW CHURCH.—MR. HENRY STOCK, F.R.I.B.A., ARCHITECT.  
INTERIOR LOOKING EAST.









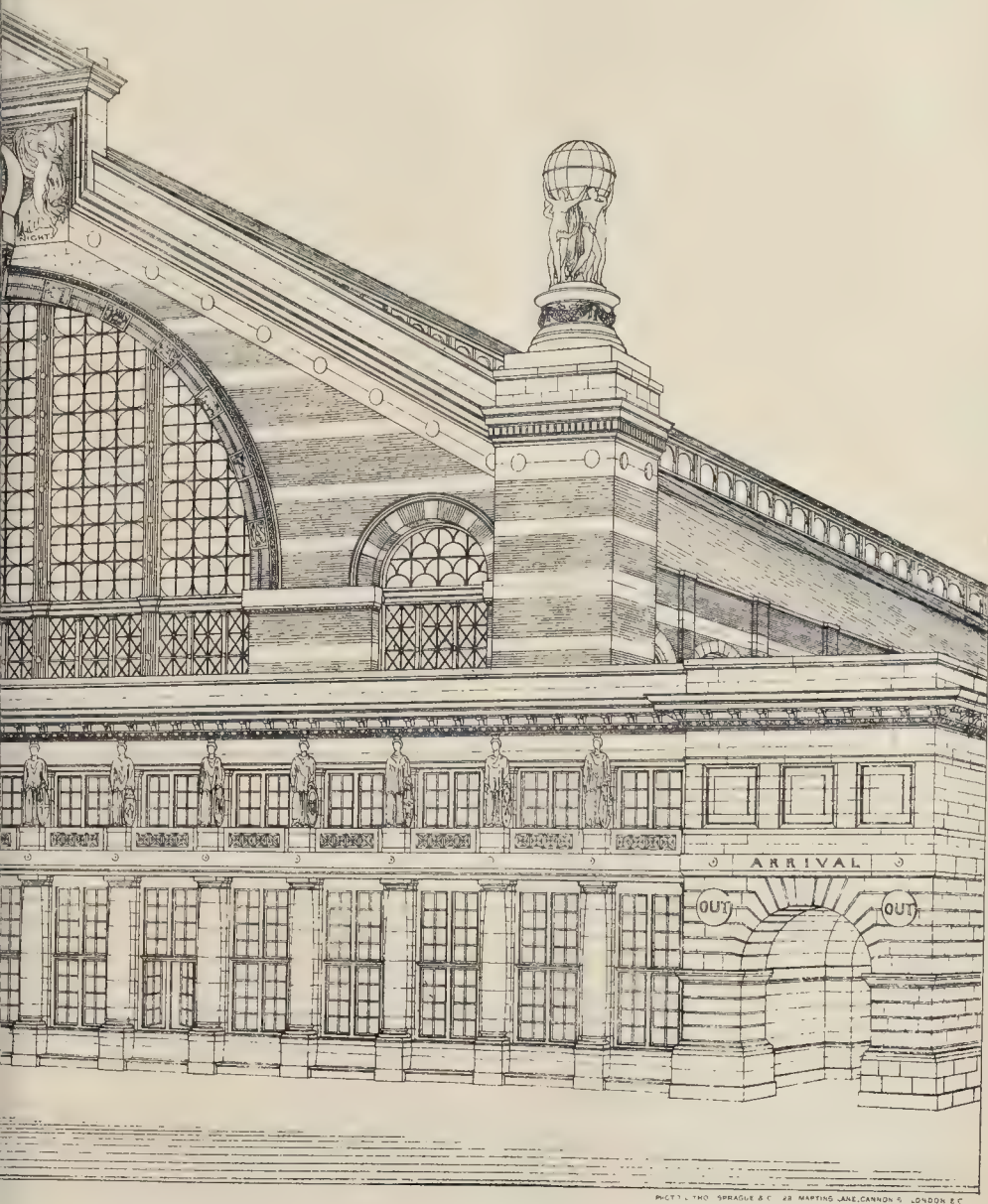
DESIGN · FOR · A  
RAILWAY · STATION



*Awarded the Royal Academy Gold Medal and Travelling Studentship, 1887.*

DESIGN FOR A RAILWAY STATION

PERSPECTIVE

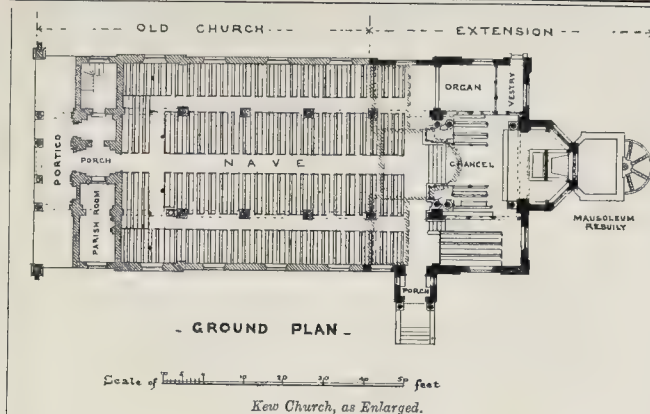


—By MR. R. WEIR SCHULTZ.

W.







### Illustrations.

#### DESIGN FOR A RAILWAY STATION.

**WE** give the perspective, detail, and a portion of the plan and section of this design by Mr. R. Weir Schultz, which obtained the Academy Gold Medal for architectural design. We commented on the design in our general remarks on the Academy students' competition designs, pages 834-5, ante.

#### "SUMMER"; DESIGN FOR THE DECORATION OF A PUBLIC BUILDING.

This is the design by Mr. E. B. Stephens which obtained the Royal Academy prize of 40l. for the best design for a decorative painting for a public building in the recent students' competition. The illustration is from an outline drawing made for the purpose by the author, the original drawing being retained by the Royal Academy for the present. It is, we understand, to be executed in some suitable position, not decided on yet.

#### KEW CHURCH, SURREY.

It having been determined to enlarge the parish church of St. Ann, Kew, by a prolongation eastward, a difficult problem had to be solved; the existing style (if it had any) had to be preserved. It was stipulated that the mausoleum of the Cambridge Royal Family should, in any enlargement, occupy in the new work the same relative position as it did in the old; this mausoleum, with its terminal semi-dome, with an organ-chamber above it completely blocking the east end. Moreover, the church was covered with a peculiar roof, spanning its whole width, which rendered an eastern finish very unpromising; and internally the tower was ceiled with a very low and gloomy segmentally-arched vault, springing from the cornice above the Tuscan colonnade.

The work has comprised the extension of the nave and aisles by one bay, a new south porch, the erection of a chancel and aisles, with a central apse. The mausoleum was re-erected with its dome eastward of this, and is entered from a doorway behind the reredos, and under the east window, which is lighted in part from an area formed by screen walls which connect the dome with the body of the apse. In erecting the chancel and aisles advantage was taken of the height of the churchyard above the floor of the church, and their floor is level with this.

Over the chancel, which is square on plan, is a low circular concrete dome, carried on an octagon clearstory, pierced with circular and semicircular openings on its cardinal and angle faces, and this clearstory both stopped the roof and gave altitude within.

The construction of the old nave roof permitting it, the ceiling was cut down and a new panelled one constructed at as great an elevation as practicable, following in its curves the lines of the chancel arch, and in this semi-circular groins were cut over each bay of the colonnade.

The church was re-seated throughout and warmed with a circulating system of hot water, the total cost of the works being 5,167l.

Mr. H. Stock, 9, Denman-street, London Bridge, was the architect; Messrs. Goddard & Sons, of Farnham, were the builders; and Messrs. W. Baily & Son, of Gracechurch-street, executed the warming work.

The church was re-opened on July, 1884. The drawings from which the illustrations are taken were in this year's Royal Academy exhibition.

#### THE INSTITUTE OF BUILDERS.

##### DISCUSSION OF SANITARY MATTERS.

At the meeting of this Institute held on the 15th inst., Mr. Robt. J. Waller in the chair, in the absence of Mr. J. Howard Colls, the President,

The Secretary having read the minutes of the last meeting,

Mr. John T. Chappell read a paper on "Sanitary Matters." He began by saying that the subject of his paper, "Sanitary Matters," was one which he was sure was not only of individual but of universal interest and importance; and to deal with it adequately was a most difficult task. What he proposed to do was to give them his own opinions upon the question, based upon experience and careful observation. He did not think it necessary to dilate at length on the various methods in vogue for the disposal of human excreta amongst the ancients, or, indeed, of those of any period, until we approached very nearly the present age.

The first departure from the most primitive customs was, he supposed, what was termed, not very euphonically, the "privy system," and a very offensive system it was, with absolutely no recommendations on the score of sanitation, but many horrible disadvantages and dangers. By far the most important division of his subject was, however, "the sewer, or water-carriage system," and, assuming that an adequate supply of water was available, he thought it would be generally admitted that it was the system best adapted for our large cities and towns, and was almost universally accepted as the best mode of disposing of what we included in the term "sewage matter." It was of the first importance that the sewers should be of proper design, and the tubular or egg-shaped sewer which was most generally adopted seemed to answer its purposes very well. In constructing these sewers materials should be used as far as possible impervious to moisture, and with the internal surface very smooth, and the whole absolutely watertight. As an example of this kind of work he could not do better than refer to the very excellent specimens carried out under the direction of the Metropolitan Board of Works. It was important that the gradients of sewers should be sufficiently sharp to ensure the rapid flow of the sewage, and that the sewers should be laid at a sufficient depth to enable an adequate fall to be given to house-drains in connecting them with the sewers. This latter point, he feared, had not in the past been sufficiently considered,—doubtless, in some instances, owing to the expense

attending it, but with the result that it had been necessary to connect the house-drains too near the bottom of the sewer,—in his opinion a most serious drawback, as it often results in the house-drains being water-logged. He was strongly of opinion that in the construction of new sewers there were now but few civil engineers who (wherever practicable) would not provide for their being of sufficient depth to admit of the house-drains being connected much nearer, if not actually at the very top, of the sewer. Personally he would prefer the latter course, as it would prevent what was, he felt sure, too commonly the case, imperfect connexion of the house-drains, by means of which the smooth and even surface of the sewer was entirely destroyed at such points, rough and uneven projections, &c., which were a fruitful source of obstruction, being often caused. These might, in his opinion, be entirely avoided by the introduction in the crown of the sewer of key or junction blocks constructed with removable discs, so as to admit of the various sizes of house and other branch drains being connected without any cutting or making good other than the joint between the pipe and its connexion with the key or junction block.

With regard to this suggestion he considered the facilities it would give for ventilation of even greater importance. Another important point in the construction of sewers was the provision for adequate and periodical flushing, and of inlets for inspection. Turning to the subject of house-drainage, he thought great advance had been made in the last few years, so much so that the arrangements that had been in existence for the past ten years without alteration would generally be found not only defective, but detrimental to health, if not absolutely dangerous. This state of things was principally caused by the absence of an intercepting chamber between the house-drains and the main sewers, and of adequate provision for the inlet of fresh air through the house-drain or for the ventilation of the same. In consequence of this and the multiplication of traps, siphonage of the latter was a common occurrence, with the result that vapours and gases escaped into the house,—a condition of things which, he believed, might without much difficulty be entirely obviated. Proceeding to deal with what he considered the desirable approach to perfection, he would first refer to the sewers, from which, unless proper ventilation, flushing, &c., were provided, the greatest source of danger probably arose. Some of his remarks might not meet with the approval of those who advocated the closing of street gratings and supplying only "vent" pipes, thereby destroying all chance of true ventilation. It was perfectly true that in many cases such gratings were nothing but outlets for the emission of foul vapours and gases, in consequence of no other means of escape being provided for them. What appeared necessary to him, therefore, was to prevent the accumulation of such vapours and gases, and not the expenditure of our energies in the attempt to find a solution for the dispersal of that which he was strongly of opinion might entirely be avoided. This, he said, could be attained not by closing up the street gratings, but by materially increasing their number and providing escape for the vitiated air. He would suggest that for this purpose outlets of not less than 9 in. clear internal diameter should be provided on the top of the sewers, from which a ventilating-pipe should be continued of a like diameter, until it reached a vertical pipe, or column, when it might be reduced to 6 in., and carried to a height of not less than 15 ft. from the surface of the ground. He did not know any reason why the lamp-posts should not be utilised for the purposes of these vertical pipes. This would necessitate the substitution of other lamp-posts for those now in use, and the size would have to be increased; but from the bottom of the pipe upwards it might be reduced to 4 in. internal diameter. A special lamp would, of course, be required, and he would recommend its being of an octagonal pattern, the top being covered with a glass space of about 5½ in. internal diameter continued through it from top to bottom, so as to admit of the cast-iron lamp-post,—at this point say 5 in. over all internal diameter,—passing through it. The inside portion of the lamp should be enclosed by a reflector. The lamp could then be slipped over the top of the column down to its resting-place about the usual length, and be supported by a moulding



or other ornament. An ornamental cap of louver pattern could then be placed at the top of the column, the whole being of an ornamental or artistic design. The reflecting power of the lamps would be very much increased in this way, and an escape from the heated air being provided around the top of the lamps, the columns above it would also become heated, and thus increase the upward flow of the air in the shaft. Three burners would, of course, be necessary in each lamp to prevent shadows, but as the light would be increased by the reflectors the burners need not be so large as those at present in use. Fresh-air inlets should be provided in the roads and be placed as nearly as possible midway between the outlets. He would now make a suggestion that he feared would not meet with approval in the same direction. It was that these outlets should be supplemented by utilising that portion of the house-drain between the intercepting trap and the sewer. On the sewer side of the intercepting trap he would take a branch pipe of not less than 4 in. internal diameter, and continue it up the house to the highest point, and of course as far as possible from all windows and chimneys. It was important in connexion with this method of ventilation that the area of the intakes should be at least one-fourth in excess of the aggregate area of the outlets. The levels of the inlet gratings being much lower than the outlets, and not subject to the friction caused by bends, &c., the greater atmospheric pressure at the intake point would insure a constant flow of fresh air through these apertures and up the outlets. While aware that on this point there was a considerable difference of opinion, he held that one pound of fact was worth a hundred-weight of opinion, and he was prepared to prove that, under the circumstances indicated, these surface gratings would be found to be neither more nor less than intakes of fresh air and not outlets from the sewer. Returning to the question of house sanitation, he thought they must all admit that the best known mode of securing this much-desired object was that the house-drains should be thoroughly disconnected from the sewer, and that on the house side of the intercepting trap there should be a fresh-air inlet, so as to produce a current of air through the house-drains, with an outlet at the top of the soil-pipe, and any other ventilating-pipes that the length and position of the drains might necessitate, particularly at all dead ends. Mr. Chappell then proceeded to discuss at some length the employment of traps, and said that none should be placed between the fresh-air inlet and the ventilating outlet, thereby insuring a thorough current of air. They should only be introduced to the various apparatus, and so ventilated as to prevent the possibility of syphonage. Dealing with the position, size, and description of house-drains, he would assume that they were thoroughly disconnected from the sewer. He might take it for granted that the drains would be constructed of a proper size and have a proper fall. He was in favour of a large size, nothing less than 6 in., and oftentimes 7 in. or 8 in. By employing pipes of a large size they got the advantage of providing a free passage for the air, or, at least, a much more perfect passage. In the case of terraced houses the pipes would generally have to pass under the house; but in detached and semi-detached houses, the pipes should pass outside. The drains from the sewer and intercepting traps should be of stoneware pipe, but pipes passing under the house might preferably be of cast iron. All the branches used should be of the Y-pattern. On the sewer side of the trap, and on the top of the drain, in the position previously indicated, he would provide a junction for ventilation. Assuming that the connexion with the sewer was on top, that would form a continuous ventilating-pipe, of course carried up to the highest point of the house. It was doubly necessary that there should be such a ventilating pipe where the connexion of the house-drains was made near the bottom, as in such a case the vapours and gases in that portion of the house-drain between the sewer and the intercepting trap and the area, were put under pressure in that portion of the drain, and unless there were means of ventilation, these gases and vapours would be forced through the intercepting trap, and pass through the remainder of the house-drains, and not, as was too often thought, escape by the fresh-air inlet. The atmospheric pressure at this point would, of course, drive such vapours through the house. A ventilating pipe on the sewer

side would effectually prevent this. The intercepting trap should be of the syphon type. He advocated the fresh-air inlet being on the house side of the syphon quite open and level with the area paving. This could also receive the surface drainage of the area. The size of this inlet should be determined by the aggregate area of the outlets of the soil-pipes and ventilating pipes, and should, in his opinion, exceed them by at least one-fourth. This inlet should communicate with an inspection chamber, all of which should be on the house side of the syphon, and as near thereto as possible. This chamber, he would recommend, should not be less than 3 ft. in length, and, say, 1 ft. 6 in. in width. Branch drains from rain-water pipes and basement closets should be brought in at the sides, whilst at the opposite end of the chamber the house-drains should be continued, and, wherever practicable, he would recommend that they should be 9 in. above the level of the entry to the intercepting trap. The channels from the chamber should be narrow and deep, and so insure a better flushing of the intercepting trap. All pipes should be laid with a true and regular fall, most carefully jointed in Portland cement, and bedded and covered in concrete. As far as practicable soil-pipes should be outside the house. Closets on the basement might be of the wash-out construction if outside the house, but whenever inside should be preferably of the valve pattern. The valve box should be provided with two connexions, one to receive an inlet ventilating-pipe 1½ in. diameter, continued through the outer face of the wall, and there increased to not less than 2½ in. At the opposite side of the valve-box should be a connexion to receive a 1½ in. outlet, the same to be continued through the wall in like manner as the former, but of the same size, thus forming an outlet, and ensuring a current of air, thereby preventing any smell from gases passing through the pan or valve, if out of order from any cause. Baths, sinks (except in the scullery), lavatories, and washing-troughs should all be provided with P-traps and inspection caps of adequate size, and fitted as close under each apparatus as possible. No D-traps should be used. None of the traps should connect with the soil-pipe, but open into a vertical waste-pipe of ample size, which should be properly ventilated, and be open at the bottom, and empty itself over a gully grating. For the scullery sink a fat-trap should be furnished. It might be objected that by leaving the waste-pipe open it would be liable to be frozen up, but he thought this objection only applied in colder climates than our own, or where, as in the northern parts of the kingdom severe frosts were of more frequent occurrence. In such cases the pipe might be fitted to the drains in the same way as the soil-pipe, but if that were done it was absolutely necessary not only to continue the waste-pipe up as a ventilator, but that from the top or crown of every trap there should be also a ventilating-pipe from that point connected with the main waste (such connexions always having an upward tendency, or serious consequences might result). He thought that if ever the suggestions he had made were carried out they would have habitable houses, as far as sanitation was concerned. With regard to the constant service water supply, and no one would think of having an intermittent supply if he could obtain a constant one,—the rising main should terminate with a ball-valve over the cisterns for supplying the closets, flushing-tanks, &c. Branches should be made from the constant-service rising main to all sinks and baths or any other necessary draw-off tap, so as to obtain a supply of pure water. To prevent waste of water each cistern should of course have an overflow pipe near the top of the tank, passing through the nearest outer wall and there emptying, and so give warning that some attention was necessary. Having given some further details, Mr. Chappell, referring to his remark that a pound of fact was worth a hundred-weight of opinion, instanced a large building of his own, planned and arranged by himself, and in which there were about forty-three closets, twelve baths, and about forty sinks, with lavatories, &c. The main drain was 9 in. diameter, with various-sized branches. There were several stacks of soil-pipes, all continued up to the top as ventilators, and the fresh-air inlet was a cast-iron grating (in the centre of a large yard), taking the surface water, the open space in which was

considerably larger than the aggregate area of the soil pipes; and although the building had been in work for something like three years, and had been tested at all times and seasons, still, under no circumstances whatever had it ever been found that the current passed upwards, nor any smell perceived from the fresh-air inlet. Now, from what he had stated, it might be thought a very simple matter to carry out the sanitary arrangements of any building, but he ventured to think that even the most skilled experts often failed in laying down their plans; for very considerable difficulties arose in the details, the neglecting of any one of which might destroy the whole principle, and thereby, instead of insuring perfect sanitary arrangements, have quite an opposite effect. He thought these facts fully warranted the views he had advanced, and if the explanations he had attempted to give were found to be of any practical assistance he would consider himself amply repaid for the time and attention he had given to the subject.

Mr. Titmass asked if Mr. Chappell advocated the trapping of the soil-pipe under the bottom?

Mr. Chappell said by no means.

Mr. Titmass went on to say that the grease-trap was one of the chief difficulties, and was a very great bugbear in connexion with the sanitation of dwelling-houses.

Mr. Chappell said he fully agreed with that. He thought a good deal of the difficulty might be got over by a proper arrangement. The scullery sinks should discharge over a grease-trap, in which should be fitted a removable bucket to act as a strainer to collect the grease, which would be cooled by the surrounding water in the trap, and could be periodically removed. Some similar arrangement might possibly be made to fit under the scullery sink, and the grease removed and secured as an article of commerce.

Mr. Titmass said that the real difficulty of the plan advocated by Mr. Chappell was in getting the grease-traps cleaned. This was not a nice job for any one to undertake, and as it generally fell to the domestic servants of a house to undertake it, it was not surprising that they were inclined to neglect it. He looked upon it as an objectionable feature that the servants had the job of cleaning the trap, and thought if some plan could be devised to obviate this difficulty it would be very advantageous.

In reply to some further observations,

Mr. Chappell said that he had sometimes found the deposit of grease in a trap quite solid and as hard as a cricket ball. There were several points which rendered the subject a difficult one to deal with in a practically satisfactory way.

Mr. Titmass said that some sanitarians advocated traps at the bottom of soil-pipes as preventing sewer gas getting up the pipe and so into the house. He quite agreed that the drain pipes under the floors, and the soil-pipes, should be of iron. He thought there was a good deal in the suggestion made as to a ventilating lamp, and very much approved of the idea.

Mr. Chappell said that if the house-drains could be connected to the top of the sewer, and the ventilators made as he had indicated, he believed that sewer gas would be almost if not entirely prevented, but as we had to deal with things as we found them, we must do the best we could, and if intercepting traps, fresh-air inlets, and thorough ventilation of house-drains, were adopted, with the further safeguard of the ventilating pipes from the sewer side of the intercepting trap, each house would be practically safe. There would still, however, be the question of ventilating the sewers, but he felt confident that the day was not far distant when some solution of this difficulty would be found and its adoption insisted upon.

Mr. Scrivener thought it an objection to the proposed lamp-ventilators that they would not have the heat of the lamp during the daytime, when the lamp would, of course, be extinguished.

In reply to this Mr. Chappell thought that, from the fact of the intake ventilators being so much larger in area and at a lower level, the consequent greater atmospheric pressure would always ensure a current of air from the intakes.

Mr. Titmass said that the water companies provided one of the difficulties in the way of improvement by each insisting upon fittings to their own approval,—one wanting one kind and another another kind.



## THE INSTITUTION OF CIVIL ENGINEERS OF IRELAND.

We take the following from the address recently delivered to this Institution by Mr. John Purser Griffith, President:—

Fifty-two years have passed since twenty engineers, practising in Ireland, met in the office of Public Works in the Custom House of this city, for the purpose of forming a Society of Civil Engineers. At their first meeting, on the 6th of August, 1835, Colonel John Fox Burgoyne was called to the chair, and in his opening address he pointed out the objects aimed at. I cannot do better than quote his own words:—

"You are well aware that in spite of the efforts of many able and eminent men, the profession has been at a low ebb in Ireland. Persons without education or skill have been frequently employed in operations of importance, and the consequence has been, as might have been anticipated, bad or injudicious works, wasteful or fruitless expenditure. It will be your effort to prevent the recurrence of these evils, and you are now adopting the measure best calculated to enable you to do so with effect, by organising a society for your own improvement."

"Let us not overlook another essential benefit to be derived from such societies,—namely, that they encourage harmony and kindly feeling and fellowship among men of the same class, and mitigate dissensions."

The name adopted was "The Civil Engineers' Society of Ireland." It embraced in its member-class civil engineers, military engineers, and architects engaged as such in the United Kingdom, and among its first members were Colonel John Fox Burgoyne, John Radcliffe, Richard Griffith, and Charles Blacker Vignolles, names which have become household words among us. Most of the members were scattered through the country, and the meetings were only held half-yearly, at the Custom House. From 1837 to 1844 no reference appears of the proceedings in our minute-book. In the latter year a meeting was summoned to determine whether the Society should be continued or not. We rejoice to-day that there were three men connected with it who, in the face of much discouragement, resolved that it was "expedient to maintain the Institution, and to place it on such a basis as might render it permanently useful." This resolve was followed by the adoption of new rules for the management of the Society, and at the same time the name was changed to "The Institution of Civil Engineers of Ireland."

The progress of the Institution was now steady. The number of its members increased; its meetings were frequent; useful papers were read, giving rise to interesting discussions. Moreover, the publication of the Transactions was begun, and by this means the interest of members scattered throughout the country was increased. Under the new by-laws, architects were no longer eligible for election as members. We have not sufficient information in our minute-book to explain why this course was adopted. Suffice it to say that by common consent the professions have long been considered distinct in these countries, and each has its own distinctive Institutions. It is, therefore, from no disrespect that we do not now admit architects as such to our member-class. I think it will be of interest to try and clear up our ideas with respect to the distinguishing features of the professions of civil engineering and architecture, and to this end I would quote the opinions of some of the most eminent representatives of these professions. Mr. William Pole, F.R.S., the present honorary secretary of the Institution of Civil Engineers, points out that "according to the strict derivation of the term, an engineer is a person who sets his mental powers in action, in order to discover or devise some means of succeeding in a difficult task which he may have to perform."\* Can any higher ideal be set before us than this combination of thought and action, of theory and practice?

With the great impulse given to hydraulic works in the eighteenth century throughout Europe, the need arose for competent men to carry out such works. "The architects found these new studies foreign to their own business, and were, moreover, already well occupied in their more legitimate employment. Hence a new class of practitioners became necessary, who should devote their attention to hydraulic constructions, with all their necessary mechanical arrangements; and with these soon became associated the erection of buildings of a massive and unartistic character. Thus the new class of men undertook to design not only

river and hydraulic works, but roads, bridges, docks, harbours, mills, and machinery. Such a class required a new name. It was noticed that the kind of work undertaken by these practitioners was exactly analogous to that allotted to the 'engineers' of the military service, and the new profession adopted the same title, prefixing, however, the word 'civil,' to indicate that they were civilians, and so to distinguish them from their military brethren. Hence the origin of the present term, 'civil engineer.'"

The field in which the civil engineer labours is extensive and ever-increasing. In the words of Thomas Tredgold, "the scope and utility of civil engineering will be increased with every discovery in philosophy, and its resources with every invention of mechanical and chemical science."

Mr. James Fergusson, in his "History of Architecture," says,—

"Architecture is nothing more nor less than the Art of Ornamental and Ornamented Construction. The art of the civil engineer consists in selecting the best and most appropriate materials for the object he has in view, and using these in the most scientific manner, so as to secure an economical but satisfactory result. Where the engineer leaves off, the art of the architect begins. The structural features being correct, it is the province of the architect to add beauty to them."

It will thus be seen that, although the works constructed by the civil engineer may be destitute of architectural ornament, yet no architectural work can be considered worthy of the name unless designed on sound structural principles. Architecture, therefore, seems to me a department of civil engineering, and I cannot but think it a matter for regret that it should have become a separate profession.

From its formation till the year 1853 the Institution of Civil Engineers of Ireland occupied rooms in the Custom House, kindly placed at its disposal by the Public Works Commissioners. We should never forget how much we owe to that body of public servants, and to our first President, who was their Chairman. In the year 1853 rooms were taken in 41, Upper Sackville-street, where the meetings were held, and to which the books and collection of models were transferred, in consequence of the rooms at the Custom House being required for the public service. The Sackville-street rooms had to be given up in 1861 for financial reasons, chiefly due to a falling off in members, and ever since we have been indebted to the Board of Trinity College for permission to hold our meetings within these walls. In 1873 it was decided to obtain rooms outside college, where members could have access to the books and papers belonging to the Institution. A Royal Charter was obtained in 1877, and in 1879 we moved to our present house in Dawson-street. The wisdom of the course adopted has been fully proved by the great additions made to the member and associate classes. Since 1873 the number of members has doubled, and that of associates quadrupled. Nor must we forget that this period corresponds with Mr. John Chaloner Smith's term of office as honorary secretary of this Institution. It is with sincere regret that we lose his services. None but those who worked with him can fully appreciate the loss which we sustain by his retirement from the most important official position in connexion with this Institution. The Smith premium will, we rejoice to think, perpetuate his name and serve to remind us of his ungrudging and unselfish service of fourteen years.

Having thus briefly sketched the history of the Institution, Mr. Griffith proceeded to discuss various topics of professional interest.

**A New Small Pox Hospital.**—The Metropolitan Asylums Board are about to erect a large small-pox hospital at Darenth, the intended outlay for the new building being 66,000*l.* It is to be erected on the Goro Farm Estate, which was purchased for the purpose in 1883, on which 24,000*l.* has already been spent, in addition to 11,000*l.* in the erection of a pier. It is intended for convalescent small-pox patients, and will provide 728 beds.

**The Art-Union of London.**—We have received from the Art-Union of London their plate for 1888. It is a reproduction in line engraving, by Mr. Lumb Stocks, R.A., of Mr. J. B. Burgess, A.R.A.'s picture of "A Spanish Letter Writer."

\* If this was meant to take construction out of the province of the architect, we need hardly say that we repudiate it in toto.—Ed.

Mr. Chappell, on this point, said he thought that the sanitary registration of buildings, as had been proposed, was very well in its way, but what he thought of more importance was that a clear and definite system should be laid down, as was the case in New York, where, if a person wanted to connect the drainage of any building to the sewer, he had to apply to the Health Office and obtain a printed form of specification with blanks to be filled in by the architect or sanitary engineer, and submitted, with a plan, to the authorities for their approval. The work was then carried out under the superintendence of the architect or sanitary engineer, as the case might be, and when done it was inspected and certified by public inspectors under the control of the Health Office. This method of procedure came to his knowledge through a gentleman he had employed in his office within the last two years, who, on his return to America, finding how nearly his (Mr. Chappell's) views accorded with those in operation in New York, sent him copies of the documents in question as well as the regulations then enforced, and which seemed to him exceedingly well worked out. If we could have something similar in this country, it would not fail to prove of great advantage, and give valuable results, and he thought that in time we should come to this.

Mr. Timmass said "quite right" to that. The fact was they might take all possible pains to secure the best results in sanitary matters, but the actual work had to be done by others; and it was a too common occurrence that the result was unsatisfactory, and complaints were justly made of imperfections, drains clogged up, and so on.

Mr. Gough said that as a visitor he should like to say a few words from his point of view as an architect. He was pleased to hear builders condemning traps, and approved the suggested lamp-ventilator, but could not agree in using iron pipes for the purposes mentioned in the paper. In a house to which he had been called where iron pipes were used he found them so corroded as to be blocked up, and since then he had strongly condemned the use of such pipes. He wished he could hear such matters as these discussed at the Institute of Architects, but he was afraid some of his profession did not regard these matters with the interest they ought.\*

Mr. Franklin suggested that the iron pipes might be lined with lead, and the danger from the corrosion of the iron pipe, pointed out by the last speaker, would thus be met.

Mr. Chappell said he did not propose iron piping alone, but iron piping with a thick coating of a suitable and proper composition, applied whilst the pipes were hot, which would effectually prevent oxidation. He did not object to stoneware pipes provided that they were strongly bedded and the other necessary conditions carried out. The repairing of pipes lined with lead would be a very expensive matter.

A Member said he thought the grease-trap trouble was the greatest of all. It was not only the grease which got into it, but large quantities of other matters, tea leaves, &c.

After some further discussion, during which Mr. Timmass said that the escape of water from baths, lavatories, &c., into drains was objectionable, as the soap in the water coagulated.

Mr. Chappell said he thought that bath and lavatory wastes should empty into the main waste, and be open at the top, whereby a through current of air would be obtained from the waste-pipe, the same being open at the top.

A vote of thanks was passed to Mr. Chappell for his paper, and

The Chairman announced that at their next meeting a paper would be read by Mr. F. J. Dove on "The Relation of the Architect's Profession to the Building Trade."

The proceedings then terminated.

**Illustrations of Chatham Hospital.**—The name of the author of the measured drawings of this building in our last should have been A. Needham Wilson, not J. Needham Wilson.

\* We thought that these matters had been pretty well discussed at the Institute of Architects of late years. At any rate, we call to mind certain papers by Mr. E. C. Robins and others, including the winners of the Godwin Bursary.—Ed.

\* This is a tolerably vague definition, however, and might apply equally to a great many other branches of human effort.—Ed.





## The Student's Column.

## LAND SURVEYING AND LEVELLING.

XXVII.—DETERMINING DISTANCES.

FIG. 9 shows how the angle of a building may be correctly determined with reference to the position of a base line, when that building is so situated that it is only possible to connect it by one line A C to the main base lines from which an estate is being surveyed. The distance of the point B along the base line being fixed, measure the lengths B D, D C, and C B, so as to be able to plot the triangle B D C, and measure the lengths C E and B E, so as to be able to plot the triangle B C E. Then, if the face of the building, D E, be straight the line C E, when plotted, should appear as a continuation of the line D C.

Fig. 10 shows a method for connecting a base line for an off-road with a main base line. A pole is placed in the middle of the off-road, at E, so as to equalise the offsets upon either side, and another pole higher up the road, not shown in the diagram, but also placed in the centre of this road. A pole is then fixed at C, so as to be in line with the two poles fixed upon the off base line and also upon a point in the main base line B A. The direction of the line C E is determined for purposes of plotting by measuring the sides of the two triangles B E C and C E K, the points B and K being taken upon the main base line B A in such positions that the tie-lines B E and E K touch the corners F and H of the adjacent buildings. Then, by recording the distance of F from B, when measuring B E, and the distance of H from K, when measuring E K, a valuable check upon the position of these corner boundaries is obtained. They are also surveyed in the ordinary way, when taking the offsets measured from both the lines B A and C E. The same method is adopted for fixing the direction of P N in fig. 11, but in fig. 11 the triangles do not extend to the points F and H as in fig. 10. When a piece of open ground exists at one corner, as shown in fig. 10, the lines B A and C E may be connected by the formation of a triangle, C D L, in which C M is measured as a *proof* line. In the triangle B E K the line E C forms the *proof* line. Upon a hard road, when frequent traffic might upset the position of poles temporarily set up in the centre of the road they may be fixed very often in gully-grates and wedged up. A chalk mark across the grate will enable the position of any pole to be easily re-determined if disturbed by passing traffic. This method has been supposed to be adopted in fixing the base lines O S and S W in fig. 11.

Fig. 12 shows a method which can be adopted for determining the angle between the sides B E and B F of an old building supposed to be out of the square in plan. The direction of the side B F is first produced by fixing a pole at A, and the direction of the line B E by fixing a pole at C. The measurement of the line A C fixes the angle A B C. A similar plan could be adopted in the case illustrated by fig. 15 for connecting the base lines A D, D C, C B, and B A. At A and C the triangles have been formed in the same way as the triangle N O Q in fig. 11. At B and D the tie lines in the triangles M B L and E D F (fig. 15) are ranged as a check in the same straight line. Figs. 16 and 17 show a method of connecting base lines by chain measurements when the angle formed by the base lines at their intersection is very obtuse. Fig. 18 shows the method adopted for calculating the unmeasured length B E of a base line, B D, after measuring a portion, B D, of this line, and taking the angles at the extremities of the measured portion by viewing a distant object A. Fig. 19 shows a means of arriving at the height of a tower, A C, by taking an angle at D, and measuring the distance equal to B D. If an obstruction prevents the distance B D (fig. 19) being accurately measured, the formula given in fig. 18 may be used, B E in fig. 18 being supposed to correspond with B D in fig. 19.

Various other cases will arise in practice, each of which must be dealt with according to its special circumstances. All we can do is to suggest examples which we think to be of the most frequent occurrence, but we trust the study of the cases we have illustrated may help the student to form a correct judgment in applying main principles to such cases as may come under his care. We have endeavoured to make our articles as practical as possible, and

to describe methods of work which we ourselves have found to combine accuracy with expedition.

## OWNERSHIP OF DRAWINGS.

SIR,—I have not been able to refer to "Roscoe's Building Cases," quoted by you in reference to this matter, but I am under the impression that "Eddy v. McGovern" only settled this point, viz., that in the event of the works not having been executed, the drawings should belong to the proprietor, and not to the architect, to enable him (the proprietor) to carry out the building when desired—as to whom the drawings should belong to after that being quite another matter. I should like to be corrected in this view if I am wrong.

THOMAS OLIVER.

Newcastle-on-Tyne.

## NON-ACCEPTANCE OF LOWEST TENDER.

SIR,—Referring to the lists of tenders published by you on the 12th of November last, p. 690, there appears one for a parish room, All Saints, Rotherhithe. It may be seen that out of nine bidders my tender was the lowest by 27*l*. After some delay I was again invited to send in an amended tender against one other competitor, with considerable alterations in the specification. This I complied with, submitting a tender for 557*l*, when, after another three weeks' delay, I was informed by the architect that Messrs. A. White & Co.'s tender had been accepted; but I am still ignorant as to what the amount of that tender was, but was told that the job was postponed until the Spring (but I see it is in full operation).

Now, as to whether it was strictly just to ask me to again compete, your numerous readers will form their own opinions; but surely it could not be right to select a builder who stood fifth from the bottom of the list?

J. BULLERS.

George-row, Bermondsey, Dec. 21.

## ALMANACKS AND DIARIES FOR 1888.

"WHITAKER'S ALMANACK" for 1888 (published at 12, Warwick-lane, Paternoster-row) is fuller and more varied in its contents than ever. It has been extended by about forty pages, and several new features have been introduced. It is not quite free from mistakes, but it is nevertheless a remarkable compilation, and the Editor is quite justified in saying that since his almanack was first published, twenty years ago, "You'll find it in Whitaker" has become an oft-quoted remark when information is sought.

Messrs. Hudson & Kearns, of 38, Southwark-street, again send us a parcel of their admirable professional and trade diaries, specially prepared for the use of architects and builders. "The Architect's Diary," adapted for the use of architects, surveyors, and civil engineers, is sent to us in two forms, Nos. 12 and 13,—the first having one page to a day and the second two pages to a day, and sold for 4*s*. 6*d*. and 5*s*. 6*d*. respectively. These diaries contain a great mass of legal and professional information, and each may be said, in fact, to provide for all possible professional requirements of the kind. "The Builder's Diary," No. 11, selling for 4*s*. 6*d*., is planned on the same comprehensive lines, only more so, if anything. These diaries supply a real want, and are well and carefully got-up. The same publishers send us a specimen of their general "Diary for 1888," and samples of their registered date-indicating blotting-pads, of which we have spoken with commendation in former years.

The "City Diary and Almanack" for 1888 (published by W. H. & L. Collingridge, City Press Office, Aldergate-street) is another handy annual, this being its twenty-fifth appearance. It contains a great deal of information about "the grand old Corporation," as well as other City and metropolitan matters, and is published for one shilling.

Mr. John E. Sears, A.R.I.B.A., sends us "The Architect's, Surveyor's, and Engineer's Compendium" for 1888, edited by himself and published by E. Marlborough & Co., 51, Old Bailey. It fairly merits its sub-title of "Professional and Office Diary and Directory of Manufacturers" ("appertaining to building" being understood). Several important improvements have been made in the work; a Certificate-Record is added, and, taking a hint from the *Builder*, a map of London (in sections), showing the boundaries of Surveyors' Districts under the Building Act, is given. In a mere passing notice like this, written immediately

the work comes to hand, we cannot, of course, vouch for the accuracy of all the matter therein contained, but, with this reservation, we may commend the publication as one of exceeding usefulness and value for the office.

"The Railway Diary and Officials' Directory" for 1888 (published at the price of one shilling by McCorquodale & Co., Limited, Cardington-street, N.W.) and the "Railway [sheet] Almanack" (scilicet, same publishers) contain much authoritative information and statistics of interest to all who travel and all who own railway stock.

"Calvert's Mechanics' Almanack and Workshop Companion" for 1888 (published by John Heywood, 11, Paternoster-buildings, price 4*d*.) well maintains its established character for usefulness, though we will not pledge ourselves to the accuracy of all the recipes and formulae given in it. Some particulars of the renewal of King's Cross Station roof are given (with diagrams) from a paper by Mr. R. M. Bancroft, read before the Society of Engineers this year. It is not generally known that until their renewal, in iron, within the last few years, the arched roof-principals were mainly of wooden planks, laminated, as illustrated in the *Builder* at the time of their erection, about the year 1851. Mr. F. J. Bancroft contributes some useful memoranda on building and engineering matters. Altogether this is a very handy little almanack.

Messrs. Griffith, Farran, & Co., of St. Paul's Churchyard, send us a specimen of Blackwood's Shilling Scribbling Diaries, interleaved with blotting-paper.

From Mr. Alfred S. Taoker, mason, &c., of 143*l*, Euston-road, we have received a handy little thing for the waistcoat pocket. It is a combination of a four-fold pocket foot rule, with scales of  $\frac{1}{4}$  in.,  $\frac{1}{2}$  in., 1 in., and 1*½* in. to the foot, and a calendar for the year 1888. It is printed in gold, black, and red, and the scales are as accurately divided as is possible by printing. A linen lining runs through the card, so that the joints where it is folded will not easily break or wear. It may be had for two-pence, and the profits, if any, will be devoted to a charitable object.

## VARIORUM.

The *Insurance Year Book*, 1888 (published by Simpkin, Marshall, & Co., Stationers' Hall-court), is the third issue of a very useful handbook, and it brings to a focus much statistical and other information as to the position of insurance offices. It may be advantageously consulted by persons effecting insurances. It is sold for one shilling.—Some little time ago we received vol. ii. of *The Architect's Register* (published by W. Pope, 16, Holborn, price 3*s*). It is very nicely printed, and is mainly filled by reprints of papers read before the Architectural Association and other bodies, but these are not always given fully. This is notably the case with Prof. Corfield's lecture (it was not a written paper) on "House Sanitation," of which a full report will be found in the *Builder* for Jan. 29 last.—The *Intelligence Quarterly*, published by W. Bartholomew, 25, Paternoster-row (price 1*s*.), is a very useful compilation of special information about London and its suburbs, suitable for the wants of visitors, tourists, &c. It contains a large number of maps, and upwards of 80,000 references to streets, public buildings, hotels, &c. But the advertising element is somewhat obtrusive.—The volume of *Transactions of the Manchester Statistical Society*, Session 1886-87 (published by John Heywood, Manchester and London) contains some interesting papers on technical education, co-operation, &c., dealt with, of course, from the statistician's point of view.

—From Messrs. Cassell & Co. we receive a parcel of their popular magazines, which are both cheap and good. The *Quiver* (which lately commenced a new and enlarged series) is well illustrated and printed, and among the contributors are the Dean of Canterbury and Professor Blaikie. In the first number of the new volume was a paper on "Noteworthy Church Roofs," with sketches of examples at South Creak, Walsingham, and Knapton, all in the county of Norfolk. *Cassell's Family Magazine* has also just commenced a new volume. It is a very readable and well-illustrated miscellany, containing much useful information as to new inventions and "notions" under the heading "The Gatherer." *Little Folks*, the popular



magazine for children (published by the same firm), commences a new and enlarged series with the January number, and is sure to increase its already great hold upon the favour of parents and children, both for its illustrations and reading matter. Among the contributors is Mr. Walter Crane, whose pencil finds some quaint conceits under the title "Lancelot's Levities," the one representing "A Dandy Lion" being a clever combination of animal and plant life. Each of the three magazines we have named is obtainable for sixpence.—The Religious Tract Society (56, Paternoster-row) send us their old-established and admirable magazines the *Leisure Hour* and the *Sunday at Home*. Both are well illustrated and varied in their contents. In the first-named there is an amusing story entitled "The Defeat of Antiquarius at Thrayemene," which graphically depicts the discomforts of tourists in unfrequented parts of Italy. In an account of "The Late Edward Thring," some interesting particulars are given of Uppingham School, of which Mr. Thring was the well-known head-master. The *Sunday at Home* contains the first of a series of articles on "Paris at the time of the Reformation," by Mr. Richard Heath. The *Girl's Own Paper* and the *Boy's Own Paper* are two other monthly magazines issued from the same office. The former devotes a good deal of space to art industries, and the number for January contains an illustrated paper by C. Harrison Townsend on "Mosaic Work, and How it is Executed." The *Boy's Own Paper* goes in for tales of adventure and deeds of daring, Mr. Talbot Baines Reed and Mr. J. F. Hodgetts being among the contributors. The mysteries of "alley lore" and "commonsense" are no doubt fully treated of in the articles on "Marbles in Twenty Ways." All four magazines are capital in their way, and cost only 6d. each. From the same Society we receive *The Child's Companion* and *Our Little Dots*, two excellent magazines for children, well illustrated and printed. "Little Dots" is specially designed for infants, and the reading is in large clear type. Each of these magazines costs but a penny per month. With the January numbers coloured plates are given. *Friendly Greetings*, *The Cottage and Artisan*, and the *Tract Magazine* are other publications issuing from the same office, but some of the illustrations in these are not up to the mark.—It is announced that Mr. A. Wyon is writing a work on "The Great Seals of England."—Mr. William Muir writes from the "The Blake Press," Edmonton, that he has produced for subscribers, through his agent, Mr. Quaritch, fifty copies each of Wm. Blake's "America" and "Europe" during the year past, and that he hopes to issue his "Uzizen," "Song of Los," and "Gates of Paradise" in 1888.—*Decoration*, a monthly journal devoted to the illustration of the decorative arts, and to the interests of the house-painting and art-furnishing trades,—published since its first issue more than seven years ago by Messrs. Sampson Low, Marston, & Co.—will henceforth be published by Mr. P. L. Deighton, at 6, York-street, Covent-garden. He promises some enlargement of the journal, of which Mr. Moyr Smith will continue to act as the art editor.—*Scientific News*, a periodical for general readers, has hitherto been published monthly, but will, beginning with the new year, be published weekly, at 138, Fleet-street.—"Fair Faces, or Types of Female Beauty," is the title of a special series of full-page engravings, from drawings by Miss Margaret Thomas, to be commenced in the January number of Mr. Francis George Heath's pictorial monthly, *Illustrations*.

#### RECENT PATENTS.

##### ABSTRACTS OF SPECIFICATIONS.

43, Domestic Fire-grates. W. H. H. Marten. The object of this invention is to provide a double grate capable of being rotated, enabling each of the grates to be utilised for either of the rooms in which they are placed, and assuming there is a fire in only one of the grates, permitting such grate to be turned from one room to the other when desirable.

424, Paving Blocks and Roads. W. White. According to this invention, asphalt or concrete composition is run into moulds of suitable shape, and having projections and sockets which interlock so as to form a secure paving. Instead of forming the compound block wholly of asphalt or concrete, embedded therein are one or more pieces of wood or other suitable material in such wise that the pieces

of wood or material appear on the surface of the compound block. This can be conveniently effected by placing the pieces in the bottom of the mould before the asphalt or composition is poured in.

734, Treating Wood. Thomas Royle.

The process of treating wood for the extraction of water, &c., is by this invention carried on by the use of a continued current of heated fluid, and in a more rapid manner than has hitherto been the case. The fluid, such as tar, creosote, &c., is forced into the pores of the wood, so as to take the place of the moisture which is expelled by the preliminary treatment.

12,247, Apparatus for Shaping and Trimming Slate. A. Spamer.

In order to dispense with the cutting plate or template employed when slates are trimmed by the hammer, and to save the time occupied in the preliminary marking of the slates, an apparatus is provided by this invention which claims not only to effect these purposes, but to prevent much of the breaking of the slates when being trimmed for roofing purposes. The table on which the slates are laid is provided with notched marks or gauges, and the knife is made to fall with a double-edged lever, which gives it weight and accuracy in stroke. Curves or shaped lines may be cut with the shears by moving the slate while under the blade of the knives carried by the levers.

12,488, Ventilating, Disinfecting, &c. J. McConnell.

The appliance which is the subject of this patent is actuated by the flow of water, or propelling fans effected by the flow of water, steam, or compressed air, or other fluid, the pressure required being very low, and is reversible in action, so that by the same apparatus air may be drawn from or admitted into the apartment.

18,656, Fixing Roofs, &c. W. Rickwood.

According to this invention, instead of using zinc, lead, or wire clips, a metal button or plate is pierced to receive nails or screws for fastening the battens to boards. The lower end of the plate is thickened and tapped to receive a screw to be inserted after the roof covering has been placed in position, and is provided with a circular or other shaped button screwed on as far as may be necessary to press upon the slate and thus prevent its rising.

#### NEW APPLICATIONS FOR PATENTS.

Inv. 16. 17,326, J. Hill, Opening and Closing Fanlights.—17,348, E. Robbins, Clear Crystal Concrete Material, or Buildings entirely of Primary Lights.

Dec. 17.—17,396, R. Dickinson, Slow Combustion Stove Grates.—17,398, E. Tapsell, Utilising the Waste Heat generated by Register and other Stoves for Warming, Ventilating, &c.

Dec. 19.—J. Peacocke, Portable Hut.—17,437, W. Payne, Pivoting Fanlights, &c.—17,451, W. Rigway, Cranes.—17,458, S. Hollyman and J. Horne, Chimney Top to Induce Up-draught.

Dec. 20.—17,470, W. Somers, Preparation for use in Paints and Varnishes.—17,479, J. Roberts, Heating and Ventilating Workshops, &c.—17,483, A. Boulton, Concrete Pavements.—17,488, J. Mott & Co., Automatic Bolt and Indicator for Water-closets, &c.—17,503, G. Cook, Spirit Levels.

Dec. 21.—17,539, D. Marshall, Joints for Pipes.—17,546, J. Bennett and J. Telfor, White Lead.—17,556, H. Stockman, Ventilators.—17,588, H. Ball, Opening and Closing Fanlights, &c.

#### PROVISIONAL SPECIFICATIONS ACCEPTED.

11,671, G. and A. Needham, Window Fasteners.—15,148, J. Cardwell and J. Chandler, Bolts for Shop Window Shutter Bars, Sliding Sashes, &c.—15,395, R. McGregor, Bricks, Blocks, Tiles, &c.—15,764, J. Stevenson, Fasteners for Windows, Doors, &c.—15,634, J. Gay and F. Wood, Fire Bricks, &c.—16,043, J. Beesley, Fixing and Holding together Scaffold Poles, Ladders, &c.—16,746, W. Wodson and J. Judge, Dressing and Finishing Building Bricks, Flooring Tiles, &c.—16,769, R. Melhuish, Joiner's Parallel Vice.—16,860, B. Finch, Fireproof Partition Doors for Theatres, &c.—16,772, J. Macdonald, Electric Balls.—16,839, C. Dugange, Window, Door, and Similar Arches and Ornaments for Building Purposes.—16,897, L. Gould, Casing and Fixing Locks to Doors.

#### COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.  
2,613, R. Hellyer, Ventilating, Warming, and Illuminating.—4,261, J. Millar, Window Sashes to facilitate Cleaning, Painting, and Glazing from the Inside.—10,689, H. Newcome, Portable Smoke Flue or Chimney.—11,039, J. Kenyon and Others, Preventing the Passage of Wind, Rain, or Dust beneath Doors.—12,913, A. Wells, Revolving Window Shutters.—15,588, R. Shaw, Drain Pipes, &c.—2,244, F. Taylor, Door Bolts.—2,335, R. Adams, Door Closing Appliances and Checks.—2,692, H. Lewis, Hand or Foot Power Saw Blades.—3,141, F. Taylor, Attaching and Adjusting Knobs to Spindles.—10,050, S. Bromhead, Stone-Sawing Machine.—16,025, E. Boynton, Saws.

#### RECENT SALES OF PROPERTY.

##### ESTATE EXCHANGE REPORT.

DECEMBER 19.	
By A. BOOTH.	
Camden-road—Nos. 322 and 324, term 59 years, ground-rent 25l.	£2,300
By H. SMALLMAN.	
Hampstead-road—115, Drumsden-street, 31 years, ground-rent 8l.	27
87 and 89, Robert-street, 36 years, ground-rent 14l.	815
By J. WILKINS & SON.	
Battersea—12 and 14, Home-road, 88 years, ground-rent 14l.	480
Deptford—2, Adolphus-street, freehold	380
DECEMBER 20.	
By H. W. LEE.	
Poplar—An improved ground-rent of 17l., term 49 years.	205
By GLOVE & HARRISON.	
Poplar, Woolmer-street—The Forester's Arms Beer House, freehold	780
Lower Sydenham, main road—The Man of Kent Beer House, freehold	720
By CHESTERTON & SONS.	
Hyde Park—2 and 8, Cleveland-gardens, 66 years, ground-rent 38l. 6s.	4,080
27, Cleveland-gardens, 62 years, ground-rent 2l. 17 and 20, Cleveland-gardens, 61 years, ground-rent 1l.	2,453
28, Cleveland-gardens, 62 years, ground-rent 2l.	5,200
7, Gloucester-news West, 55 years, ground-rent 7l.	2,570
68, Porchester-nues, 51 years, ground-rent 2l. 11, 11a, 12 to 16, Leinster-street, 51 years, ground-rent 30l.	500
Harrow-road—No. 219, term 60 years, ground-rent 8l.	1,640
Pimlico—8, Passmore-street, 34 years, ground-rent 40l.	575
Kenington 30, Pembroke-gardens, 59 years, ground-rent 10l.	350
	1,340
DECEMBER 22.	
By DALE & SON.	
Mile End—1 to 11, Swan-court, 16 years, ground-rent 24l.	165
Islington 30, Chisle-street, 63 years, ground-rent 8l.	155
16, Gainsford-street, 36 years, ground-rent 6l.	250
Stepney Green—Nos. 165 to 190 even, 18 years, ground-rent 160l.	270
Bethnal Green—174, Old Ford-road, 42 years, Bonner-street, 60 years, ground-rent 4l.	1,030

#### MEETINGS.

MONDAY, JANUARY 2.  
Clerks of Works' Association—General Quarterly Meeting (Carpenters' Hall). 8 p.m.  
WEDNESDAY, JANUARY 4.  
British Archaeological Association. (1) Mr. J. Romilly Allen, F.S.A. Scot., on "A Museum of Christian Archaeology for Great Britain." (2) The Rev. Canon Collier, F.S.A., on "Recent Discoveries in Winchester Cathedral." 8 p.m.  
Civil and Mechanical Engineers' Society.—Mr. A. Fazlie Bruce, A.M.I.C.E., on "Salmon Passes."—Mr. Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting. 8.30 p.m.

THURSDAY, JANUARY 5.  
Parkes Museum. Dr. Angel Money on "Hygiene in Childhood." 6 p.m.

FRIDAY, JANUARY 6.  
Architectural Association.—Mr. A. Oliver on "Brasses of the Fourteenth and Fifteenth Centuries." 7.30 p.m.

#### Miscellaneous.

##### Registration of Plumbers in Scotland.

The monthly meeting of the District Council for Forfarshire, Perthshire, and Fifehire was held in the Town House, Dundee, on Saturday last. Ex-Provost Ballingall presided, and presented certificates of registration to several members of the trade. The secretary drew the attention of the Council to pamphlets which are being circulated in Scotland by a new organisation, which adopts the title of "The Scottish Society for Registration." This title, he remarked, seemed to be wider than the facts warranted, for the aim appeared to be to vest the control of the registration in the hands of four master plumbers, whereas the Ancient Guild of Plumbers of London, founded by Edward III. (commonly called the Worshipful Company of Plumbers), and not connected with any plumbers' societies or trade organisations, was recognised as the only examining and certifying body for the registration of plumbers for the United Kingdom, in conformity with the resolution of the Congress of Metropolitan and Provincial Plumbers, held in London in 1884. The certificates were granted to those who were not only qualified to superintend, but also practically to execute, all branches of the trade. The Council wished to direct the attention of plumbers as a body to the importance of loyally supporting the registration system under the Worshipful Company of Plumbers, that the trade might not become damaged by the action of unqualified men.—*Dundee Advertiser*.



**Schools, from an Architect's Point of View.**—At a recent meeting of the Worcester-shire Association of Church School Managers and Teachers, held at Worcester, the Sheriff (Mr. Ernest Day, architect and surveyor) read a paper on "Schools, from an Architect's Point of View." He said that a good plan for boys' and girls' schools might be carried out by providing a lofty central hall or schoolroom, communicating with class-rooms for boys on the ground-floor, and over these rooms class-rooms for girls communicating with a gallery running round the central hall, the girls of course having separate approaches, but so arranged that they might have access to the central hall to mass the whole school as occasion might require. This plan was on the lines of Sir Titus Salt's schools at Saltaire, but he thought it questionable if the Education Department would sanction such a scheme. In elementary school planning there were some essential points to keep in view. The site should be selected in as central a position as possible in the district where school accommodation was needed. It should if practicable be of ample size to afford good playgrounds and to secure plenty of light and a good circulation of air round the buildings for the purposes of ventilation. Good-sized, properly-paved play-grounds were very desirable in order that children might enjoy reasonable recreation, which added much to their physical strength and greatly augmented their mental faculties. The general arrangement of each school must depend upon the number and classes of children; if a mixed school, say, 325 scholars, then, he should apportion as follows:—allow for boys 171, girls 171, infants 280, and generally a provision of about one-third class accommodation for infants. In girls in each case, although where funds allowed he preferred providing a general room and class-room to accommodate respectively all the children in the boys' and girls' schools. The floor area should not be less than 10 ft. per child, except for infants, which would suffice at 8 ft., and the cubical air-space for each boy and girl should be 200 ft., and each infant 130 ft., although the Education Department would sanction a much lower standard.

**Water supply of Cheltenham**.—The *Cheltenham Examiner* says:—Some months ago reference was made in our columns and at meetings of the Town Council to a very misleading statement as to the character of the water supply of Cheltenham, made in the report of a committee appointed by the British Association "for the purpose of investigating . . . the quantity and character of the water supplied to various towns and districts" from the Permeable Formations of England. On attention being drawn to the report it was at once admitted that its reference to the water supply of Cheltenham was founded upon an error, into the origin of which it is not necessary now to inquire; but we are pleased to state that in a later report of the same committee just issued an ample *amende* for the error is made. We quote the paragraph referring to the subject at length:—

"Cheltenham Water Supply is derived from springs issuing at the base of the sands of the Inferior Oolite, which yield a water described by the Rivers Pollution Commission as 'palatable, wholesome, and pure.' The water is obtained from the springs at a softer than most spring waters from the same strata." Mr. McLeadsborough, C.E., the engineer to the Corporation, says that the water "is pure and is delivered on the constant system; he has seen the springs on the hills above the reservoirs since 1874, and has never found them fail. During the severe drought of 1880, the Corporation were obliged to draw the supply of the period gauged. The minimum yield of the spring was in December of 1881, when the reservoirs were nearly empty, and the Corporation were obliged to give a full supply if the drought had not been into the spring of 1882. In the Eleventh Report of your Committee, by a most unfortunate misprint, the reservoirs were said to be empty in the spring of 1881, and the word of 'short,' as reported by a correspondent, in which statement was obviously incorrect. Your Committee must have been under the impression that the Cheltenham Waterworks were in a state of disrepair, and that the Corporation should have been compelled to purchase water from the fully available of the ample supply and pure quality given to the town by the Corporation, the purity of which has been proved by the analysis of the water, by Messrs. Tidy and Tidy, and Professor Veolcker."

**Wilton Park, Beaconsfield, Bucks.**—The restoration of the mansion at Wilton Park, at Beaconsfield, Bucks, has been recently completed by Messrs. Bywaters, of King-street, London, under the direction of Mr. Arthur Vernon, architect. This important fabric, in the midst of one of the loveliest parks in the country, had been allowed to become greatly dilapidated during the present century, and a very large outlay has been incurred in the restoration of the mansion, stabling, and out-houses.

**Street Improvements at Chelmsford.**—The Chelmsford Local Board have recently carried out, under their Surveyor, Mr. Charles Pertwee, extensive street improvements in kerbing and tar-paving footways, the contractors for the kerbing being Messrs. Ringo & Nicholls, of Chelmsford. The kerb is of Hopton Wood and York stone, 12 in. by 4 in. and 12 in. by 5 in. The contractors for the tar-paving were Messrs. A. C. W. Hobman & Co., of London. Mr. James Maddocks, the Board's road foreman, has acted as clerk of works.

**Free Church, High Wycombe.**—A limited competition has been recently held for the erection of a new Free Church structure at High Wycombe, Bucks. Plans were submitted by Messrs. Paul & Bonella, of London; Mr. Wills, of Derby; Mr. Charles Carter, Great Marlow; Mr. Thos. Thurlow, High Wycombe; and Mr. Arthur Vernon, of High Wycombe. The design by the last-named competitor has been selected. The accommodation required is for 450 persons, and the intended outlay is £2,000.

**Artesian Wells.**—Messrs. C. Isler & Co. write to say that at Messrs. Seabrooke & Sons, Grays, Essex, an 127 ft. deep artesian bored tube well, including the lining of the same with 5 in. internal diameter pipes, was completed in less than a week, through chalk and flints, the rapidity with which this work was executed being attributed to their improved method of well boring. The same firm are at present engaged at Fulham on the new site of the premises of The Maltose Company Limited, fixing two 420 ft. artesian bored tube wells, from the designs and under the superintendence of Mr. Arthur Kinder.

**Burning of the "Grand" Theatre.**—Islington. —Early on Thursday morning, and only an hour or two after the building had been crammed with a large audience to witness the pantomime, the Grand Theatre at Islington was completely burnt down (at least, the greater part of it). The audience, who had gathered from the somewhat meagre reports to hand up to the time of our going to press.) Fortunately the few persons who were in the premises at the time were rescued, but eleven horses, in stables at the rear belonging to the London General Omnibus Company, were killed by a falling wall, and a young man was injured by the falling *adbris*. As to the cause of the fire, it is stated in an evening paper that "from investigations hurriedly made there is little doubt but that the fire broke out on the 'O.P.' side of the stage, a spark from one of the gas jets having probably been blown to some of the scenery and then been fanned into a flame by the back draught after the house was closed." The theatre was only built four years ago, on the site of the previously-existing "Philharmonic" Theatre (formerly a music hall), which was burnt down in September, 1882. The theatre now destroyed had a seating capacity for 3,000 persons, and was described at the time of its erection as of "fireproof (!) construction," and "planned in conformity with the requirements of the Metropolitan Board of Works." Mr. Frank Matcham was the architect.

**The New Junction Railway in North-West London.**—The new Junction Railway in North-West London, which is to be opened on Monday next, and which will have the effect of bringing into direct communication with each other the two principal railway systems of the country,—the London and North Western, and the Great Western lines,—consists of a short line about four miles in length, which leaves the Great Western main line about midway between the Ealing and Acton stations, and proceeding in a southeasterly direction, partly on embankment and partly in cutting, joins the North and South Western Railway near the Acton station of the line, the Great Western Company effecting, by that angular route, a communication with the London and North Western, and also with the North London Companies, at Willesden Junction. In its passage eastward the line runs almost parallel, on the north side, with Uxbridge Road, and High-street, Acton. The new route will place the whole of the North London system, both east and west of Dalston Junction, in immediate communication with the Great Western, and will also enable the last-named company to run their trains from Willesden Junction to Euston Station, as well as to Paddington, under agreement with the London and North Western Company.

**National Smoke Abatement Institution.**  
The annual meeting of the National Smoke Abatement Institution was held a few days since at the offices of the Institution, 2, Victoria Mansions, Westminster. Sir W. E. Pollock, in the chair. The report of the Council was read by the secretary, and the proposals submitted by the Council for the programme of the operations for next year were adopted. A series of meetings for the reading and discussion of papers dealing with the subjects of smoke prevention and fuel economy were arranged, and a conference will also be held at which sanitary inspectors and medical officers of health will be invited to attend, in order to compare the existing by-laws, which regulate the emission of smoke from chimneys, and to suggest a basis for further action with the object of bringing more prominently forward before the public the necessity for the amendment of the existing Smoke Nuisance Acts.

## PRICES CURRENT OF MATERIALS.

TBBB.		2. s. d.	2. s. d.
Greenheer, B.G.	ton	6 10	7 15
Tank, K.I.	load	0	12 10
Sequoia, U.S.	foot	0	13 0
Asb, Canada	foot	9 0	4 10
Birch	..	2 0	3 10
Elm	..	3 10	4 10
Fir, Dantsie, &c.	..	1 10	4 0
Oak	..	2 10	4 10
Canada	..	3 0	6 0
Pine, Canada, red	..	2 0	3 10
.. yellow	..	2 10	4 0
Lath, Dantsie	..fathom	3 0	5 0
St. Petersburg	..	4 0	5 10
Wainacot, Riga	..log	0 0	0 0
.. Odessa, crown	..	2 10	3 0
Deals, Finland, 2nd and 1st	..std.100	7 10	9 0
.. 4th and 3rd	..	6 0	8 0
Riga	..	10 0	7 10
St. Petersburg, 1st yellow	..	8 10	14 0
.. 2nd	..	7 0	8 0
.. white	..	6 10	8 0
Swedish	..	6 15	15 0
White Sea	..	7 0	16 10
Canada, Pine, 1st	..	16 0	24 0
.. 2nd	..	10 0	15 10
.. 3rd, &c.	..	7 0	9 10
.. Spruce, 1st	..	8 0	9 10
.. 3rd and 2nd	..	5 0	7 0
New Brunswick, &c.	..	5 0	7 0
Hattens, all kinds	..	4 0	10 10
Flooring Boards, sq., 1 in., prepared, First	..	5 9 0	0 11 8
Second	..	0 6 8	0 7 8
Other qualities	..	0 0	0 0
Cedar, Cuba	..	0 0	32 0
Honduras, &c.	..foot	0 0	3 0
Australian	..	0 0	2 0
Mahogany, Cuba	..	0 0	44 0
St. Domingo, cargo average	..	0 0	44 0
Mexican	..	0 0	32 0
Tobacco	..	0 0	4 0
Honduras	..	0 0	4 0
Maple, Bird's-eye	..	0 0	4 0
Rose, Rio	..	8 0	11 0
Bahia	..	7 0	9 0
Box, Turkey	..	5 0	12 0
Satin, St. Domingo	..foot	0 0	6 0
Fora Rice	..	0 0	6 0
Walnut, Italian	..	0 0	4 0

METALS.					
Iron—Bar, Welsh, in London.....	ton	0	0	0	0
" " do " " in Wales .....	do	0	0	0	0
" " Standard, London .....	do	0	0	0	0
Copper—					
British, cake and ingot .....	ton	0	0	0	0
Sest selected .....	do	0	0	0	0
Sheet, strong .....	do	0	0	0	0
Zinc, bars .....	84 lb	0	0	0	0
Yellow Metal.....lb.		0	0	0	0
Lead .....		0	0	0	0
Pg., Spanish ..... ton	15	10	15	15	0
English, common brands .....	15	15	15	17	8
Steel, English .....	16	16	17	0	0
Rail .....					
Silesian, special .....	ton	20	10	21	0
Ordinary brand .....	ton	20	0	20	10
Tin .....					
Strait .....	ton	167	19	0	0
Australian .....	ton	167	10	0	0
English ingots .....	ton	0	0	0	0
OILS.					
Lined .....	ton	19	2	6	8
Cocunut, Ceylon .....	ton	23	0	30	0
Palm .....	ton	23	5	8	0
Cayn, Lagos .....	ton	21	10	22	0
Fanned, Java .....	ton	20	0	0	0
" brown .....	ton	24	16	0	0
Cottonseed, refined .....	ton	19	10	0	0
Tallow and Oleine .....	ton	25	0	45	0
Lubricating U.S.A. ....	ton	5	0	5	0
" refined .....	ton	6	0	12	0
TURPENTINE.					
American, in casks .....	cwt.	1	s	o	o
Tar—					
Gloekholm .....	barril	0	15	0	0
Archangel .....	ton	0	10	0	0



## COMPETITIONS, CONTRACTS, &amp; PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

## COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Sketch Design for Shop Premises.....	Managers .....	5l. 5s. ....	Jan. 11th ..	ii.
New Schools, Guernsey .....	Managers .....	5l. ....	Jan. 31st ..	xix.

## CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Making-up Road .....	S. Hornsey Local Board	E. Fry .....	Jan. 4th ..	x.
Wood Paving .....	Hammermith Vestry...	Official .....	do. ....	ii.
Masons' and Paviers' Work, Wood Paving, &c.	Westminster B. of Wks	G. R. W. Wheeler .....	Jan 3 and 4 ..	x.
Repairs to Roadways .....	Met. Asylums Board ..	Official .....	Jan. 5th ..	x.
Road-Making and Paving Works .....	Hammermith Vestry...	do. ....	Jan. 9th ..	ii.
Repairs of Roads, Buildings, &c. ....	Met. Asylums Board ..	Pennington & Bridgen...	do. ....	x.
Pipe-Sewers, &c. ....	Willenden Local Board	O. Claude Robson .....	Jan. 10th ..	xix.
Kerling, Tarpaving, &c. ....	Lewisham Bd. of Wks.	Official .....	do. ....	ii.
(1) Formation of Footpath. (2) Iron Hurdles.	Met. Est. Paving Com.	do. ....	Jan. 11th ..	x.
Removal of Dust, &c. ....	St. Marylebone Vestry	do. ....	Jan. 12th ..	x.
Works and Materials .....	do. ....	do. ....	do. ....	x.
Breeze, Ashes, and Dusting .....	do. ....	do. ....	do. ....	x.
Carting away Slop and Sweepings .....	do. ....	do. ....	do. ....	x.
Watering Streets and Roads .....	do. ....	do. ....	do. ....	x.
Road Materials .....	do. ....	do. ....	do. ....	x.
Repairs, &c. ....	St. Pancras Guardians	do. ....	do. ....	x.
Main Sewerage Works .....	Billesdon U.R.S.A. ....	J. B. Everard .....	Jan. 15th ..	ii.
Pumping Station .....	Edmonton Local Board	G. E. Eachus .....	Jan. 20th ..	ii.
Works and Materials .....	Hackney Board of Wks	J. Lovegrove .....	Jan. 24th ..	x.
Construction of Aqueduct .....	Manchester Cor. Works	G. H. Hill .....	Jan. 25th ..	x.
Works and Materials .....	Liverpool Corporation	Official .....	Feb. 14th ..	x.
			Not stated ..	x.

## PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Barorough Surveyors .....	Barnley Cor. ....	350l. ....	Jan. 7th ..	xvi.
District Surveyors .....	Met. Board of Works ..	Not stated ..	Jan. 11th ..	xvi.
Clerk of Works .....	Billesdon U.R.S.A. ....	2l. 10s. weekly ..	Jan. 13th ..	xvi.
Assistant Surveyor .....	Roigate Town Council ..	80l. ....	Jan. 17th ..	xvi.

## TENDERS.

[Communications for insertion under this heading must reach us not later than 12 Noon on Thursdays.]

KENSAL GREEN.—For alterations and additions to the Tavistock Farm Dairy, for Mr. E. A. Peters. No quantities.—	
G. Bowles .....	£485 0 0
W. Pevor .....	290 0 0
F. T. Chinchon (accepted) .....	260 0 0

WAPPING.—For the erection of a warehouse, Granite Wharf, Mr. H. Alexander, architect, 72, Cannon-street, E.C. Quantities by Mr. E. A. B. Crockett, 6, Poultry, E.C.—

Lunn .....	£1,855 0 0
H. T. Greenwood .....	1,537 0 0
B. E. Nighingale .....	1,510 0 0
Outhwaite & Son .....	1,483 0 0

WILLESDEN.—For completing two residences, Craven-park, Willenden. Mr. Walter Hall, surveyor, 38, Chancery-lane—

F. T. Chinchon .....	£652 0 0
F. J. Wicks .....	586 0 0
G. S. Archer .....	560 0 0
J. Maling .....	549 0 0
E. Snooks .....	520 0 0
J. Parfit .....	519 0 0
J. Sharp .....	510 0 0
C. A. Sexton .....	490 0 0
Talbot .....	485 0 0
J. M. Goodwin .....	483 0 0
G. Baines .....	475 0 0
W. & G. Jenkins .....	390 0 0
Burling & Wood (accepted) .....	227 0 0

WALWORTH.—For laying down a new wood carriage-way and York stone footways, and executing other works in connexion therewith, for the purposes of the Walworth-road improvement, for the Metropolitan Board of Works. Sir J. W. Battey, engineer:—

C. Dickinson .....	£2,300 0 0
J. Mowlem & Co. ....	2,074 0 0
Stubbs .....	2,013 0 0
Turner & Sons .....	1,906 0 0
Hindle & Morrish .....	1,848 0 0
Briggs (accepted conditionally) .....	1,814 0 0

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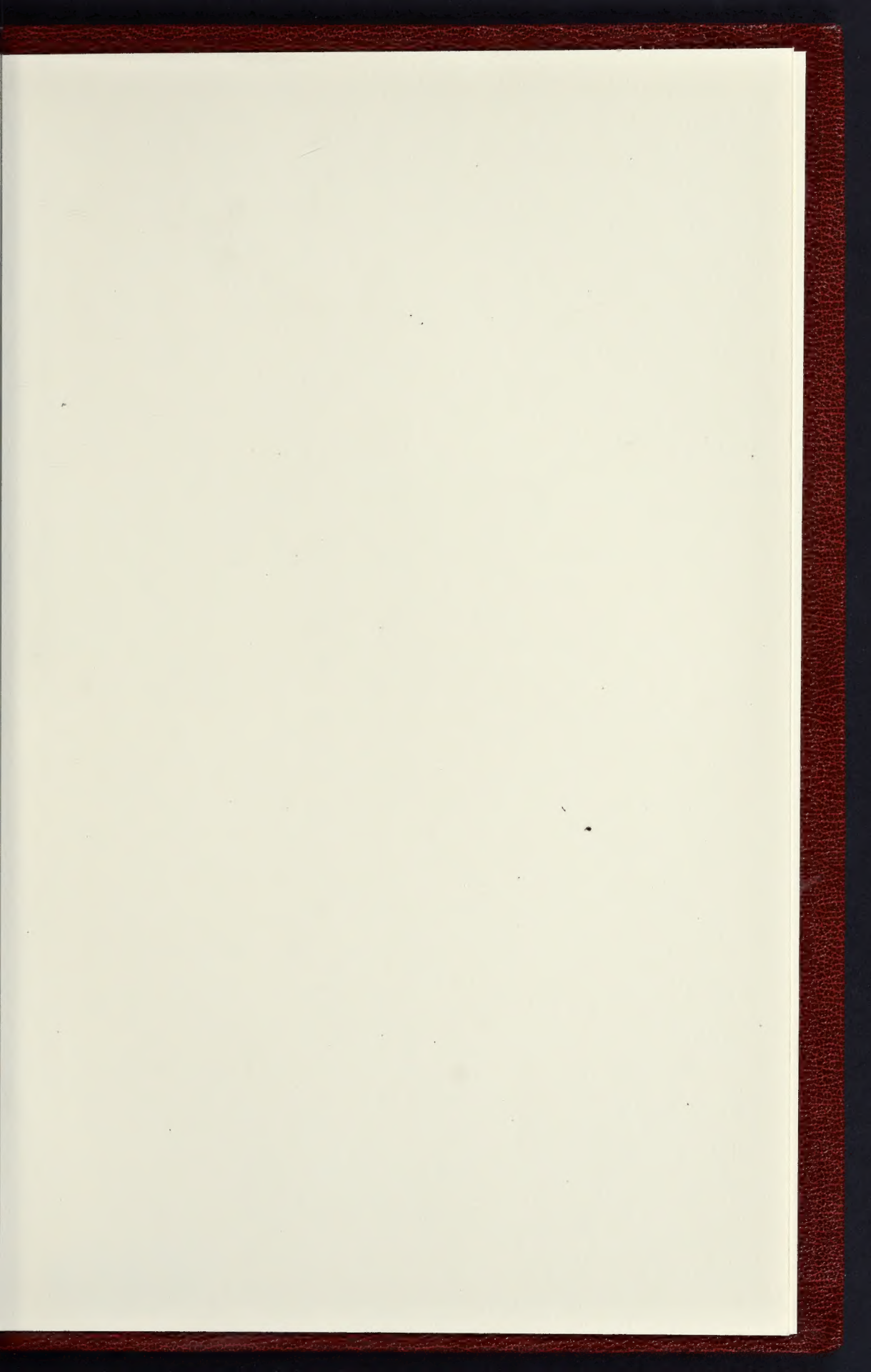
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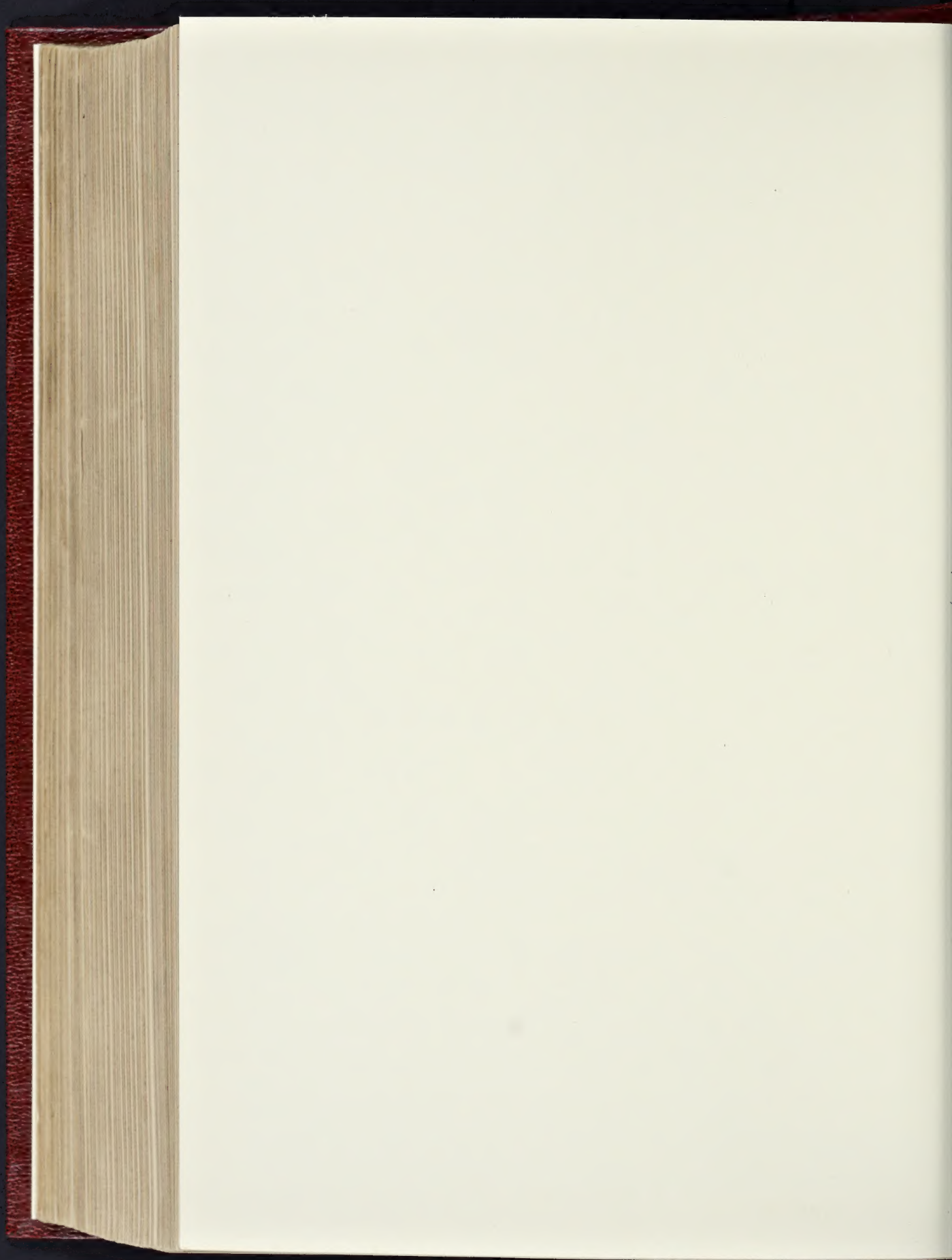
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